APPENDIX A

Quality Assurance Standards for Convicted Offender DNA Databasing Laboratories

Quality Assurance Standards for Convicted Offender DNA Databasing Laboratories

PREFACE

Throughout its deliberation concerning these quality standards, the DNA Advisory Board recognized the need for a mechanism to ensure compliance with the standards. An underlying premise for these discussions was that accreditation would be required to demonstrate compliance with the standards and therefore assure quality control and a quality program. Accordingly, the Board recommends that forensic laboratories performing DNA analysis seek such accreditation with all deliberate speed. Additionally, the Board strongly encourages the accrediting bodies to begin positioning themselves to accommodate the increasing demand for accreditation.

INTRODUCTION

Forensic DNA identification analysis currently involves forensic casework and convicted offender analyses. These complementary functions demand adherence to the highest analytical standards possible to protect both public safety and individual rights. Separate standards have been drafted for laboratories performing these functions. This separation is an acknowledgment of the differences in the nature or type of sample, the typical sample quantity and potential for reanalysis, and specialization that may exist in a laboratory. Standards for convicted offender laboratories, in some instances, are less stringent than for those performing forensic casework analyses, but in no case should the two documents be interpreted as conflicting.

This document consists of definitions and standards. The standards are quality assurance measures that place specific requirements on the laboratory. Equivalent measures not outlined in this document may also meet the standard if determined sufficient through an accreditation process.

MECHANISM TO RECOMMEND CHANGES TO STANDARDS

Once the Director of the Federal Bureau of Investigation (FBI) has issued standards for quality assurance for convicted offender DNA testing, the DNA Advisory Board may recommend revisions to such standards to the FBI Director, as necessary. In the event that the duration of the DNA Advisory Board is extended beyond March 10, 2000, by the FBI Director, the Board may continue to recommend revisions to such standards to the FBI Director. In the event that the DNA Advisory Board is not extended by the FBI Director after March 10, 2000, the Technical Working Group on DNA Analysis Methods (TWGDAM) may recommend revisions to such standards to the FBI Director, as necessary.

EFFECTIVE DATE

These *Quality Assurance Standards for Convicted Offender DNA Databasing Laboratories* take effect April 1, 1999.

REFERENCES:

American Society of Crime Laboratory Directors-Laboratory Accreditation Board (ASCLD-LAB), *ASCLD-LAB Accreditation Manual*, January 1994, and January, 1997.

Federal Bureau of Investigation, *Quality Assurance Standards for Forensic DNA Testing Laboratories,* (1998)

International Standards Organization (ISO)/International Electrotechnical Commission (IEC), *ISO/IEC Guide 25-1990*, (1990) American National Standards Institute, New York, NY.

Technical Working Group on DNA Analysis Methods, "Guidelines for a Quality Assurance Program for DNA Analysis," *Crime Laboratory Digest*, April 1995, Volume 22, Number 2, pp. 21-43.

42 Code of Federal Regulations, Chapter IV (10-1-95 Edition), Health Care Financing Administration, Health and Human Services.

1. SCOPE

The standards describe the quality assurance requirements that a government laboratory which is defined as a facility in which convicted offender DNA testing is regularly performed should follow to ensure the quality and integrity of the data and competency of the laboratory. These standards do not preclude the participation of a laboratory, by itself or in collaboration with others, in research and development, on procedures that have not yet been validated.

2. DEFINITIONS

As used in these standards, the following terms shall have the meanings specified:

(a) Administrative review is an evaluation of the documentation for consistency with laboratory policies and for editorial correctness.

(b) Amplification blank control consists of only amplification reagents without the addition of sample DNA. This control is used to detect DNA contamination of the amplification reagents.

(c) Analytical procedure is an orderly step-by-step procedure designed to ensure operational uniformity and to minimize analytical drift.

(d) Audit is an inspection used to evaluate, confirm, or verify activity related to quality.

(e) Batch is a group of samples analyzed at the same time.

(f) Calibration is the set of operations which establish, under specified conditions, the relationship between values indicated by a measuring instrument or measuring system or values represented by a material and the corresponding known values of a measurement.

(g) CODIS is the Combined DNA Index System administered by the FBI. It houses DNA profiles from convicted offenders, forensic specimens, population samples and other specimen types.

(h) Commercial test kit is a preassembled kit that allows the user to conduct a specific DNA identification test.

(i) Convicted offender is an individual who is required by statute to submit a standard sample for DNA databasing.

(j) Convicted offender database (CODIS) manager or custodian (or equivalent role, position, or title as designated by the laboratory director) is the person responsible for administration and security of the laboratory's CODIS.

(k) Convicted offender standard sample is biological material collected from an individual for DNA analysis and inclusion into CODIS. See also database sample.

(l) Critical equipment or instruments are those requiring calibration prior to use and periodically thereafter.

(m) Critical reagents are determined by empirical studies or routine practice to require testing on established samples before use in order to prevent unnecessary loss of sample.

(n) Database sample is a known blood or standard sample obtained from an individual whose DNA profile will be included in a computerized database and searched against other DNA profiles.

(o) Examiner/analyst (or equivalent role, position, or title as designated by the laboratory director) is an individual who conducts and/or directs the analysis of samples, interprets data and reaches conclusions.

(p) Known samples are biological material whose identity or type is established.

(q) Laboratory is a government facility in which convicted offender DNA testing is performed or a government facility who contracts with a second entity for such testing.

(r) Laboratory support personnel (or equivalent role, position, or title as designated by the laboratory director) are individual(s) who perform laboratory duties and do not analyze samples.

(s) NIST is the National Institute of Standards and Technology.

(t) Polymerase Chain Reaction (PCR) is an enzymatic process by which a specific region of DNA is replicated during repetitive cycles which consist of (1) denaturation of the template; (2) annealing of primers to complementary sequences at an empirically determined temperature; and (3) extension of the bound primers by a DNA polymerase.

(u) Proficiency test sample is biological material whose DNA type has been previously characterized and which is used to monitor the quality performance of a laboratory or an individual.

(v) Proficiency testing is a quality assurance measure used to monitor performance and identify areas in which improvement may be needed. Proficiency tests may be classified as:

(1) Internal proficiency test is one prepared and administered by the laboratory.

(2) External proficiency test, which may be open or blind, is one which is obtained from a second agency.

(w) A Qualifying test measures proficiency in both technical skills and knowledge.

(x) Quality assurance includes the systematic actions necessary to demonstrate that a product or service meets specified requirements for quality.

(y) A quality manual is a document stating the quality policy, quality system and quality practices of an organization.

(z) Quality system is the organizational structure, responsibilities, procedures, processes and resources for implementing quality management.

(aa) Reagent blank control consists of all reagents used in the test process without any sample. This is to be used to detect DNA contamination of the analytical reagents.

(bb) Reference material (certified or standard) is a material for which values are certified by a technically valid procedure and accompanied by or traceable to a certificate or other documentation which is issued by a certifying body.

(cc) Restriction Fragment Length Polymorphism (RFLP) is generated by cleavage by a specific

restriction enzyme and the variation is due to restriction site polymorphism and/or the number of different repeats contained within the fragments.

(dd) Review is an evaluation of documentation to check for consistency, accuracy, and completeness.

(ee) Second agency is an entity or organization external to and independent of the laboratory and which performs DNA identification analysis.

(ff) Secure area is a locked space (for example, cabinet, vault or room) with access restricted to authorized personnel.

(gg) Subcontractor is an individual or entity having a transactional relationship with a laboratory.

(hh) Technical manager or leader (or equivalent position or title as designated by the laboratory director) is the individual who is accountable for the technical operations of the laboratory.

(ii) Technical review is an evaluation of reports, notes, data, and other documents to ensure an appropriate and sufficient basis for the scientific conclusions. This review is conducted by a second qualified individual.

(jj) Technician (or equivalent role, position, or title as designated by the laboratory director) is an individual who performs analytical techniques on samples under the supervision of a qualified examiner/analyst and/or performs DNA analysis on samples for inclusion in a database.

(kk) Traceability is the property of a result of a measurement whereby it can be related to appropriate standards, generally international or national standards, through an unbroken chain of comparisons.

(ll) Validation is a process by which a procedure is evaluated to determine its efficacy and reliability for DNA analysis and includes:

(1) Developmental validation is the acquisition of test data and determination of conditions and limitations of a new or novel DNA methodology for use on samples.

(2) Internal validation is an accumulation of test data within the laboratory to demonstrate that established methods and procedures perform as expected in the laboratory.

3. QUALITY ASSURANCE PROGRAM

STANDARD 3.1 The laboratory shall establish and maintain a documented quality system that is appropriate to the testing activities.

3.1.1 The quality manual shall address at a minimum:

(a) Goals and objectives
(b) Organization and management
(c) Personnel qualifications and training
(d) Facilities
(e) Sample control
(f) Validation
(g) Analytical procedures
(h) Calibration and maintenance
(i) Proficiency testing
(j) Corrective action
(k) Documentation
(l) Review
(m) Safety
(n) Audits

4. ORGANIZATION AND MANAGEMENT

STANDARD 4.1 The laboratory shall:

(a) have a managerial staff with the authority and resources needed to discharge their duties and meet the requirements of the standards in this document.
(b) have a technical manager or leader who is accountable for the technical operations.
(c) have a CODIS manager or custodian who is accountable for CODIS operations.
(d) specify and document the responsibility, authority, and interrelation of all personnel who manage, perform or verify work affecting the validity of the DNA analysis.

5. PERSONNEL

STANDARD 5.1 Laboratory personnel shall have the education, training and experience commensurate with the examination and testimony provided. The laboratory shall:

5.1.1 have a written job description for personnel to include responsibilities, duties and skills.

5.1.2 have a documented training program for qualifying all technical laboratory personnel.

5.1.3 have a documented program to ensure technical qualifications are maintained through continuing education.

5.1.3.1 Continuing education - the technical manager or leader, CODIS manager or custodian, and examiner/analyst(s) must stay abreast of developments within the field of DNA typing by reading current scientific literature and by attending seminars, courses, professional meetings or documented training sessions/classes in relevant subject areas at least once a year.

5.1.4 maintain records on the relevant qualifications, training, skills and experience of the technical personnel.

STANDARD 5.2 The technical manager or leader shall have the following:

5.2.1 Degree requirements: The technical manager or leader of a laboratory shall have, at a minimum, a Master's degree in biology-, chemistry-, or forensic science-related area and successfully completed a minimum of 12 semester or equivalent credit hours of a combination of undergraduate and graduate course work covering the subject areas of biochemistry, genetics and molecular biology (molecular genetics, recombinant DNA technology), or other subjects which provide a basic understanding of the foundation of forensic DNA analysis, as well as statistics and/or population genetics as it applies to forensic DNA analysis.

5.2.1.1 The degree requirements of section 5.2.1 may be waived by the American Society of Crime Laboratory Directors (ASCLD) or other organizations designated by the Director of the FBI in accordance with criteria approved by the Director of the FBI. This waiver shall be available for a period of two years from the effective date of the standards. The waiver shall be permanent and portable.

5.2.2 Experience requirements: A technical manager or leader of a laboratory shall have a minimum of three years of relevant problem solving or related analytical laboratory experience.

5.2.3 Duty requirements:

5.2.3.1 General: manages the technical operations of the laboratory.

5.2.3.2 Specific duties:

(a) Is responsible for evaluating all methods used by the laboratory and for proposing new or modified analytical procedures to be used by examiners.

(b) Is responsible for technical problem solving of analytical methods and for the oversight of training, quality assurance, safety and proficiency testing in the laboratory.

5.2.3.3 The technical manager or leader shall be accessible to the laboratory to provide on-site, telephone or electronic consultation as needed.

STANDARD 5.3 CODIS manager or custodian shall have the following:

5.3.1 Degree requirements: A CODIS manager or custodian shall have, at a minimum, a Bachelor's degree in a natural science or computer science.

5.3.2 Experience requirements: A CODIS manager or custodian shall have a working knowledge of computers, computer networks, and computer database management, with an understanding of DNA profile interpretation.

5.3.3 Duty requirements:

(a) Is the system administrator of the laboratory's CODIS network and is responsible for the security of DNA profile data stored in CODIS.

(b) Is responsible for oversight of CODIS computer training and quality assurance of data.

(c) Has the authority to terminate the laboratory's participation in CODIS in the event of a problem until the reliability of the computer data can be assured. The state CODIS

manager or custodian has this authority over all CODIS sites under his/her jurisdiction.

STANDARD 5.4 Examiner/analyst shall have the following:

5.4.1 Degree requirements: An examiner/analyst shall have, at a minimum, a Bachelors degree or its equivalent degree in biology-, chemistry-, or forensic science-related area and must have successfully completed college course work (graduate or undergraduate level) covering the subject areas of biochemistry, genetics and molecular biology (molecular genetics, recombinant DNA technology) or other subjects which provide a basic understanding of the foundation of forensic DNA analysis, as well as course work and/or training in statistics and population genetics as it applies to forensic DNA analysis.

5.4.2 Experience requirements: An examiner/analyst shall have a minimum of six (6) months of DNA laboratory experience, including the successful analysis of a range of samples typically encountered in convicted offender analysis prior to independent work using DNA technology.

5.4.3 An examiner/analyst shall have successfully completed a qualifying test before beginning independent work responsibilities.

STANDARD 5.5 Technician shall have:

5.5.1 on-the-job training specific to their job function(s).

5.5.2 successfully completed a qualifying test before participating in DNA typing responsibilities.

STANDARD 5.6 Laboratory support personnel shall have:

5.6.1 training, education and experience commensurate with their responsibilities as outlined in their job description.

6. FACILITIES

STANDARD 6.1 The laboratory shall have a facility that is designed to provide adequate security and minimize contamination. The laboratory shall ensure that:

6.1.1 Access to the laboratory is controlled and limited.

6.1.2 Prior to PCR amplification, evidence examinations, liquid sample examinations, DNA extractions, and PCR setup are conducted at separate times or in separate spaces.

6.1.3 Amplified DNA product is generated, processed and maintained in a room(s) separate from the evidence examination, liquid blood examinations, DNA extractions and PCR setup areas.

6.1.4 A robotic work station may be used to carry out DNA extraction and amplification in a single room, provided it can be demonstrated that contamination is minimized and equivalent to that when performed manually in separate rooms.

6.1.5 The laboratory follows written procedures for monitoring, cleaning and decontaminating facilities and equipment.

7. SAMPLE CONTROL

STANDARD 7.1 The laboratory shall have and follow a documented sample inventory control system. This system shall ensure that:

7.1.1 Offender samples are marked for identification.

7.1.2 Documentation of sample identity, collection, receipt, storage, and disposition is maintained.

7.1.3 The laboratory follows documented procedures that minimize sample loss, contamination, and/or deleterious change.

7.1.4 The laboratory has secure areas for sample storage including environmental control consistent with the form or nature of the sample.

8. VALIDATION

STANDARD 8.1 The laboratory shall use validated methods and procedures for DNA analyses.

8.1.1 Developmental validation that is conducted shall be appropriately documented.

8.1.2 Novel database DNA methodologies shall undergo developmental validation to ensure the accuracy, precision and reproducibility of the procedure.

8.1.2.1 Documentation shall be available which defines and characterizes the locus.

8.1.3 Internal validation shall be performed and documented by the laboratory.

8.1.3.1 The procedure shall be tested using known samples. The laboratory shall monitor and document the reproducibility and precision of the procedure using human DNA control(s).

8.1.3.2 Before the introduction of a procedure into database sample analysis, the analyst or examination team shall successfully complete a qualifying test.

8.1.3.3 Material modifications made to analytical procedures shall be documented and subject to validation testing.

9. ANALYTICAL PROCEDURES

STANDARD 9.1 The laboratory shall have and follow written analytical procedures approved by the laboratory management/technical manager.

9.1.1 The laboratory shall have a standard operating protocol for each analytical technique used.

9.1.2 The procedures shall include reagents, sample preparation, extraction, equipment and controls which are standard for DNA analysis and data interpretation.

STANDARD 9.2 The laboratory shall use reagents that are suitable for the methods employed.

9.2.1 The laboratory shall have written procedures for documenting commercial supplies and for the formulation of reagents.

9.2.2 Reagents shall be labeled with the identity of the reagent, the date of preparation and expiration, and the identity of the individual preparing the reagent.

9.2.3 The laboratory shall identify critical reagents, if any, and evaluate them prior to use.

STANDARD 9.3 The laboratory shall monitor the analytical procedures using appropriate controls and standards.

9.3.1 The following controls shall be used in RFLP analysis:

9.3.1.1 When required by the analytical procedure, standards for estimating the amount of DNA recovered by extraction shall be used.

9.3.1.2 K562 as a human DNA control.

9.3.1.3 Molecular weight size markers to bracket samples on an analytical gel. No more than five lanes shall exist between marker lanes.

9.3.1.4 A procedure shall be available to monitor the completeness of restriction enzyme digestion. Interpretation of the autorad/lumigraph is the ultimate method of assessment but a test gel or other method may be used as necessary.

9.3.2 The following controls shall be used for PCR database analysis:

9.3.2.1 When required by the analytical procedure, standards which estimate the amount of human nuclear DNA recovered by extraction shall be used.

9.3.2.2 Positive and negative amplification controls.

9.3.2.3 Contamination controls.

9.3.2.3.1 Samples extracted prior to the effective date of these standards without reagent blanks are acceptable as long as other samples analyzed in the batch do not demonstrate contamination.

9.3.2.4 Allelic ladders for variable number tandem repeat sequence PCR-based systems.

STANDARD 9.4 The laboratory shall check its DNA procedures annually or whenever substantial changes are made to the protocol(s) against an appropriate and available NIST standard reference material or standard traceable to a NIST standard.

STANDARD 9.5 The laboratory shall have and follow written general guidelines for the interpretation of data.

9.5.1 The laboratory shall verify that all control results are within established tolerance limits.

10. EQUIPMENT CALIBRATION AND MAINTENANCE

STANDARD 10.1 The laboratory shall use equipment suitable for the methods employed.

STANDARD 10.2 The laboratory shall identify critical equipment and shall have a documented program for calibration of instruments and equipment.

10.2.1 Where available and appropriate, standards traceable to national or international standards shall be used for calibration.

10.2.1.1 Where traceability to national standards of measurement is not applicable, the laboratory shall provide satisfactory evidence of correlation of results.

10.2.2 The frequency of the calibration shall be documented for each instrument requiring calibration. Such documentation shall be retained in accordance with federal or state law.

STANDARD 10.3 The laboratory shall have and follow a documented program to ensure that

instruments and equipment are properly maintained.

10.3.1 New critical instruments and equipment, or critical instruments and equipment that have undergone repair or maintenance, shall be calibrated before use.

10.3.2 Written records or logs shall be maintained for maintenance service performed on instruments and equipment. Such documentation shall be retained in accordance with federal or state law.

11. REPORTS

STANDARD 11.1 The laboratory shall have and follow written procedures for generating and maintaining documentation for database samples.

11.1.1 The laboratory shall have written procedures for the release of database sample information.

12. REVIEW

STANDARD 12.1 The laboratory shall have and follow written procedures for reviewing database sample information, results, and matches.

12.1.1 The laboratory shall have a mechanism in place to address unresolved discrepant conclusions between analysts and reviewer(s).

STANDARD 12.2 The laboratory shall have and follow a program that documents the annual monitoring of the testimony of laboratory personnel.

13. PROFICIENCY TESTING

STANDARD 13.1 Examiners and other personnel designated by the technical manager or leader who are actively engaged in DNA analysis shall undergo, at regular intervals of not to exceed 180 days, external proficiency testing in accordance with these standards. Such external proficiency testing shall be an open proficiency testing program.

13.1.1 The laboratory shall maintain the following records for proficiency tests:

(a) The test set identifier.

(b) Identity of the examiner.

(c) Date of analysis and completion.
(d) Copies of all data and notes supporting the conclusions.
(e) The proficiency test results.
(f) Any discrepancies noted.
(g) Corrective actions taken.

Such documentation shall be retained in accordance with applicable federal or state law.

13.1.2 The laboratory shall establish at a minimum the following criteria for evaluation of proficiency tests:

(a) All reported inclusions are correct or incorrect.
(b) All reported exclusions are correct or incorrect.
(c) All reported genotypes and/or phenotypes are correct or incorrect according to consensus genotypes/phenotypes or within established empirically determined ranges.
(d) All results reported as inconclusive or uninterpretable are consistent with written laboratory guidelines. The basis for inconclusive interpretations in proficiency tests must be documented.
(e) All discrepancies/errors and subsequent corrective actions must be documented.
(f) All final reports are graded as satisfactory or unsatisfactory. A satisfactory grade is attained when there are no analytical errors for the DNA profile typing data. Administrative errors shall be documented and corrective actions taken to minimize the error in the future.
(g) All proficiency test participants shall be informed of the final test results.

14. CORRECTIVE ACTION

STANDARD 14.1 The laboratory shall establish and follow procedures for corrective action whenever proficiency testing discrepancies and/or analytical errors are detected.

14.1.1 The laboratory shall maintain documentation for the corrective action. Such documentation shall be retained in accordance with federal or state law.

15. AUDITS

STANDARD 15.1 The laboratory shall conduct audits annually in accordance with the

standards outlined herein.

15.1.1 Audit procedures shall address at a minimum:

(a) Quality assurance program
(b) Organization and management
(c) Personnel
(d) Facilities
(e) Sample control
(f) Validation
(g) Analytical procedures
(h) Calibration and maintenance
(i) Proficiency testing
(j) Corrective action
(k) Documentation
(l) Review
(m) Safety
(n) Previous audits

15.1.2 The laboratory shall retain all documentation pertaining to audits in accordance with relevant legal and agency requirements.

STANDARD 15.2 Once every two years, a second agency shall participate in the annual audit.

16. SAFETY

STANDARD 16.1 The laboratory shall have and follow a documented environmental health and safety program.

17. SUBCONTRACTOR OF ANALYTICAL TESTING FOR WHICH VALIDATED PROCEDURES EXIST

STANDARD 17.1 A laboratory operating under the scope of these standards will require certification of compliance with these standards when a subcontractor performs convicted offender DNA analyses for the laboratory.

17.1.1 The laboratory will establish and use appropriate review procedures to verify the integrity of the data received from the subcontractor including but not limited to:

(a) Random reanalysis of samples.
(b) Visual inspection and evaluation of results/data.
(c) Inclusion of QC samples.
(d) On-site visits.

APPENDIX B

NDIS Standards for Acceptance of DNA Data

National DNA Index System (NDIS)

NDIS STANDARDS FOR ACCEPTANCE OF DNA DATA

January 11, 2000

Send comments to Dr. Barry Brown, FBI Laboratory, GRB 3R, 935 Pennsylvania Avenue, Northwest, Washington, D. C. 20535-0001, (202) 324-1337. FAX (202) 324-1276

NDIS STANDARDS FOR ACCEPTANCE OF DNA DATA

Purpose

The concept for utilizing DNA profiles for forensic analysis was proposed by the Technical Working Group for DNA Analysis (TWGDAM), as described by Kirby (1990)[1]. The Federal Bureau of Investigation Laboratory initiated development of the COmbined DNA Index System, (CODIS), which contains separate files or indexes of DNA profile information. The main files in use at the local and state level are forensic and convicted offender. The DNA profiles in CODIS are used for law enforcement purposes only, and access is limited to criminal justice agencies performing DNA analysis (DNA Identification Act of 1994. 42 U.S.C. §14132). CODIS facilitates comparisons of DNA records to generate investigative leads. CODIS also provides functionality for use in assessing the statistical significance of a forensic DNA match.

The National DNA Index System (NDIS) is intended to be a single central repository of DNA records. These DNA records will be locally generated by NDIS participating laboratories in the United States. The centralized repository of DNA records will be used to generate investigative leads. System-wide standards have been established thereby ensuring that only reliable and compatible DNA profiles are contained in the NDIS files.

This document provides the NDIS standards for acceptance of DNA profiles. This version governs DNA data generated by Restriction Fragment Length Polymorphism (RFLP) and for Polymerase Chain Reaction (PCR) based methods.

CHANGES IN THE NDIS STANDARDS FOR ACCEPTANCE OF DNA DATA

From time to time, changes to the NDIS STANDARDS FOR ACCEPTANCE OF DNA DATA (NDIS STANDARDS), may be issued. Changes to the NDIS STANDARDS are to be posted on the FBI Web page (fbi.gov). These changes shall be promptly instituted by NDIS participating laboratories upon notification of the changes. Any laboratory recommending a change to the NDIS STANDARDS shall contact the NDIS Custodian, in writing. This communication should include the name of a contact person and telephone number, as well as a description of the proposed change and the reasons supporting the need for such a change. After review of such request, the NDIS Custodian shall notify the NDIS participating laboratory of his/her determination.

NDIS shall accept a DNA profile after it is determined to be compliant with the NDIS STANDARDS in effect at the time the DNA profile was derived or compliant with the standards that are in place at the time the DNA profile is offered. For example, a "new" molecular weight size marker may be added to the list of acceptable molecular weight size markers. Any DNA profiles offered but previously rejected solely as a result of the use of the previously unrecognized molecular weight size marker shall be accepted after the NDIS STANDARDS are revised to include the "new" molecular weight size marker.

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[1]The Combined DNA Index System (CODIS): A Theoretical Model, Appendix II, from DNA Fingerprinting, An Introduction, Kirby, L. T., 1990, Stockton Press, New York.

Laboratory Procedures and Practices

All DNA profiles offered to NDIS by NDIS participating laboratories shall be produced in accordance with the Quality Assurance Standards, as required in the DNA Identification Act of 1994. The Quality Assurance Standards for Forensic DNA Testing Laboratories were approved by the Director of the FBI and became effective October 1, 1998. The Quality Assurance Standards for Convicted Offender DNA Databasing Laboratories, also approved by the Director of the FBI, became effective April 1, 1999. These Quality Assurance Standards supersede the quality assurance guide lines adopted by TWGDAM, entitled "Guidelines for a Quality Assurance Program for DNA Analysis[2]" (TWGDAM Guidelines).

Restriction Fragment Length Polymorphism Section

Protocol for RFLP

1. The laboratory shall demonstrate that it continues to use a protocol that produces NDIS-compatible DNA results by analysis of the K562 human DNA control (American Type Culture Center, [ATCC], registered cell line). The K562 human DNA control shall be run on every RFLP electrophoretic analytical gel that exhibits a DNA profile offered to NDIS. The protocol is acceptable as long as the K562 human DNA control measurements are routinely within NDIS tolerances.

2. The restriction enzyme shall be *Hae III*.

3. Only DNA profiles derived by applying DNA probes to loci listed on the "List of NDIS Accepted Loci" shall be accepted by NDIS.

4. Derivation of base pair values shall be obtained using computer software approved by the Federal Bureau of Investigation.

Changes to the RFLP Protocols

1. A laboratory that changes its protocol shall not use the modified protocol in the analysis of specimens that are intended for submission to NDIS until the laboratory demonstrates that the modified protocol produces NDIS-compatible results.

2. The use of a protocol that does not achieve K562 human DNA control measurements within NDIS established tolerances shall be discontinued.

3. At the request of NDIS, a laboratory shall demonstrate the reliability of data generated by the proposed protocol.

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[2]Guidelines for a Quality Assurance Program for DNA RFLP Analysis, Crime Laboratory Digest, April-July 1989, Vol. 16 (2), pp. 40-59; Guidelines for a Quality Assurance Program for DNA Analysis, Crime Laboratory Digest, April 1991, Vol 18 (2), pp. 44-75; and Guidelines for a Quality Assurance Program for DNA Analysis, Crime Laboratory Digest, April 1995, Vol. 22 (2), pp. 21-43.

Molecular Weight Size Marker (MWSM)

1. An MWSM from the list of acceptable MWSMs shall be run on each gel that exhibits a DNA profile that is submitted to NDIS.

2. All MWSMs, specimens and K562 human DNA control(s) shall be of sufficient clarity and intensity within the relevant measurement area of the gel so that meaningful measurements can be made.

3. No more than five (5) lanes shall be between any two MWSMs.

4. The MWSM lanes shall contain only MWSM.

5. The addition of a"new MWSM" to the list of acceptable MWSMs shall be made by NDIS only after data presented to NDIS demonstrates that the "new MWSM" shall generate NDIS-compatible results.

K562 Human DNA Control

1. The K562 human DNA control shall be on each analytical electrophoretic gel that exhibits a DNA profile submitted to NDIS.

2. Each NDIS subscribing laboratory shall request approval, in writing, from the NDIS Custodian, for established K562 human DNA control tolerances to be used by the NDIS subscribing laboratory. Once approved by the NDIS Custodian, such K562 human DNA control tolerances shall be accepted by NDIS.

3. K562 human DNA control measurements submitted to NDIS shall be within each subscribing laboratory's approved K562 human DNA control tolerances. K562 human DNA control measurements outside acceptable tolerances shall result in the rejection of all associated DNA profiles submitted from that analytical electrophoretic gel, at that locus.

4. Any NDIS subscribing laboratories seeking to change established tolerances shall request of the NDIS Custodian, in writing, approval of the new tolerances for associated DNA profiles to be accepted by NDIS, and the reason(s) for seeking to change established tolerances.

5. Any human DNA controls other than K562 included in a DNA analysis shall not be evaluated by NDIS (except as may be described elsewhere in this document). All sized K562 human DNA control measurements shall be evaluated before DNA results from any specimens are accepted by NDIS (for either use or inclusion in NDIS files).

6. As per Table 1, the NDIS Custodian shall calculate and record K562 human DNA controls for quality assurance as defined according to the following function:

$$\frac{\left(\frac{X-\overline{X}}{SD_x}\right)^2 - \left(\frac{Y-\overline{Y}}{SD_y}\right)^2 - 2R\left(\frac{X-\overline{X}}{SD_x}\right)\left(\frac{Y-\overline{Y}}{SD_y}\right)}{(1-R^2)} \leq K_{1-a}$$

where: X, Y
Measured
band size of alleles 1 and 2.

$\overline{X}$, $\overline{Y}$	Expected interlaboratory band size of alleles 1 and 2
SD_X, SD_Y	Expected interlaboratory reproducibility SD of alleles 1 and 2
R	Expected intralaboratory correlation between allele 1 and 2 measurements
K_{1-a}	Constant for coverage of 100(1-a)% of a bivariate normal distribution

Table 1

Locus	$\overline{X}$	SD_X[c]	$\overline{Y}$	SD_Y[c]	R[d]	$K_{0.99}$[e]
D1S7	4571[a]	34	4231[a]	31	0.62	9.21
D2S44	2907[a]	21	1791[a]	14	0.62	9.21
D4S139	6474[a]	58	3438[a]	24	0.62	9.21
D5S110	3714[b]	26	2942[b]	21	0.62	9.21
D10S28	1757[a]	14	1182[a]	12	0.62	9.21
D17S79	1982[a]	15	1520[a]	13	0.62	9.21

[a]Certified allele band size as stated in the National Institute of Standards and Technology Certificate of Analysis for Standard Reference Material 2390 "DNA Profiling Standard", available from Standard Reference Materials Program, NIST, Gaithersburg, MD 20899 (1992). NIST will update this periodically.

[b]Median of data from 10 laboratories, compiled by Brian Hoey of the Missouri State Highway Patrol.

[c]Predicted standard deviation for the band sizes, using equation:

$$SD = 7.5(1+bp/19500)^{7.1}$$

of: A.M. Stolorow; D.L. Duewer; Dennis J. Reeder; E. Buel; G. Herrin, Jr.; Interlaboratory Comparison of Autoradiographic DNA Profiling Measurements. 3. Repeatability and Reproducibility of Restriction Fragment Length Polymorphism Band Sizing, Particularly Bands of Molecular Size >10k Base Pairs. Analytical Chemistry 1996: 68(11), 1941-1947.

[d]Empirically determined for each locus using data supplied by numerous city, county, state, or Federal forensic laboratories. Correlations were determined for each laboratory supplying data (between 16 and 26 unique data sets, depending on locus). The median correlation at each locus was found to be 0.62±0.04.

[e]$K_{0.99} = \chi^{-1}(.01,2) = 9.21$. The inverse one-tailed (1-0.99) probability of the chi-squared distribution with two degrees of freedom is the limiting (infinite data) critical K for 99% coverage of a bivariate normal distribution.

Monomorphic Human DNA Controls

Monomorphic probes shall not be used concurrently with a probe for any locus in the table of RFLP Loci Accepted at NDIS.

Interpretation of DNA Profiles

1. DNA profiles submitted to NDIS shall be interpretable (interpretable - any DNA data that could be used to make an exclusion).

2. A laboratory submitting a DNA profile to NDIS that is derived from forensic evidence, shall only offer those bands that are attributed to the putative perpetrator(s). Alleles derived from forensic profiles that are unambiguously attributed to a victim or individuals other than the perpetrator(s), such as, but not limited to a husband or boyfriend, shall not be offered to NDIS.

3. The DNA results from any locus in which an ambiguity exists in the assignment of one or more alleles to the putative perpetrator(s) may be offered to NDIS. The mere observation of alleles that may be attributed to individuals other than the putative perpetrator, does not in itself, preclude offering DNA profiles to NDIS at that locus.

4. After image analysis, no "correction factors" that alter or adjust the readings derived directly from an image analysis workstation shall be applied to the DNA profile offered to NDIS.

RFLP Loci Accepted and Minimum RFLP Loci for a DNA Profile to be Accepted at NDIS

The inclusion of DNA profiles in NDIS derived from convicted offender, forensic samples, unidentified human remains, and population samples requires conclusive fragment size determinations from certain specific loci. There is a minimum number of loci from which conclusive results are required for profiles submitted to the forensic, unidentified human remains and convicted offender indexes. Additional loci on these samples shall then be accepted. DNA profiles which fail to include these loci (number and name) shall not be accepted by NDIS.

Table 2 constitutes all RFLP loci from which results shall be accepted by NDIS The absence of any particular locus from this table does not suggest the unsuitability of the locus for forensic application. The addition of new RFLP loci shall be accepted by NDIS, upon approval by the NDIS Custodian.

Table 2 RFLP Loci Accepted at NDIS

Locus	Probe	Convicted Offender[1]	Forensic[2]	Unidentified Human Remains[2]	Population
D1S7	MS1	Accepted	Accepted	Accepted	Accepted
D2S44	YNH24	**Required**	**Required**	**Required**	Accepted
D4S139	PH30	**Required**	**Required**	**Required**	Accepted
D5S110	LH1	**Required**	**Required**	**Required**	Accepted
D10S28	TBQ7	**Required**	**Required**	**Required**	Accepted
D14S13	CMM101	Accepted	Accepted	Accepted	Accepted
D16S85	3'HVR	Accepted	Accepted	Accepted	Accepted
D17S26	EFD52	Accepted	Accepted	Accepted	Accepted
D17S79	V1	Accepted	Accepted	Accepted	Accepted

Any of these RFLP loci so indicated shall be accepted at NDIS.

[1]The number required to be a complete profile for Convicted Offender is the required 4.

[2]An analysis of all 4 required loci must be attempted for both Forensic and Unidentified Human Remains. The minimum number of RFLP loci required for search purposes is 3 for Forensic and Unidentified Human Remains.

Application of probes

Alleles detected following the hybridization of a membrane shall be unambiguously ascribed to a single locus. Therefore, only one locus may be probed during the hybridization of a membrane. The mixing of probes to more than one locus for concurrent application to a single membrane is prohibited.

Molecular Weight Size Markers (MWSMs) Accepted by NDIS for RFLP Loci

The following MWSMs shall be accepted at NDIS:

1. Life Technologies BRL, DNA Analysis Marker System
2. Lifecodes, 23 kb sizing standard
3. Promega Genetic Analysis Marker Ladder

Polymerase Chain Reaction (PCR) Section

Protocol for PCR

PCR DNA Controls, allelic ladders and primer sets that were validated together shall be used together.

1. The laboratory shall demonstrate that it continues to use a protocol that produces NDIS compatible DNA results by its application of a positive PCR DNA Control that has been appropriately validated.

2. All DNA profiles offered to NDIS must be associated with an accurate result for PCR DNA Controls.

3. Only DNA profiles derived from analysis of NDIS Accepted PCR Kits (Table 3) shall be accepted at NDIS.

Changes to PCR Based Protocols (Per the FBI Quality Assurance Standards, page 2)

1. Any significant changes made to a protocol must be demonstrated to be non-detrimental to the PCR results, as indicated by appropriate PCR DNA Control results.

2. The use of a protocol that does not achieve the correct results for the PCR DNA Controls shall be discontinued.

3. At the request of NDIS, a laboratory shall demonstrate the reliability of data generated by the proposed protocol.

Allelic Ladders

1. The allelic ladders used must be from the list of NDIS Accepted PCR Kits (Table 3).

2. The allelic ladders used for each locus must give NDIS compatible results, as demonstrated by the PCR DNA Controls.

3. At each locus, the allelic ladder should have the commonly occurring alleles of the repeat element.

4. An NDIS Accepted Allelic ladder must be associated with each sample set.

Interpretation of DNA Profiles

1. DNA profiles submitted to NDIS shall be interpretable (interpretable - any DNA data that could be used to make an exclusion).

2. A laboratory submitting a DNA profile to NDIS that is derived from forensic evidence, shall only offer those alleles that are attributed to the putative perpetrator(s). Alleles derived from forensic profiles that are unambiguously attributed to a victim or individuals other than the perpetrator(s), such as, but not limited to a husband or boyfriend, shall not be offered to NDIS.

3. The DNA results from any locus in which an ambiguity exists in the assignment of one or more alleles to the putative perpetrator(s) may be offered to NDIS. The mere observation of alleles that may be attributed to individuals other than the putative perpetrator, does not in itself, preclude offering DNA profiles to NDIS at that locus.

NDIS Accepted PCR Kits

1. The following table (Table 3) provides the PCR Kits accepted by NDIS.

2. The absence of a PCR Kit from Table 3 does not suggest the unsuitability of that particular PCR Kit for forensic application.

3. The addition of a PCR Kit to Table 3 (NDIS Accepted PCR Kits) or modification of an existing PCR Kit, shall be made only after data are presented to NDIS, that demonstrates that the new PCR Kit generates NDIS compatible results, or the modification is justified.

Table 3 - NDIS Accepted PCR Kits	
Manufacturer	Kit Name
Promega	GenePrint PowerPlex 1.1(Catalog numbers DC6091/6090)
Promega	GenePrint PowerPlex 1.2 (Catalog numbers DC 6101/6100)
Promega	GenePrint PowerPlex 2.1 (Catalog numbers DC 6471/6470)
PE Applied Systems	AmpF/STR Profiler Plus (PIN 4303326)
PE Applied Systems	AmpF/STR Cofiler (PIN 4305246)
PE Applied Systems	AmpF/STR Profiler Plus and AmpF/STR Cofiler (PIN 4305979)
Promega Monoplex*	Monoplex D5S818 (Catalog number DC6161)
Promega Monoplex*	Monoplex D7S820 (Catalog number DC6141)
Promega Monoplex*	Monoplex D13S317 (Catalog number DC6151)
Promega Monoplex*	Monoplex D16S539 (Catalog number DC6131)
Promega Monoplex*	Monoplex TH01 (Catalog number DC5081)
Promega Monoplex*	Monoplex TPOX (Catalog number DC5111)
Promega Monoplex*	Monoplex CSF1PO (Catalog number DC5091)
Promega Monoplex*	Monoplex vWA (Catalog number DC5141)

* Monoplexes are all fluorescene-labeled and have same chemistry as when in multiplex kits

PCR Profiles Offered to NDIS

1. The DNA result from each locus will be in the form p,q for heterozygotes (in ascending order) and p,p for homozygotes.

2. Alleles below or above the allelic ladder are entered as < (lowest allele) or > (highest allele), respectively.

PCR Loci Accepted and Minimum PCR Loci for a DNA Profile to be Accepted at NDIS

The inclusion of DNA PCR profiles in NDIS derived from convicted offender, forensic samples, unidentified human remains and population samples require conclusive results from a minimum number of specific loci/systems. DNA profiles which fail to include these loci, at a minimum, shall not be accepted by NDIS. There is a minimum number of loci from which conclusive results are required for profiles submitted to the forensic, unidentified human remains and convicted offender indexes. Additional loci on these samples shall then be accepted. DNA profiles which fail to include these loci (number and name) shall not be accepted by NDIS.

Table 4 constitutes all PCR loci from which results shall be accepted by NDIS The absence of any particular locus from this table does not suggest the unsuitability of the locus for forensic application. The addition of new PCR loci shall be accepted by NDIS, upon approval by the NDIS Custodian.

Table 4 PCR Loci Accepted at NDIS

Locus	Chromosome Location	Convicted Offender[1]	Forensic[2]	Unidentified Human Remains[2]	Population
CSF1PO	5q33.3-34	**Required**	**Required**	**Required**	Accepted
FGA	4q28	**Required**	**Required**	**Required**	Accepted
THO1	11p15.5	**Required**	**Required**	**Required**	Accepted
TPOX	2p23-2pter	**Required**	**Required**	**Required**	Accepted
VWA	12p12-pter	**Required**	**Required**	**Required**	Accepted
D3S1358	3p	**Required**	**Required**	**Required**	Accepted
D5S818	5q21-31	**Required**	**Required**	**Required**	Accepted
D7S820	7q	**Required**	**Required**	**Required**	Accepted
D8S1179	8	**Required**	**Required**	**Required**	Accepted
D13S317	13q22-31	**Required**	**Required**	**Required**	Accepted
D16S539	16q24-qter	**Required**	**Required**	**Required**	Accepted
D18S51	18q1.3	**Required**	**Required**	**Required**	Accepted
D21S11	21	**Required**	**Required**	**Required**	Accepted
Amlogenin	X:p22.1-22.3 Y:p11.2	Accepted	Accepted	Accepted	Accepted

Any of these PCR loci so indicated shall be accepted at NDIS.

[1]The number required to be a complete profile for Convicted Offender is the required 13.

[2]An analysis of all 13 required loci must be attempted for both Forensic and Unidentified Human Remains. The minimum number of PCR loci required for search purposes is 10 for Forensic and Unidentified Human Remains.

Appendix

Waivers - General Information

NDIS shall conditionally accept DNA results obtained prior to the "Guidelines for a Quality Assurance Program for DNA Analysis" (TWGDAM Guidelines first published in 1989, footnote page 2), the effective date of the NDIS STANDARDS. The Quality Assurance Standards for Forensic DNA Testing Laboratories (effective October 1, 1998), and The Quality Assurance Standards for Convicted Offender DNA Databasing Laboratories (effective April 1, 1999), supersede the quality assurance guide lines adopted by TWGDAM. Waivers shall not be granted to DNA records derived after the issuance of NDIS STANDARDS, except as noted herein.

A waiver granted shall remain in effect until NDIS Custodian issues superseding NDIS STANDARDS, at which time previously granted waivers may be renewed upon approval by the NDIS Custodian.

Provisions Subject to NDIS RFLP Waivers

Applications for waivers to the sections from the NDIS STANDARDS relative to RFLP data listed previously may be submitted to the NDIS Custodian. The application shall specify the DNA results that are to be covered by the waiver. No other waivers shall be granted. Granting of a waiver is at the sole discretion of the NDIS Custodian.

Waiver - DNA Records Derived Prior to April, 1989

Waivers may be granted for those DNA records that were derived prior to the issuance of the TWGDAM Guidelines in April, 1989, at the discretion of the NDIS Custodian. The laboratory must demonstrate that the qualified DNA records were derived in a manner largely consistent with the TWGDAM Guidelines. The certification shall be signed and dated (date signed) by a DNA Supervisor, an individual who is administratively responsible for the DNA analysis work of laboratory personnel.

Waiver - Alternative Image Analysis Workstation (IAW) System

Data demonstrating that an IAW system other than that developed by the FBI (alternative IAW) produces reliable and NDIS compatible DNA records is required. Also, a test plan and data demonstrating the conversion of the electronic format of the DNA records to a NDIS compatible format are required. The electronic conversion of DNA records to a NDIS data compatible format must be demonstrated to retain the integrity of the DNA record through the conversion process.

DNA profiles derived using an alternative IAW software/work station shall only be accepted by NDIS after the alternative IAW has been demonstrated to meet all NDIS performance standards, including reliability, compatibility, and data integrity.

Waiver - RFLP Human DNA control

All analytical electrophoretic gels exhibiting DNA profiles for use by or inclusion in NDIS shall also exhibit a human DNA control. Human DNA controls other than K562 (alternative human DNA control) shall only be accepted when sufficient data are presented to determine acceptable values for the alternate human DNA control. The waiver shall only apply to analyses conducted prior to 90 days after the effective date of the NDIS STANDARDS.

Waiver for Minimum Loci Constituting a DNA Profile Accepted by NDIS

NDIS shall accept any locus listed as "NDIS Accepted Loci" for "convicted offender," "forensic," "unidentified human remains," and "population" classes of specimens, where results are available for the specified minimum number of loci. Thus, NDIS shall accept any combination of loci for the "population" class of specimen and any combination of accepted loci beyond the required loci for the "convicted offender," "forensic" or "unidentified human remains" classes of specimens; where these locus combinations are defined from among the "Loci Accepted at NDIS": Pages 6 (Table 2) and 9 (Table 4).

Application for a Waiver

States intending to make application for a waiver of NDIS STANDARDS should write the NDIS Custodian for details.

Application for Acceptance of New Loci by NDIS

Applications for new loci to the NDIS STANDARDS may be submitted to the NDIS Custodian by a criminal justice agency. The addition of new loci to NDIS STANDARDS shall be made by the NDIS Custodian only after data presented to NDIS demonstrates that the new loci have been appropriately validated including forensic and population studies, and provide NDIS comparable results. The NDIS Custodian may request further validation by additional criminal justice agencies.

Correspondence

Any correspondence regarding NDIS STANDARDS FOR ACCEPTANCE OF DNA DATA should be sent to:

Attention: NDIS Custodian
Forensic Science Systems Unit
FBI Laboratory
935 Pennsylvania Avenue, Northwest, Room GRB-3R
Washington, DC 20535-0001

Revision History		
Date	Author	Comments
11 November 1996	Barry Brown	Revised per TWGDAM*
12 June 1998	Barry Brown	Revised per TWGDAM*
4 January 1999	Barry Brown	Revised per SWGDAM*
12 July 1999	Barry Brown	Reviewed at SWGDAM*
11 January 2000	Barry Brown	Revised per SWGDAM*

*The TWGDAM CODIS Subcommittee, later SWGDAM CODIS Subcommittee, reviews and makes revision suggestions on a regular basis.

APPENDIX F

Common Message Format for CODIS

U.S. Department of Justice
Federal Bureau of Investigation

CODIS
Interface Specification (CMF 2.5)

For

Contract Laboratories

February 1, 2000

U.S. Department of Justice
Federal Bureau of Investigation
Washington, DC 20535

Prepared By:

Systems Applications Business Unit
Science Applications International Corporation
8233 Old Courthouse Road, Suite 200
Vienna, VA 22182

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1 Overview

This specification describes the interface between the CODIS and external systems. This specification consists of the following sections:

- **Common Message Format –** summarizes the components of the CODIS Interface Specification Common Message Format (CMF).
- **Implementation –** describes the CODIS Interface Specification implementation for PCR-based DNA typing.
- **Appendix A-Example CMF file for PCR Specimens.**
- **Appendix B-Import XML DTD file –** defines the valid XML structure for a CMF file.
- **Appendix C-Cascade Style Sheet –** defines the manner in which a browser will display a CMF file.
- **Appendix D – Kit Information** – defines the currently available kits, the loci for those kits, and the accepted allele values for each locus.

Questions regarding this document and requests for an electronic copy of this document and all style sheets, etc. should be referred to Mr. Jin Kang, SAIC, 703.394.4252.

Important Note: The CMF 2.5 format is a subset of the CMF 2.0 format. The CMF 2.5 format is specifically designed for the contract labs participating in the NIJ program. CMF 2.0 files do not need to be modified.

2 Common Message Format

The CODIS Interface Specification uses a Common Message Format (CMF) to enable the exchange of data between CODIS and external systems. The CMF defines the packaging of information for import into CODIS and is based on the Extensible Markup Language (XML) industry standard.

There are two types of CMF Packets: batch and user. A CMF message has the following general format:

CMF Header
CMF Packet
CMF Packet
•
•
•

2.1 CMF Header

The CMF Header contains the following information:

- CMF Header Version.
- CMF Message Type.
- Source Laboratory Name.
- Destination Laboratory ORI.
- Creation Date/Time.

2.2 CMF Packet

CMF packets have the following characteristics:

- Packet Type.

- Packet Version.
- Packet Data.

The Packet Version indicates the version of the Packet Data portion of the CMF file.

2.3 CMF Data Types and Formats

CMF files are described using consistent data types and formats.

2.3.1 Data Types

Data types refered to in this document are defined by the SQL Server 6.5 data type definitions:

- int – Is a datatype that holds whole numbers from -2 (31) (-2,147,483,648) through 2 (31) - 1 (2,147,483,647). Storage size is 4 bytes.
- smallint – Is a datatype that holds whole numbers from -2 (15) (-32,768) through 2 (15) - 1 (32,767). Storage size is 2 bytes.
- float(n) – Is a datatype that holds real numbers where n is the units of precision. The range of values is approximately from 3.4E - 38 through 3.4E + 38. In all instances where float is used within this document, n equals 1. Storage size is 4 bytes.
- bit – Is a datatype that holds either 1 or 0. Integer values other than 1 or 0 are accepted but are always interpreted as 1. Storage size is 1 byte.
- smalldatetime – Is a date and time datatype. This parameter's storage size is 4 bytes, consisting of one small integer for the number of days after January 1, 1900, and one small integer for the number of minutes past midnight. Data values for smalldatetime range from January 1, 1900, through June 6, 2079, with accuracy to the minute.

2.3.2 Date Formats

Date formats referred to in this document follow the Visual Basic 5.0 format notation conventions. All times are based on a 24-hour clock.

- dd Display the day as a number with a leading zero (01 – 31).
- mmm Display the month as an abbreviation (Jan – Dec).
- yyyy Display the year as a 4-digit number (100 – 9999).
- hh Display the hour as a number with leading zeros (00 – 23).
- nn Display the minute as a number with leading zeros (00 – 59).

3 Implementation

3.1 File Format

The CMF file, coded in XML, contains information about the specimens to be imported into CODIS. This file consists of a CMF header and one or more packets structured in the format listed below. For readability in this document, the format shown below does not include the actual XML syntax. Tabs, carriage returns, and blanks may be inserted at the beginning or end of any line to improve readability. Comments may be included in the file following the XML comment syntax. The CODIS Import program will assign a default value to the population groupfield if it is not provided within the CMF file. See *Appendix A* for an example Import CMF file for PCR Specimens. *Appendix B* includes the Document Type Definition (DTD) document used in interpreting and validating the XML file. *Appendix C* includes the Cascade Style Sheet (CSS) document used in displaying the XML .

CMF Header:

CMF Header Version (2.5 float(1))
CMF Message Type (Import, 32 characters)
Source Laboratory Name (40 characters)

CODIS Laboratory (destination) ORI (10 characters)
Creation Date/Time of this file (smalldatetime, dd-mmm-yyyy hh:nn)

CMF Packet Type = Batch

CMF Packet Version (2.5 float(1))
Run/Batch/Gel Number (40 characters)
Ladder/Kit Used (75 characters)
FOR each lane/item
    Lane/Item Number (32 characters)
    Lane/Item Type (SPECIMEN/CONTROL/STANDARD/EMPTY, 8 characters)
    IF Lane/Item Type = CONTROL:
        CODIS Control (10 characters)
    ELSEIF Lane/Item Type = SPECIMEN:
        CODIS Specimen Number (32 characters)
        CODIS Specimen Category (40 characters)
        CODIS Population Group (15 characters, may be blank)
    ENDIF
ENDFOR
IF CODIS Technology = PCR:
    FOR each reading
        Reading Type (15 characters)
        Reading By (20 characters, User ID of CODIS user)
        Reading Date/Time (smalldatetime, dd-mmm-yyyy hh:nn)
        FOR each SPECIMEN/CONTROL lane/item
            Lane/Item number (32 characters)
            FOR each Locus
                CODIS Locus Name (10 characters)
                FOR each allele
                    PCR Value (10 characters)
                ENDFOR
            ENDFOR
        ENDFOR
    ENDFOR
ENDIF

CMF Packet Type = CODIS User

User ID of CODIS user (20 characters)
CMF Packet Version (2.5, float(1))
User Lab ORI (10 characters)
First Name (20 characters)
Last Name (20 characters)
Start Date (smalldatetime, dd-mmm-yyyy)
Stop Date (smalldatetime, dd-mmm-yyyy)
User Role (32 characters)

3.1.1 Import Header Values

The following table lists details for fields in the Import CMF header:

Field	Values/Formats	Req.	XML Tag	Comments
CMF Header Version	2.5 Float(1) 1 to Max	Yes	HEADERVERSION	Used to specify the version of the CMF header used. As requirements change, newer versions/formats of the CMF Header will be used.
CMF Message Type	Import Up to 32 characters.	Yes	MESSAGETYPE	The only valid message type is Import.
Source Laboratory Name	Up to 40 characters.	Yes	SOURCELAB	The name of the source laboratory producing the CMF file. This will contain the name of the contract laboratory.
Destination ORI	Up to 10 characters.	Yes	DESTINATIONLABORI	CODIS ORI for the destination CODIS laboratory that will import the CMF file. This is the State lab's ORI and will be provided to the contract lab by the State.
Creation Date/Time	Smalldatetime, dd-mmm-yyyy hh:nn	Yes	CREATIONDATETIME	The date/time for when the CMF file was created.

3.1.2 Import Packet Values

Import supports two packet types: Batch and User. The following tables list details for fields in the Import CMF packets:

3.1.2.1 Batch Packet Values

Batch packets describe the Run/Batch/Gel being imported into CODIS. The table below describes the fields in a Batch packet.

Field	Values/Formats	Req.	XML Tag	Comments
CMF Packet Version	2.5 Float(1) 1 to Max	Yes	BATCH_PACKETVERSION	Used to specify the version of the CMF packet used. As requirements change, newer versions/formats of the CMF packet will be used.
CODIS Run/Batch/Gel Number	Up to 40 characters, including embedded blanks.	Yes	BATCHNUMBER	Run/batch/gel number. Assigned by contract lab.

Ladder/Kit Used	Up to 75 characters.	Yes	LADDER	Valid CODIS Ladder/Kit. See Appendix D for the complete list of kits.

For each lane/item, as specified by the Number of lanes/items field, the following information is provided.

Field	Values/Formats	Req.	XML Tag	Comments
Lane/Item Number	Up to 32 characters.	Yes	LANENUMBER	An identifier of lane position within the Run/Batch/Gel Assigned by the contract lab.
Lane/Item Type	Control Specimen Standard Empty Up to 10 characters.	Yes	LANETYPE	Valid CODIS lane/item type. A Control lane indicates a lane that contains a control. A Specimen lane indicates a lane that contains a specimen. A Standard lane indicates a lane that contains a ladder. This lane type may not be needed for non-gel based systems. An Empty lane indicates a lane that contains no data. This lane type may not be needed for non-gel based systems.

If Lane/Item Type = Empty or Standard, then no additional information is required.

If Lane/Item Type = Control, then the following information is provided.

Field	Values/Formats	Req.	XML Tag	Comments
CODIS Control	Up to 10 characters.	Yes	CONTROLNAME	Valid CODIS control.

If Lane/Item Type = Specimen, then the following information is provided.

Field	Values/Formats	Req.	XML Tag	Comments
CODIS Specimen Number	Up to 32 characters.	Yes	SPECIMENNUMBER	A unique identifier for the specimen within the batch.
CODIS Specimen Category	Convicted Offender.	Yes	SPECIMENCATEGORY	Convicted Offender should be used for all specimens.
CODIS Population Group	Black Caucasian Hispanic American Indian Not Available Oriental Unknown Unspecified Up to 15 characters or blank.	No	POPULATIONGROUP	Valid CODIS population group. The State will specify whether to output this field.

The format of the remainder of the Batch packet is dependent upon the type of DNA technology (RFLP or PCR) used to create the Batch. The following table describes the format for PCR results in a Batch packet.

Field	Values/Formats	Req.	XML Tag	Comments
CODIS Locus name	Up to 10 characters.	Yes	LOCUSNAME	See Appendix D for valid Locus names.
Reading Type	Analytic Verification Up to 15 characters.	Yes	PCRREADINGTYPE	Contract labs analyzing convicted offender specimens should use Analytic. QA labs should use Verification.
Reading By	Up to 20 characters.	Yes	PCRREADINGBY	A valid CODIS User ID of the person performing the reading.
Reading Date/Time	smalldatetime, dd-mmm-yyyy hh:nn	Yes	PCRREADINGDATETIME	Date/time the reading was performed.
Lane/Item number	smallint 1 to Max	Yes	PCRLANENUMBER	Number of lane/item where alleles are located.
PCR Locus Value	Up to 10 characters.	Yes	PCRVALUE	See Appendix D for valid alleles values for each locus.

3.1.2.2 CODIS User Packet Values

The following table lists the acceptable values and formats for the CODIS User packet type.

Field	Values/Formats	Req.	XML Tag	Comments
User ID	Up to 20 characters.	Yes	USERID	Typically, this is the Windows NT login ID for the user.
CMF Packet Version	2.5 Float(1) 1 to Max	Yes	USER_PACKETVERSION	Used to specify the version of the CMF Packet used. As requirements change, newer versions/formats of the CMF Packet will be used.
User Lab ORI	Up to 10 characters.	Yes	USERORI	CODIS lab ORI for the user (the State's ORI).
First Name	Up to 20 characters.	Yes	FIRSTNAME	First name of the user.
Last Name	Up to 20 characters.	Yes	LASTNAME	Last name of the user.
Start Date	Smalldatetime, dd-mmm-yyyy	Yes	STARTDATE	The date the user is allowed to begin entering data via the Import process.
Stop Date	Smalldatetime, dd-mmm-yyyy	Yes	STOPDATE	The date the user is not allowed to enter any further data into CODIS via the Import process.
User Role	Non-host user Up to 32 characters.	Yes	USERROLE	The only valid value is non-host user.

4 Validation

The Import application validates both the format of the CMF 2.5 file and the data contained within the file. The format of the CMF 2.5 file can also be validated by Contractors using an XML Validator such as the one available from Microsoft at the following URL :

http://msdn.microsoft.com/downloads/samples/internet/xml/xml_validator/default.asp

Appendix A. Example CMF File for PCR Specimens

An example of an Import file from a Hitachi FMBIO for CTTv results follows:

```
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<!DOCTYPE IMPORTFILE SYSTEM "import.dtd">
<?xml-stylesheet type="text/css" href="import.css" ?>
<!--
        CODIS Import File
-->
<IMPORTFILE>
  <HEADERVERSION>2.5</HEADERVERSION>
  <MESSAGETYPE>Import</MESSAGETYPE>
  <SOURCELAB>VA122015Y</SOURCELAB>
  <DESTINATIONLABORI>VA122015Y</DESTINATIONLABORI>
  <CREATIONDATETIME>30-Jun-1999 09:00</CREATIONDATETIME>
  <!--CODIS Import File-->
  <BATCH>
    <BATCH_PACKETVERSION>2.5</BATCH_PACKETVERSION>
    <BATCHNUMBER>RUN990222001</BATCHNUMBER>
    <LANE>
      <LANENUMBER>1</LANENUMBER>
      <LANETYPE>Control</LANETYPE>
      <CONTROL>
        <CONTROLNAME>K562</CONTROLNAME>
      </CONTROL>
    </LANE>
    <LANE>
      <LANENUMBER>2</LANENUMBER>
      <LANETYPE>Specimen</LANETYPE>
      <SPECIMEN>
        <SPECIMENNUMBER>990222C</SPECIMENNUMBER>
        <SPECIMENCATEGORY>Convicted Offender</SPECIMENCATEGORY>
        <POPULATIONGROUP>Caucasian</POPULATIONGROUP>
      </SPECIMEN>
    </LANE>
    <LANE>
      <LANENUMBER>3</LANENUMBER>
      <LANETYPE>Specimen</LANETYPE>
      <SPECIMEN>
        <SPECIMENNUMBER>990222D</SPECIMENNUMBER>
        <SPECIMENCATEGORY>Convicted Offender</SPECIMENCATEGORY>
        <POPULATIONGROUP>Unknown</POPULATIONGROUP>
      </SPECIMEN>
    </LANE>
    <LANE>
      <LANENUMBER>4</LANENUMBER>
      <LANETYPE>Specimen</LANETYPE>
      <SPECIMEN>
        <SPECIMENNUMBER>990222E</SPECIMENNUMBER>
        <SPECIMENCATEGORY>Convicted Offender</SPECIMENCATEGORY>
        <POPULATIONGROUP>Caucasian</POPULATIONGROUP>
      </SPECIMEN>
```

```
</LANE>
<PCRREADING>
  <PCRREADINGTYPE>Analytic</PCRREADINGTYPE>
  <PCRREADINGBY>KEllis</PCRREADINGBY>
  <PCRREADINGDATETIME>30-Jun-1999 07:13</PCRREADINGDATETIME>
  <PCRLANE>
    <PCRLANENUMBER>2</PCRLANENUMBER>
    <LOCUS>
      <LOCUSNAME>CSF1PO</LOCUSNAME>
      <PCRALLELE>
        <PCRVALUE>9</PCRVALUE>
      </PCRALLELE>
      <PCRALLELE>
        <PCRVALUE>10</PCRVALUE>
      </PCRALLELE>
    </LOCUS>
    <LOCUS>
      <LOCUSNAME>TH01</LOCUSNAME>
      <PCRALLELE>
        <PCRVALUE>2</PCRVALUE>
      </PCRALLELE>
      <PCRALLELE>
        <PCRVALUE>10</PCRVALUE>
      </PCRALLELE>
    </LOCUS>
    <LOCUS>
      <LOCUSNAME>TPOX</LOCUSNAME>
      <PCRALLELE>
        <PCRVALUE>6</PCRVALUE>
      </PCRALLELE>
      <PCRALLELE>
        <PCRVALUE>8</PCRVALUE>
      </PCRALLELE>
    </LOCUS>
    <LOCUS>
      <LOCUSNAME>vWA</LOCUSNAME>
      <PCRALLELE>
        <PCRVALUE>16</PCRVALUE>
      </PCRALLELE>
      <PCRALLELE>
        <PCRVALUE>16</PCRVALUE>
      </PCRALLELE>
    </LOCUS>
  </PCRLANE>
  <PCRLANE>
    <PCRLANENUMBER>3</PCRLANENUMBER>
    <LOCUS>
      <LOCUSNAME>CSF1PO</LOCUSNAME>
      <PCRALLELE>
        <PCRVALUE>9</PCRVALUE>
      </PCRALLELE>
      <PCRALLELE>
        <PCRVALUE>10</PCRVALUE>
      </PCRALLELE>
    </LOCUS>
```

```
    <LOCUS>
      <LOCUSNAME>TH01</LOCUSNAME>
    </LOCUS>
    <LOCUS>
      <LOCUSNAME>TPOX</LOCUSNAME>
      <PCRALLELE>
        <PCRVALUE>6</PCRVALUE>
      </PCRALLELE>
      <PCRALLELE>
        <PCRVALUE>8</PCRVALUE>
      </PCRALLELE>
    </LOCUS>
    <LOCUS>
      <LOCUSNAME>vWA</LOCUSNAME>
      <PCRALLELE>
        <PCRVALUE>16</PCRVALUE>
      </PCRALLELE>
      <PCRALLELE>
        <PCRVALUE>16</PCRVALUE>
      </PCRALLELE>
    </LOCUS>
  </PCRLANE>
  <PCRLANE>
    <PCRLANENUMBER>4</PCRLANENUMBER>
    <LOCUS>
      <LOCUSNAME>CSF1PO</LOCUSNAME>
      <PCRALLELE>
        <PCRVALUE>7</PCRVALUE>
      </PCRALLELE>
      <PCRALLELE>
        <PCRVALUE>12</PCRVALUE>
      </PCRALLELE>
    </LOCUS>
    <LOCUS>
      <LOCUSNAME>TH01</LOCUSNAME>
      <PCRALLELE>
        <PCRVALUE>3</PCRVALUE>
      </PCRALLELE>
      <PCRALLELE>
        <PCRVALUE>8</PCRVALUE>
      </PCRALLELE>
    </LOCUS>
    <LOCUS>
      <LOCUSNAME>TPOX</LOCUSNAME>
      <PCRALLELE>
        <PCRVALUE>7</PCRVALUE>
      </PCRALLELE>
      <PCRALLELE>
        <PCRVALUE>10</PCRVALUE>
      </PCRALLELE>
    </LOCUS>
    <LOCUS>
      <LOCUSNAME>vWA</LOCUSNAME>
      <PCRALLELE>
        <PCRVALUE>8</PCRVALUE>
```

```
          </PCRALLELE>
          <PCRALLELE>
            <PCRVALUE>12</PCRVALUE>
          </PCRALLELE>
        </LOCUS>
      </PCRLANE>
    </PCRREADING>
  </BATCH>
</IMPORTFILE>
```

Appendix B. Import XML DTD File

The Import XML DTD file follows:

```
<?xml encoding="UTF-8"?>

<!--

**************************************************
CODIS Import Specification
**************************************************
The optional character following a name or list
governs whether the element or the content particles
in the list may occur one or more (+), zero or
more (*), or zero or one times (?). The absence of
such an operator means that the element or content
particle must appear exactly once.

-->

<!ELEMENT IMPORTFILE (HEADERVERSION, MESSAGETYPE,
                      SOURCELAB, DESTINATIONLABORI, CREATIONDATETIME, BATCH+,
USER*)>
        <!ELEMENT HEADERVERSION (#PCDATA)>
        <!ELEMENT MESSAGETYPE (#PCDATA)>
        <!ELEMENT SOURCELAB (#PCDATA)>
        <!ELEMENT DESTINATIONLABORI (#PCDATA)>
        <!ELEMENT CREATIONDATETIME (#PCDATA)>

<!ELEMENT PCRREADING (PCRREADINGTYPE, PCRREADINGBY,
                      PCRREADINGDATETIME, PCRLANE+)>
        <!ELEMENT PCRREADINGTYPE (#PCDATA)>
        <!ELEMENT PCRREADINGBY (#PCDATA)>
        <!ELEMENT PCRREADINGDATETIME (#PCDATA)>

<!ELEMENT BATCH (BATCH_PACKETVERSION, BATCHNUMBER, LADDER, , LANE+,
PCRREADING+)>
        <!ELEMENT BATCH_PACKETVERSION (#PCDATA)>
        <!ELEMENT BATCHNUMBER (#PCDATA)>
        <!ELEMENT LADDER (#PCDATA)>

<!ELEMENT LANE (LANENUMBER, LANETYPE, CONTROL?, SPECIMEN?)>
        <!ELEMENT LANENUMBER (#PCDATA)>
        <!ELEMENT LANETYPE (#PCDATA)>

<!ELEMENT CONTROL (CONTROLNAME)>
        <!ELEMENT CONTROLNAME (#PCDATA)>

<!ELEMENT SPECIMEN (SPECIMENNUMBER, SPECIMENCATEGORY, POPULATIONGROUP?,
                    )>
        <!ELEMENT SPECIMENNUMBER (#PCDATA)>
        <!ELEMENT SPECIMENCATEGORY (#PCDATA)>
        <!ELEMENT POPULATIONGROUP (#PCDATA)>
```

```
<!ELEMENT PCRLANE (PCRLANENUMBER, LOCUS+)>
        <!ELEMENT PCRLANENUMBER (#PCDATA)>

<!ELEMENT LOCUS (LOCUSNAME, PCRALLELE*)>
        <!ELEMENT LOCUSNAME (#PCDATA)>

<!ELEMENT PCRALLELE (PCRVALUE, PCRREQUIRED?)>
        <!ELEMENT PCRVALUE (#PCDATA)>
        <!ELEMENT PCRREQUIRED (#PCDATA)>

<!ELEMENT USER (USERID, USER_PACKETVERSION, USERORI, FIRSTNAME,
                        LASTNAME, STARTDATE, STOPDATE?, USERROLE)>
        <!ELEMENT USERID (#PCDATA)>
        <!ELEMENT USER_PACKETVERSION (#PCDATA)>
        <!ELEMENT USERORI (#PCDATA)>
        <!ELEMENT FIRSTNAME (#PCDATA)>
        <!ELEMENT LASTNAME (#PCDATA)>
        <!ELEMENT STARTDATE (#PCDATA)>
        <!ELEMENT STOPDATE (#PCDATA)>
        <!ELEMENT USERROLE (#PCDATA)>
```

Appendix C. Cascade Style Sheet

The Import XML Import file references a cascading style sheet file (<?xml-stylesheet type="text/css" href="import.css" ?>). The Import XML cascade style sheet file follows:

```
IMPORTFILE
{
 display: block;
 font-family: Arial, Helvetica, sans-serif;
 font-size: x-small;
 width: 30em;
 background-color: #AAADEA;
}

IMPORTFILE HEADERVERSION, MESSAGETYPE, SOURCELAB, DESTINATIONLABORI,
CREATIONDATETIME
{
 display: block;
 color: #DDDDDD
}

BATCH
{
 color: #FFFFAA
}

BATCH BATCH_PACKETVERSION, BATCHNUMBER, LADDER{
 display: block;
 text-indent: 1.5em;
 font-weight: bold
}


BATCH LANE
{
 display: block;
 text-indent: 3.0em;
}

LANE
{
 display: block;
 color: blue
}

LANE LANENUMBER
{
 display: inline;
 font-weight: bold
}
LANE LANETYPE
{
 display: inline;
 font-weight: bold
```

```
}

CONTROL
{
 display: block;
 color: green
}

CONTROL CONTROLNAME
{
 display: block;
 text-indent: 4.5em;
}

SPECIMEN
{
 display: block;
 color: red
}

SPECIMEN SPECIMENNUMBER, SPECIMENCATEGORY,  POPULATIONGROUP
{
 display: block;
 text-indent: 4.5em;
}

PCRREADING
{
 display: block;
 text-indent: 3.0em;
}

PCRREADING PCRREADINGTYPE, PCRREADINGBY, PCRREADINGDATETIME
{
 display: block;
 color: green;
}

PCRREADING PCRLANE
{
 display: block;
 text-indent: 4.5em;
}

PCRREADING PCRLANE PCRLANENUMBER
{
 display: block;
 font-weight: bold;
 color: blue;
}

PCRREADING PCRLANE LOCUS
{
 display: list-item;
 color: green;
```

```
}

LOCUSNAME
{
 display: block;
 color: #FFFFAA;
 font-weight: bold;
 text-indent: 6.0em;
}

LOCUS PCRALLELE
{
 display: block;
 font-style: italic;
 color: green;
}

LOCUS PCRALLELE PCRVALUE
{
 display: block;
 font-size: x-small;
 text-indent: 9.0em;
 color: blue;
}

LOCUS PCRALLELE
{
 display: block;
 font-size: x-small;
 text-indent: 9.0em;
 color: blue;
}

USER
{
 display: block;
 color: green;
 text-indent: 1.5em;
}

USER USERID
{
 display: block;
 font-weight: bold;
}

USER USER_PACKETVERSION, USERORI, FIRSTNAME, LASTNAME, STARTDATE, STOPDATE,
USERROLE
{
 display: block;
 text-indent: 3.0em;
}
```

Appendix D. Valid PCR Loci with Allele Values

The table below shows the currently accepted PCR Kits. More kits may be added in the future.

Manufacturer	**Kit Name to be output in CMF**
Promega	GenePrint PowerPlex 1.1(Catalog numbers DC6091/6090)
Promega	GenePrint PowerPlex 1.2 (Catalog numbers DC 6101/6100)
Promega	GenePrint PowerPlex 2.1 (Catalog numbers DC 6471/6470)
PE Applied Systems	AmpF/STR Profiler Plus (PIN 4303326)
PE Applied Systems	AmpF/STR Cofiler (PIN 4305246)
PE Applied Systems	AmpF/STR Profiler Plus and AmpF/STR Cofiler (PIN 4305979)
Promega Monoplex	Monoplex D5S818 (Catalog number DC6161)
Promega Monoplex	Monoplex D7S820 (Catalog number DC6141)
Promega Monoplex	Monoplex D13S317 (Catalog number DC6151)
Promega Monoplex	Monoplex D16S539 (Catalog number DC6131)
Promega Monoplex	Monoplex TH01 (Catalog number DC5081)
Promega Monoplex	Monoplex TPOX (Catalog number DC5111)
Promega Monoplex	Monoplex CSF1PO (Catalog number DC5091)
Promega Monoplex	Monoplex vWA (Catalog number DC5141)

The table below shows the current PCR Loci and the valid allele values associated with them. New loci and alleles may be added in the future.

Locus	**Value to be output in CMF**
Amelogenin	X
	Y
CSF1PO	<6
	6
	6.1
	6.2
	6.3
	6.X
	<7
	7
	7.1
	7.2
	7.3
	7.X
	8
	8.1

Locus	Value to be output in CMF
	8.2
	8.3
	8.X
	9
	9.1
	9.2
	9.3
	9.X
	10
	10.1
	10.2
	10.3
	10.X
	11
	11.1
	11.2
	11.3
	11.X
	12
	12.1
	12.2
	12.3
	12.X
	13
	13.1
	13.2
	13.3
	13.X
	14
	14.1
	14.2
	14.3
	14.X
	15
	>15
D13S317	<7
	7
	7.1
	7.2
	7.3
	7.X
	<8
	8
	8.1
	8.2
	8.3
	8.X
	9
	9.1
	9.2
	9.3

Locus	Value to be output in CMF
	9.X
	10
	10.1
	10.2
	10.3
	10.X
	11
	11.1
	11.2
	11.3
	11.X
	12
	12.1
	12.2
	12.3
	12.X
	13
	13.1
	13.2
	13.3
	13.X
	14
	14.1
	14.2
	14.3
	14.X
	15
	>15
D16S539	<5
	5
	5.1
	5.2
	5.3
	5.X
	8
	8.1
	8.2
	8.3
	8.X
	9
	9.1
	9.2
	9.3
	9.X
	10
	10.1
	10.2
	10.3
	10.X
	11
	11.1

Locus	Value to be output in CMF
	11.2
	11.3
	11.X
	12
	12.1
	12.2
	12.3
	12.X
	13
	13.1
	13.2
	13.3
	13.X
	14
	14.1
	14.2
	14.3
	14.X
	15
	>15
D18S51	<9
	9
	9.1
	9.2
	9.3
	9.X
	10
	10.1
	10.2
	10.3
	10.X
	11
	11.1
	11.2
	11.3
	11.X
	12
	12.1
	12.2
	12.3
	12.X
	13
	13.1
	13.2
	13.3
	13.X
	14
	14.1
	14.2
	14.3
	14.X

Locus	Value to be output in CMF
	15
	15.1
	15.2
	15.3
	15.X
	16
	16.1
	16.2
	16.3
	16.X
	17
	17.1
	17.2
	17.3
	17.X
	18
	18.1
	18.2
	18.3
	18.X
	19
	19.1
	19.2
	19.3
	19.X
	20
	20.1
	20.2
	20.3
	20.X
	21
	21.1
	21.2
	21.3
	21.X
	22
	22.1
	22.2
	22.3
	22.X
	23
	23.1
	23.2
	23.3
	23.X
	24
	24.1
	24.2
	24.3
	24.X
	25

Locus	Value to be output in CMF
	25.1
	25.2
	25.3
	25.X
	26
	>26
D1S80	<14
	14
	15
	16
	17
	18
	19
	20
	21
	22
	23
	24
	25
	26
	27
	28
	29
	30
	31
	32
	33
	34
	35
	36
	37
	38
	39
	40
	41
	>41
D21S11	<24.2
	24.2
	24.3
	24.X
	<25
	25
	25.1
	25.2
	25.3
	25.X
	26
	26.1
	26.2
	26.3
	26.X

Locus	Value to be output in CMF
	27
	27.1
	27.2
	27.3
	27.X
	28
	28.1
	28.2
	28.3
	28.X
	29
	29.1
	29.2
	29.3
	29.X
	30
	30.1
	30.2
	30.3
	30.X
	31
	31.1
	31.2
	31.3
	31.X
	32
	32.1
	32.2
	32.3
	32.X
	33
	33.1
	33.2
	33.3
	33.X
	34
	34.1
	34.2
	34.3
	34.X
	35
	35.1
	35.2
	35.3
	35.X
	36
	36.1
	36.2
	36.3
	36.X
	37

Locus	Value to be output in CMF
	37.1
	37.2
	37.3
	37.X
	38
	>38
D3S1358	<12
	12
	12.1
	12.2
	12.3
	12.X
	13
	13.1
	13.2
	13.3
	13.X
	14
	14.1
	14.2
	14.3
	14.X
	15
	15.1
	15.2
	15.3
	15.X
	16
	16.1
	16.2
	16.3
	16.X
	17
	17.1
	17.2
	17.3
	17.X
	18
	18.1
	18.2
	18.3
	18.X
	19
	>19
D5S818	<7
	7
	7.1
	7.2
	7.3
	7.X
	8

Locus	Value to be output in CMF
	8.1
	8.2
	8.3
	8.X
	9
	9.1
	9.2
	9.3
	9.X
	10
	10.1
	10.2
	10.3
	10.X
	11
	11.1
	11.2
	11.3
	11.X
	12
	12.1
	12.2
	12.3
	12.X
	13
	13.1
	13.2
	13.3
	13.X
	14
	14.1
	14.2
	14.3
	14.X
	15
	15.1
	15.2
	15.3
	15.X
	16
	>16
D7S8	A
	B
D7S820	<6
	6
	6.1
	6.2
	6.3
	6.X
	7
	7.1

Locus	Value to be output in CMF
	7.2
	7.3
	7.X
	8
	8.1
	8.2
	8.3
	8.X
	9
	9.1
	9.2
	9.3
	9.X
	10
	10.1
	10.2
	10.3
	10.X
	11
	11.1
	11.2
	11.3
	11.X
	12
	12.1
	12.2
	12.3
	12.X
	13
	13.1
	13.2
	13.3
	13.X
	14
	14.1
	14.2
	14.3
	14.X
	>14
	15
	>15
D8S1179	<8
	8
	8.1
	8.2
	8.3
	8.X
	9
	9.1
	9.2
	9.3

Locus	Value to be output in CMF
	9.X
	10
	10.1
	10.2
	10.3
	10.X
	11
	11.1
	11.2
	11.3
	11.X
	12
	12.1
	12.2
	12.3
	12.X
	13
	13.1
	13.2
	13.3
	13.X
	14
	14.1
	14.2
	14.3
	14.X
	15
	15.1
	15.2
	15.3
	15.X
	16
	16.1
	16.2
	16.3
	16.X
	17
	17.1
	17.2
	17.3
	17.X
	18
	18.1
	18.2
	18.3
	18.X
	19
	>19
DQAlpha	1.1
	1.2
	1.3

Locus	Value to be output in CMF
	2
	3
	4
	4.1
	4.2
	4.3
	4.X
FGA	<18
	18
	18.1
	18.2
	18.3
	18.X
	19
	19.1
	19.2
	19.3
	19.X
	20
	20.1
	20.2
	20.3
	20.X
	21
	21.1
	21.2
	21.3
	21.X
	22
	22.1
	22.2
	22.3
	22.X
	23
	23.1
	23.2
	23.3
	23.X
	24
	24.1
	24.2
	24.3
	24.X
	25
	25.1
	25.2
	25.3
	25.X
	26
	26.1
	26.2

Locus	Value to be output in CMF
	26.3
	26.X
	27
	27.1
	27.2
	27.3
	27.X
	28
	28.1
	28.2
	28.3
	28.X
	29
	29.1
	29.2
	29.3
	29.X
	30
	>30
GC	A
	B
	C
GYPA	A
	B
HBGG	A
	B
	C
LDLR	A
	B
TH01	<5
	5
	5.1
	5.2
	5.3
	5.X
	6
	6.1
	6.2
	6.3
	6.X
	7
	7.1
	7.2
	7.3
	7.X
	8
	8.1
	8.2
	8.3
	8.X
	9

Locus	Value to be output in CMF
	9.1
	9.2
	9.3
	9.X
	10
	10.1
	10.2
	10.3
	10.X
	>10
	11
	>11
TPOX	<6
	6
	6.1
	6.2
	6.3
	6.X
	7
	7.1
	7.2
	7.3
	7.X
	<8
	8
	8.1
	8.2
	8.3
	8.X
	9
	9.1
	9.2
	9.3
	9.X
	10
	10.1
	10.2
	10.3
	10.X
	11
	11.1
	11.2
	11.3
	11.X
	12
	12.1
	12.2
	12.3
	12.X
	>12
	13

Locus	Value to be output in CMF
	>13
vWA	<11
	11
	11.1
	11.2
	11.3
	11.X
	12
	12.1
	12.2
	12.3
	12.X
	<13
	13
	13.1
	13.2
	13.3
	13.X
	14
	14.1
	14.2
	14.3
	14.X
	15
	15.1
	15.2
	15.3
	15.X
	16
	16.1
	16.2
	16.3
	16.X
	17
	17.1
	17.2
	17.3
	17.X
	18
	18.1
	18.2
	18.3
	18.X
	19
	19.1
	19.2
	19.3
	19.X
	20
	20.1
	20.2

Locus	Value to be output in CMF
	20.3
	20.X
	>20
	21
	>21

Appendix G. Import CMF 1.0 Message Format

The Import CMF 1.0 information expected from the external imaging system consists of an ASCII file containing analysis information for those specimens processed by the external imaging system.[1] The file is a CMF message consisting of the following information. (Each line represents a single line of text in the CMF file.)

CMF Header:

CMF Header Version (1.0)
CMF Message ID (Integer)
CMF Message Type (IMPORT)
Imaging system (source) ORI (9 characters)
CODIS Laboratory (destination) ORI (9 characters)
Creation Date/Time of this file (DD-MMM-YYYY HH:MM:SS)
Imaging system organization/company (up to 64 characters)
Imaging system utilized (up to 64 characters)
Number of packets in this file (Integer)

CMF Packets: The IMPORT message contains the specified number of the following types of CMF packets.

```
CMF Packet Type (DNA Analysis Result)
CMF Packet Version (1.0)
        CODIS Technology used for analysis
        IF CODIS Technology = PCR:
                CODIS Specimen Number (24 characters)
                CODIS Sample ID (8 characters)
                CODIS Specimen Category (21 characters)
                CODIS Tissue Type (15 characters, may be blank)
                CODIS Tissue Form (10 characters, may be blank)
                CODIS Population Group (15 characters, may be blank)
                Number of markers
                FOR each marker
                        CODIS Marker Name
                        Number of readings
                        FOR each reading
                                Reading By (8 characters, User ID of CODIS user)
                                Reading Date (DD-MMM-YYYY)
                                Reading Time (HH:MM:SS)
                                Number of alleles
                                FOR each allele
                                        PCR Value
                                ENDFOR
                        ENDFOR
                ENDFOR
        ENDIF
ENDFOR

CMF Packet Type (CODIS User)
CMF Packet Version (1.0)
```

[1] This document is based on the *CODIS Imaging Application Program Interface, 2/3/1997*.

User Lab ORI (9 characters)
User Initials (4 characters)
First Name (20 characters)
Last Name (20 characters)
Start Date (DD-MMM-YYYY, may be blank)
User ID (8 characters, may be blank)
eMail ID (8 characters, may be blank)

An example of an IMPORT file for a DQ-Alpha strip looks like the following:

```
1.0
532
IMPORT
CELLMARK
FL0370100
08-MAR-1995  09:14:22
CellMark
BioImage
1
DNA Analysis Result
1.0
PCR
022395047Q3
0
FORENSIC, UNKNOWN
BLOOD
STAIN
UNKNOWN
1
DQALPHA
1
ABCDEFGH
11-MAR-1995
11:10:23
2
1.1
3
```

APPENDIX G

CODIS Hit Counting Guidelines

Combined DNA Index System (CODIS)

Hit Counting Guidelines
(An Element of Performance Measurement)

FBI Laboratory

Forensic Science Systems Unit

Created: Friday, July 24, 1998 1:11 PM

Revised:

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Date	Author	Comments
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June 25, 1998	Clare Searby	Performed major revisions and added examples.
July 2, 1998	Clare Searby	Clarified definitions based on peer review. Added aggregate counting.
July 9, 1998	Steve Niezgoda Clare Searby	Incorporated feedback from Jim Bixby, David Coffman, Florencio Dasalla, Barbara Evans, Keith Inman, George Li, Don MacLaren, and Taylor Scott at the CODIS GDIS 5.1 training on July 9, 1998.
July 23, 1998	Clare Searby	Incorporated additional feedback from David Coffman, Keith Inman, Ken Konzak, and Taylor Scott.

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Oh No! (Or, the introduction)

It's 3:00 pm and you are finally starting to relax. Since this morning, you've been hammered by three prosecutors who want lab reports yesterday, coerced into giving a lab tour because your boss was "too busy", continued the lengthy process of validating the latest DNA technology, and argued with your information technology people about why CODIS is running so slowly. (The FBI swears the problem is not CODIS!) So far, just another day in the lab.

Thinking that you might actually get home before the beginning of your favorite TV show, you start feeling pretty good. The telephone rings and your fantasy vanishes like a puff of smoke. As you listen to the harried voice at the other end, you stifle that pang of angst that always precedes a crisis. Your mind races as you catch fragments of the conversation:

> *"… from the press is doing a story on DNA and wants an interview …"*
>
> Oh great, another opportunity to be misquoted.
>
> *"… under a tight deadline. The reporter needs to talk with you this afternoon …"*
>
> Thanks for the short notice! How am I gonna get this ketchup stain off my clothes? I knew I shouldn't have had french-fries with lunch.
>
> *"… shouldn't take more than 15 minutes …"*
>
> When was the last time anything around here took less than 15 minutes?
>
> *"… just some simple questions, you know, things like how many cases we work each year, how many hits we've had …*
>
> What? 'How may hits we've had?' Oh no! Not that! Anything but that! THE FBI STILL HASN'T GIVEN US ANY GUIDELINES FOR COUNTING HITS!

As you reach for your Maalox, you hope that these guidelines provide a simple, straightforward approach to counting CODIS hits.

Counting is not Easy (Or, the problem statement)

Why in the world is counting hits so difficult? Why has it taken so long to develop straightforward, consistent hit counting guidelines? The problem is simple: counting is not easy! The trick to good hit counting is to give credit to all the participants, without inflating the total number of hits. The inflation problem is real: if two local laboratories link their cases through a hit at State, both local labs and the state lab all want to claim hits -- a total of three hits. Although it is reasonable for all three organizations to claim some credit, only one hit occurred!

> The effectiveness of CODIS is ultimately measured by the crimes it helps solve. Therefore, the number of "investigations aided" is a better measure of program performance than the number of "hits".

To solve this dilemma, we need to track two metrics. The primary metric is the number of investigations aided by CODIS. This is ***the*** primary metric: the effectiveness of CODIS is ultimately measured by the crimes it helps solve. The secondary metric is the number of hits made by CODIS. Counting the number of hits gives laboratories credit for their investment in CODIS, and indirectly shows the value CODIS adds to fighting crime. In the past, "Investigations

Aided" may have been treated as subordinate to "hits". This is incorrect! The better measure of CODIS's value to society is the number of criminal investigations it assists.

The previous paragraph was important, read it again.

Laboratories may also wish to experiment with variations of these metrics. For example, casework labs may want to describe how their CODIS database has assisted other labs in the State/country. State labs may want to show how their convicted offender program has helped solve crimes in other states. State labs may also want to compute a tally of all CODIS activity for the state, including hits and Investigations Aided in local labs. The counting approach outlined in this document handles these, and other, variations.

What's in a Name? (Or, definitions)

Casework Laboratory

A casework laboratory is a forensic DNA lab responsible for developing DNA profiles from crime scene evidence. A casework laboratory counts metrics using the Casework Scorecard (scorecards are explained later).

Convicted Offender Laboratory

A convicted offender laboratory is a forensic DNA lab responsible for developing DNA profiles from samples provided by known convicted offenders. This document assumes that the convicted offender laboratory is also the state repository, or SDIS. A convicted offender laboratory counts metrics using the Convicted Offender Scorecard. Although convicted offender laboratories may also perform casework, Offender Hits should always be counted using the Convicted Offender Scorecard, and Forensic Hits should always be counted using the Casework Scorecard.[1]

Although convicted offender laboratories may also perform casework, Offender Hits should always be counted using the Convicted Offender Scorecard, and Forensic Hits should always be counted using the Casework Scorecard.[1]

Hit

A hit is a confirmed match between two or more DNA profiles discovered by CODIS software at a single instant in time. Hits may occur at any level in the CODIS hierarchy, LDIS, SDIS, or NDIS. There are two categories of hits:

- A Forensic Hit (**FH**) occurs when two or more forensic samples are linked at LDIS, SDIS, or NDIS. Forensic Hits are sometimes called case-to-case hits.
- An Offender Hit (**OH**) occurs when one or more forensic samples are linked to a convicted offender sample at SDIS or NDIS.

Sometimes, hits may be classified as both Offender Hits and Forensic Hits. When this occurs, always call the hit an Offender Hit.

[1] There is one exception: states having only one DNA laboratory should use the Entire State Laboratory Scorecard for tracking all metrics. (See Appendix A)

Offender Hits are sometimes called case-to-offender hits.

Sometimes, hits may be classified as both Offender Hits and Forensic Hits. For example, two unknown suspect cases match each other and a convicted offender. When this occurs, always classify the hit as an Offender Hit.

We no longer make a distinction between cold and warm hits, since both add value to the investigative process.

There are several important concepts not stated in this definition. First, hits are identical to matches - there is no difference! Second, hits result from searching CODIS databases. *Hits are not created by matching known samples to unknown samples on the laboratory workbench!* Finally, we no longer make a distinction between cold and warm hits, since both add value to the investigative process.[2] Hits are hits - count them all!

Investigations Aided

Each CODIS hit typically assists one or more criminal investigations. For the purposes of hit counting, a criminal investigation equates to a case, which equates to a submission to a laboratory. *This document uses the terms "cases" and "investigations" interchangeably.* Although a single case may have multiple submissions, and you can probably contrive scenarios where a "case" represents more than one investigation (like a serial rapist task force), equating these three terms is awfully convenient for hit counting. (If anything, this approach understates the value of a CODIS hit.) The metric for counting the number of Investigations Aided is **IA**:

A good rule of thumb for determining whether an investigation has been aided is to ask, "Did the CODIS hit add value to the investigative process?" If the answer is yes, take credit for aiding an investigation.

- **IA (Investigations Aided)**

  For casework laboratories (LDIS): The number of cases submitted *to your lab* that were assisted by a CODIS hit.

  For convicted offender laboratories (SDIS): The number of cases submitted *to labs within your State* that were assisted by a CODIS hit.

The following terms are synonymous: Investigations Aided, Investigations Assisted, Cases Aided, and Cases Assisted. In other words,

Investigations Aided = Investigations Assisted = Cases Aided = Cases Assisted.

[2] In a cold hit, there is no prior indication that the DNA profiles are related. Cold hits add value by linking cases that are previously unlinked, or by providing investigators with the identity of a known convicted offender. In a warm hit, investigators have a hunch that there may be a match in CODIS. A typical example of a warm hit is when a police officer develops a suspect in a case, obtains a blood sample, and has a qualified DNA analyst use CODIS to search the profile against other unsolved cases. In this example, the warm hit adds value by saving the investigative resources required to link the cases without DNA.

Finally, it is important to recognize that sometimes you may inadvertently undercount Investigations Aided because of missing information. For example, the police may never notify you that a single CODIS hit assisted several investigations that they had linked through other means. All you can do is your best! A good rule of thumb for determining whether an investigation has been aided is to ask, "Did the CODIS hit add value to the investigative process?" If the answer is yes, take credit for aiding an investigation.

Sometimes, you may inadvertently undercount Investigations Aided because of missing information.

The Rules

The following three rules must be followed to properly count Investigations Aided and hits.

Rule #1

The level in the CODIS hierarchy (LDIS, SDIS, NDIS) at which the hit occurs gets credit for the hit.

If you did not personally run Searcher, AutoSearcher, or Batch Search in your laboratory, you cannot claim a hit. However, if a DNA profile developed in your laboratory is part of a hit made in another laboratory, you can claim that you *participated* in a hit. The following metrics track hit participation.

- **FH_s:** A Forensic Hit made at SDIS that includes one or more profiles developed by a casework laboratory. (This metric only applies to casework laboratories.)

  Casework laboratories can use this metric to help describe their participation in a statewide CODIS program. For example, the director of a casework laboratory might say, "Our laboratory takes great pride in being part of the statewide CODIS program. We believe that sharing data with other laboratories through CODIS is a great way to solve crimes. And we have provided investigative leads to other labs in the State: our laboratory has participated in ___ Forensic Hits made at SDIS."

- **FH_n:** A Forensic Hit made at NDIS that includes one or more profiles developed by a casework laboratory. (This metric applies to both casework and convicted offender laboratories.)

  Laboratories can use this metric to help describe their participation in the National DNA Index System. For example, a casework laboratory administrator might say, "In addition to participating in a statewide CODIS program, we also share our data with the rest of the forensic community by participating in the FBI's National DNA Index System. Our laboratory has been part of ___ Forensic Hits made at NDIS."

- **OH_s:** An Offender Hit made at SDIS that matched one or more profiles developed by a casework laboratory. (This metric only applies to casework labs.)

  Casework laboratories can use this metric to help describe their participation in a statewide CODIS program. For example, a casework laboratory spokesperson might say, "It is our policy to share our forensic DNA data with other crime

laboratories in the State in an effort to solve crimes that would otherwise go unsolved. The State's convicted offender database has been particularly helpful, producing ___ hits that have aided ___ investigations for our laboratory."

- **OH_n:** This metric has two definitions, one for casework laboratories and one for offender laboratories.

  Casework Laboratory: An Offender Hit made at NDIS that matched one or more profiles developed by the casework laboratory.

  Casework laboratories can use this metric to help describe their participation in the National DNA Index System. For example, a casework laboratory spokesperson might say, "As you know, in an effort to solve as many crimes as possible, we participate in the FBI's National DNA Index System. This participation has paid off: to date, there have been ___ Offender Hits at NDIS that have aided ___ investigations in our laboratory."

  Convicted Offender Laboratory (SDIS): An Offender Hit made at NDIS that matched a convicted offender profile developed by the State.

  Convicted offender laboratories can use this metric to help describe how their convicted offender database contributes to solving crimes throughout the Country. An SDIS administrator might say, "Our convicted offender DNA program has aided law enforcement in other states, too. To date, there have been __ Offender Hits at NDIS as a result of our convicted offender program. These __ hits have aided __ investigations in other states."

Rule #2

A single hit may aid more than one investigation.

That's right. A hit linking five separate crimes is still only one hit. However, laboratories may claim credit for all of the cases they have assisted, including cases inside and outside of their jurisdiction. For each case that is assisted by a CODIS hit, the laboratory that worked the case is credited with one "Investigation Aided" (IA). Additionally, laboratories receive participation credit for assisting investigations at the state (IA_s) and national (IA_n) levels.

- **IA_s (Investigations Aided Elsewhere in the State):** The number of cases belonging to other laboratories in your State that you assisted through an SDIS hit. (This metric only applies to casework laboratories.)
- **IA_n (Investigations Aided Elsewhere in the Nation):** The number of cases belonging to other laboratories in the U.S. (outside of your State) that you assisted through an NDIS hit. (This metric applies to both casework and convicted offender labs.)

Rule #3

An investigation may be aided only once.

Rule #3 states that we count how many investigations CODIS has aided. We ***do not*** count the number of times CODIS has aided investigations. This is a subtle but important distinction –

read it again! There may be instances where a particular investigation is part of multiple hits. For example, a serial rapist may cause several CODIS hits over the course of a crime spree. However, each Investigation Aided is counted only once. The following example illustrates this rule:

> On Day #1, two unknown suspect cases (Case 1 and Case 2) are matched by CODIS at LDIS. The resulting score is 1 Forensic Hit and 2 Investigations Aided. On Day #2, another unknown suspect case (Case 3) is entered into CODIS and searched. Case 3 is found to match Cases 1 & 2. The result of the search on Day #2 is 1 Forensic Hit and 1 Investigation Aided. The total score for the laboratory is 2 Forensic Hits and 3 Investigations Aided. *Although Cases 1 & 2 were aided twice (once for each hit), they were only counted as Investigative Assists once.*

While you might argue that this method understates the "value" of a CODIS hit, it simplifies hit counting. Finally, Rule #3 makes it is possible to have a hit that assists no investigations (IA = 0). See Scenario #6 for an example.

Scorecards

We have created scorecards to facilitate the counting process. (Sample forms are provided in Appendix A.) Note that there are three different scorecards, one for casework laboratories, one for convicted offender laboratories, and one for laboratories that perform all DNA analysis for the State (called an Entire State Lab). Remember that laboratories performing both convicted offender analysis and casework should score each activity on separate scorecards (except for Entire State Labs). The scorecards are designed to be updated on a regular basis.

Casework Scorecard

Following is a sample scorecard for casework:

Date	FH	IA	FH_s	FH_n	OH_s	OH_n	IA_s	IA_n
Total								

Fields are defined below.

Field Name	Description
FH	Forensic Hit made by searching your CODIS database. (One hit can link multiple cases.)
IA	Cases belonging to your laboratory that were assisted by a CODIS hit at LDIS, SDIS, or NDIS. (Each case is counted only once!)
FH_s	Forensic Hit made at SDIS that matched one or more cases from your laboratory.
FH_n	Forensic Hit made at NDIS that matched one or more cases from your laboratory.
OH_s	Offender Hit made at SDIS that matched one or more cases from your laboratory.
OH_n	Offender Hit made at NDIS that matched one or more cases from your laboratory.

IA_s	Cases belonging to other laboratories in your State that were linked to one or more cases from your lab through an SDIS hit. (Each case is counted only once!)
IA_n	Cases belonging to other laboratories in the country (outside of your State) that were linked to one or more cases from your lab through and NDIS hit. (Each case is counted only once!)

Convicted Offender (SDIS) Scorecard

Following is a sample Convicted Offender Scorecard:

Date	FH	OH	IA	OH_n	FH_n	IA_n
Total						

Since the SDIS administrator receives a copy of all NDIS match reports, the SDIS scorecard can also be used to track all NDIS activity within the state. Note: In order to confirm the disposition of an NDIS hit, the SDIS administrator must contact the local lab(s) that participated in the hit.

Fields are defined below.

Field	Description
FH	Forensic Hit made by searching your SDIS database. (One hit can link multiple cases within the State.)
OH	Offender Hit made by searching your SDIS database. (One hit can link multiple offenders and cases.)
IA	Investigations Aided in the State by an SDIS or NDIS hit.
OH_n	Offender Hit made at NDIS linking an offender from your State to one or more cases in other states.
FH_n	Forensic Hit made at NDIS linking a casework sample from your State to one or more cases in other states.
IA_n	Cases belonging to other laboratories in the U.S. (outside of your State) that were linked to one or more cases from your State through an NDIS hit.

Entire State Lab Scorecard

In some states, there is only one laboratory that conducts ALL convicted offender and casework analysis for the State. For the purpose of counting hits, these laboratories will be considered "entire state laboratories." Following is a sample scorecard for tracking both convicted offender and casework activity in an entire state lab:

Date	FH	OH	IA	OH_n (1)	OH_n (2)	FH_n	IA_n

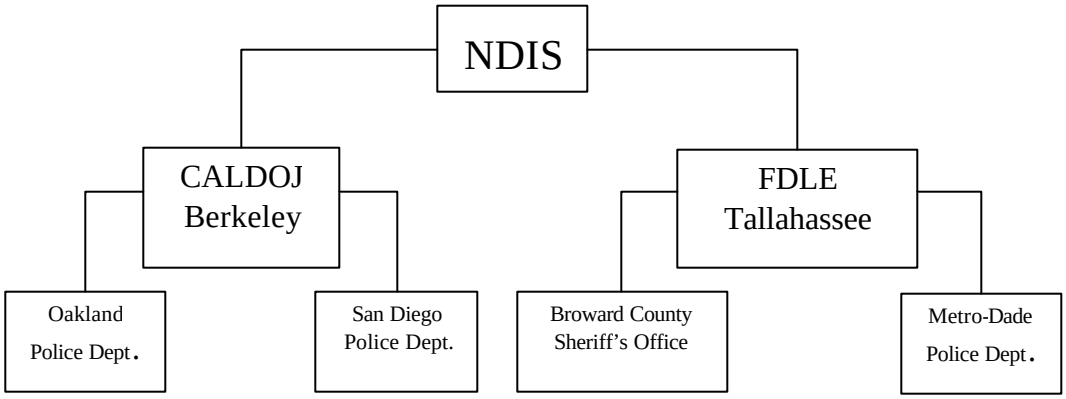
Note: This scorecard is to be used by entire state labs only. It is not intended to be used by laboratories that function as both the state repository and a casework lab. Labs that function in this capacity should use both a Casework and Offender Scorecard to track CODIS hits.

Fields are defined below.

Field	Description
FH	Forensic Hit made by searching your SDIS database. (One hit can link multiple cases within the State.)
OH	Offender Hit made by searching your SDIS database. (One hit can link multiple offenders and cases.)
IA	Investigations Aided in the State by an SDIS or NDIS hit.
OH_n (1)	Offender Hit made at NDIS that matched one or more cases from your laboratory.
OH_n (2)	Offender Hit made at NDIS linking an offender from your State to one or more cases in other states.
FH_n	Forensic Hit made at NDIS linking a casework sample from your State to one or more cases in other states.
IA_n	Cases belonging to other laboratories in the U.S. (outside of your State) that were linked to one or more cases from your State through an NDIS hit.

Examples

The following examples use the laboratories listed in the diagram below. The Florida Department of Law Enforcement (FDLE) Tallahassee and California Department of Justice (CALDOJ) Berkeley laboratories are convicted offender (SDIS) laboratories, while the other four laboratories are casework laboratories (LDIS).



Scenario #1

On Day #1, Metro-Dade uses CODIS to discover a match between two previously unlinked cases. On Day #2, a new case is submitted to Metro-Dade, and CODIS matches it to the two cases linked on Day #1.

The scorecard below outlines the credit the laboratory receives:

Metro-Dade Police Department (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #1	1	2						
Day #2	1	1						
Total	**2**	**3**	**0**	**0**	**0**	**0**	**0**	**0**

Explanation: Matching the first two cases (Day #1) produced one Forensic Hit, or "FH" and two Investigations Aided, or "IA". When the third case was linked to Cases 1 and 2, another hit was recorded, but only Case 3 was assisted (1 IA) as the first two cases had been aided once before. (This is an application of Rule #3.) Thus, after Day #2, the Metro-Dade laboratory can report a total of two Forensic Hits and three Investigations Aided.

Scenario #2

On Day #3, SDIS at the CALDOJ Berkeley laboratory links a case from the Oakland Police Department to a case at the San Diego Police Department. (Neither case has been previously assisted.)

The scorecards below show how to credit each participating laboratory:

CALDOJ Berkeley (SDIS)						
Date	**FH**	**OH**	**IA**	**OH_n**	**FH_n**	**IA_n**
Day #3	1		2			
Total	**1**	**0**	**2**	**0**	**0**	**0**

Oakland Police Department (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #3		1	1				1	
Total	**0**	**1**	**1**	**0**	**0**	**0**	**1**	**0**

San Diego Police Department (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #3		1	1				1	
Total	**0**	**1**	**1**	**0**	**0**	**0**	**1**	**0**

Explanation: Only the Berkeley laboratory can claim direct credit for the hit because it occurred at SDIS. However, both local laboratories can claim that they participated in a Forensic Hit at SDIS (1 FH_s apiece), and that they aided one investigation in their own laboratory (1 IA apiece) and one investigation in another California laboratory (1 IA_s apiece). Additionally, Berkeley receives credit for aiding two investigations in the State (2 IA).

Scenario #3

On Day #4, a new case from the San Diego Police Department matches a convicted offender sample from the FDLE Tallahassee laboratory at NDIS.

The scorecards below show how to credit each participating laboratory:

San Diego Police Department (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #3		1	1				1	
Day #4		1				1		
Total	**0**	**2**	**1**	**0**	**0**	**1**	**1**	**0**

FDLE Tallahassee (SDIS)						
Date	**FH**	**OH**	**IA**	**OH_n**	**FH_n**	**IA_n**
Day #4				1		1
Total	**0**	**0**	**0**	**1**	**0**	**1**

NDIS				
Date	**FH**	**OH**	**IA**	**Participating Labs**
Day #4		1	1	FDLE Tallahassee / San Diego PD
Total	**0**	**1**	**1**	

Explanation: Since NDIS is responsible for the hit, NDIS gets direct credit and a "1" is recorded under the Offender Hit, "OH" column. NDIS is additionally credited with one Investigation Aided at the national level (1 IA). Both participating laboratories receive credit for contributing to a national Offender Hit (1 OH_n apiece). Furthermore, the San Diego laboratory aided an investigation in its own jurisdiction (1 IA), and the Tallahassee laboratory aided an investigation in another State (1 IA_n).

Scenario #4

On Day #5, a new case from the Oakland Police Department laboratory in California matches a new case in the Metro-Dade Police Department laboratory in Florida at NDIS.

The scorecards below show how to credit each participating laboratory:

Oakland Police Department (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OHn**	**IA_s**	**IA_n**
Day #3		1	1				1	
Day #5		1		1				1
Total	**0**	**2**	**1**	**1**	**0**	**0**	**1**	**1**

CALDOJ Berkeley (SDIS)						
Date	**FH**	**OH**	**IA**	**OH_n**	**FH_n**	**IA_n**
Day #3	1		2			
Day #5			1		1	1
Total	**1**	**0**	**3**	**0**	**1**	**1**

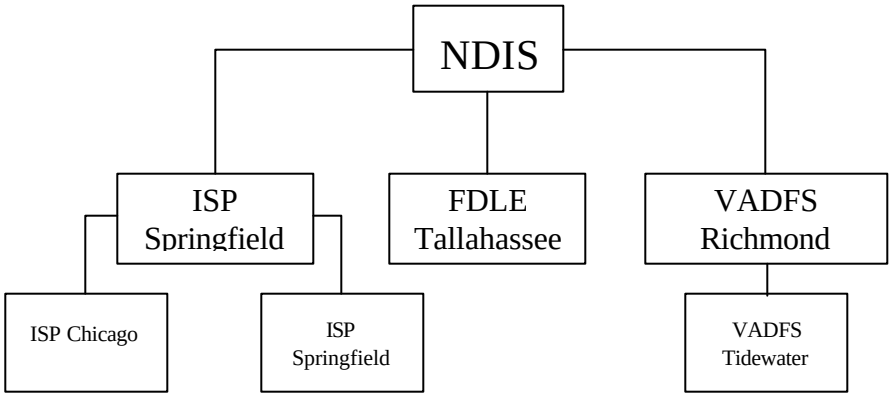
Metro-Dade Police Department (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #1	1	2						
Day #2	1	1						
Day #5		1		1				1
Total	**2**	**4**	**0**	**1**	**0**	**0**	**0**	**1**

FDLE Tallahassee (SDIS)						
Date	**FH**	**OH**	**IA**	**OHn**	**FH_n**	**IA_n**
Day #4				1		1
Day #5			1		1	1
Total	**0**	**0**	**1**	**1**	**1**	**2**

NDIS				
Date	**FH**	**OH**	**IA**	**Participating Labs**
Day #4		1	1	FDLE Tallahassee / San Diego PD
Day #5	1		2	Metro-Dade PD / Oakland PD
Total	**1**	**1**	**3**	

Explanation: Both local laboratories receive credit for assisting one case in their respective laboratories (1 IA apiece) and one investigation in another State (1 IA_n apiece), and for participating in a Forensic Hit at NDIS (1 FH_n apiece). Since NDIS is responsible for the hit, only NDIS receives direct credit for producing the hit (1 FH). Additionally, NDIS is credited with assisting two investigations nationally (2 IA). Having received a hit report about this national Forensic Hit, the two convicted offender laboratories can track the Investigations Aided by the hit. Each lab records one national Forensic Hit (1 FH_n), one Aided Investigation in their respective states (1 IA), and one Aided Investigation in another state (1 IA_n).

For the following examples we will use the laboratories listed in the diagram below. The FDLE Tallahassee, Virginia Division of Forensic Science (VADFS) Richmond, and Illinois State Police (ISP) Springfield laboratories are SDIS labs, while the other three laboratories are casework labs (LDIS). *It is important to note that in this diagram, the Springfield laboratory plays a dual role as the state repository and as a local casework laboratory. Offender laboratories that also perform casework must maintain separate scorecards for the two activities.*



Scenario #5

The ISP Chicago laboratory has an unsolved case from 1994 stored in LDIS. The ISP Springfield (LDIS) laboratory develops an unknown suspect case in 1998. On Day #1 the Springfield (SDIS) laboratory matches the profiles from the two laboratories.

The scorecards below show how to credit each participating laboratory:

ISP Springfield (SDIS)						
Date	**FH**	**OH**	**IA**	**OH_n**	**FH_n**	**IA_n**
Day #1	1		2			
Total	**1**	**0**	**2**	**0**	**0**	**0**

ISP Chicago (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #1		1	1				1	
Total	**0**	**1**	**1**	**0**	**0**	**0**	**1**	**0**

ISP Springfield (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #1		1	1				1	
Total	**0**	**1**	**1**	**0**	**0**	**0**	**1**	**0**

Explanation: Only the Springfield state laboratory (SDIS) can claim credit for the hit (1 FH). Both local laboratories receive credit for participating in a state hit (1 FH_s apiece), and for aiding one investigation in their respective laboratories (1 IA apiece). The local labs also receive credit for aiding investigations in one another's laboratories (1 IA_s apiece). Additionally, the state laboratory is credited for aiding two investigations within Illinois (2 IA).

Scenario #6

A new offender profile is entered into (SDIS) at the Springfield laboratory. On Day #2, this profile matches with the two previously linked cases from Chicago and Springfield.

The scorecards below show how to credit each participating laboratory:

ISP Springfield (SDIS)						
Date	**FH**	**OH**	**IA**	**OH_n**	**FH_n**	**IA_n**
Day #1	1		2			
Day #2		1				
Total	**1**	**1**	**2**	**0**	**0**	**0**

ISP Chicago (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #1		1	1				1	
Day #2					1			
Total	**0**	**1**	**1**	**0**	**1**	**0**	**1**	**0**

ISP Springfield (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #1		1	1				1	
Day #2					1			
Total	**0**	**1**	**1**	**0**	**1**	**0**	**1**	**0**

Explanation: Only hit points are awarded because both investigations have already been aided. (Remember Rule #3 says that an investigation can be aided only once.) The state lab (SDIS) is credited directly with the hit (1 OH), and the local labs get participation points (1 OH_s apiece).

Scenario #7

On Day #3, the FDLE Tallahassee lab works the same convicted offender that ISP Springfield worked in Scenario #6. (The offender's blood was collected in both states.) The FDLE profile is uploaded to NDIS, where it matches the Chicago and Springfield cases. Since ISP Springfield already solved these cases back in Scenario #6, there are no score changes. Although this may seem unfair, by crediting only the ISP Springfield lab with the hit you avoid double counting.

Scenario #8

On Day #4, a case from VADFS Tidewater is linked to the Illinois group of cases (and the convicted offender which solved them) at NDIS (see Scenario #6).

The scorecards below show how to credit each participating laboratory:

ISP Springfield (SDIS)						
Date	**FH**	**OH**	**IA**	**OH_n**	**FH_n**	**IA_n**
Day #1	1		2			
Day #2		1				
Day #4				1		1
Total	**1**	**1**	**2**	**1**	**0**	**1**

ISP Chicago (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #1		1			1		1	1
Day #2					1			
Day #4						1		1
Total	**0**	**1**	**0**	**0**	**2**	**1**	**1**	**2**

ISP Springfield (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #1		1	1				1	
Day #2					1			
Day #4						1		1
Total	**0**	**1**	**1**	**0**	**1**	**1**	**1**	**1**

VADFS Tidewater (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #4		1				1		
Total	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**0**

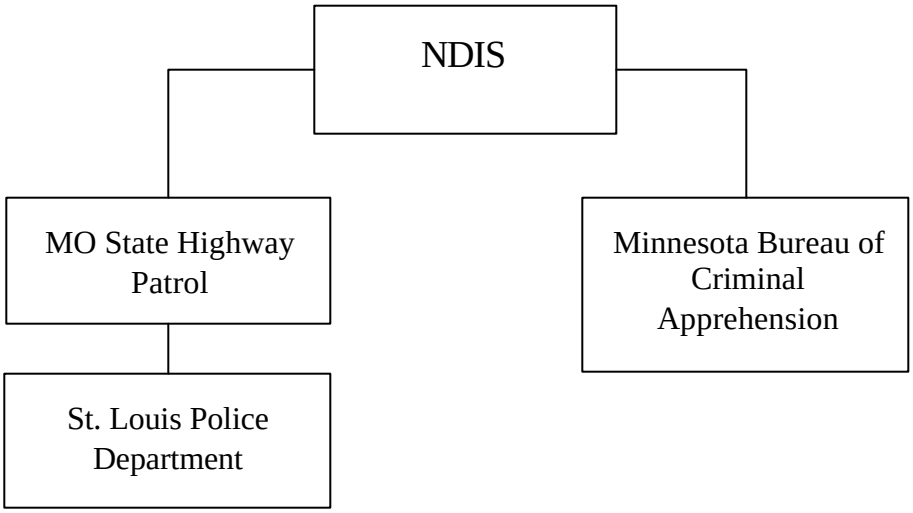
NDIS				
Date	**FH**	**OH**	**IA**	**Participating Labs**
Day #4		1	1	ISP Chicago / ISP Springfield / VADFS Tidewater
Total	**0**	**1**	**1**	

Explanation: Once again, since NDIS is responsible for the hit, it receives direct credit (1 OH). Only the new case from VADFS Tidewater is aided by the hit, so Tidewater receives 1 IA and 1 OH_n. Each of the three Illinois

laboratories receive 1 IA_n and 1 OH_n for their contribution to the national Offender Hit. NOTE: Although this hit could be considered a Forensic and Offender Hit, it should only be counted once, as an Offender Hit.

More Examples

The previous section provides examples of basic hit counting scenarios. This section provides exceptional cases. For the following scenarios, we will use the laboratories listed in the diagram below. The Missouri State Highway Patrol is an SDIS lab, the Minnesota Bureau of Criminal Apprehension is both an SDIS and LDIS lab, and the St. Louis Police Department laboratory is a casework lab (LDIS).



Scenario #1

An examiner at the St. Louis Police Department laboratory links three cases by comparing DNA profiles on the laboratory workbench, without using CODIS searching. Later that week, one of the cases is entered into the CODIS Forensic index. On Day #1, the case entered into CODIS hits a convicted offender profile at the Missouri State Highway Patrol's SDIS.

The scorecards below show how to credit each participating laboratory:

St. Louis Police Department (LDIS)

Date	FH	IA	FH_s	FH_n	OH_s	OH_n	IA_s	IA_n
Day #1		3			1			
Total	**0**	**3**	**0**	**0**	**1**	**0**	**0**	**0**

Missouri State Highway Patrol (SDIS)

Date	FH	OH	IA	OH_n	FH_n	IA_n
Day #1		1	3			
Total	**0**	**1**	**3**	**0**	**0**	**0**

Explanation: Since the hit occurred at SDIS, only the MO State Highway Patrol laboratory is credited with the hit. Missouri receives one Offender Hit (1 OH) and three Investigations Aided within the State (3 IA). The St. Louis PD lab can claim participation in one Offender Hit at SDIS (1 OH_s), and receives three Investigations Aided (3 IA). NOTE: Although the three cases had previously been linked using DNA, the hit still produces three Investigations Aided (3 IA) because it provides additional information to each investigation (i.e., each investigation in now linked to the convicted offender). Even though this could also be considered a Forensic Hit, it should be classified as an Offender Hit because Offender Hits take priority over Forensic Hits.

Scenario #2

Five rapes occur in St. Louis and are linked using latent fingerprints. DNA examiners at the St. Louis Police Department lab develop a profile from one of the cases, and enter it into CODIS. On Day #2, the profile matches a profile from a solved Minnesota case at NDIS.

The scorecards below show how to credit each participating laboratory:

St. Louis Police Department (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #1		3			1			
Day #2		5		1				
Total	**0**	**8**	**0**	**1**	**1**	**0**	**0**	**0**

Minnesota Bureau of Criminal Apprehension (SDIS & LDIS)						
Date	**FH**	**OH**	**IA**	**OH_n**	**FH_n**	**IA_n**
Day #2					1	5
Total	**0**	**0**	**0**	**0**	**1**	**5**

NDIS				
Date	**FH**	**OH**	**IA**	**Participating Labs**
Day #2	1	0	5	Minnesota Bureau of Criminal Apprehension / St. Louis Police Department
Total	**1**	**0**	**5**	

Explanation: NDIS gets a Forensic Hit (1 FH) and five Investigations Aided (5 IA). Minnesota contributed to a national Forensic Hit (1 FH_n) and aided five cases in another State (5 IA_n). No credit is given for aiding the case from

Minnesota: since the case was already solved, the hit added no value![3] St. Louis receives a national Forensic Hit (1 FH_n) and five Aided Investigations (5 IA). Although the cases had previously been linked by means other than DNA, the hit still produces five Investigations Aided (5 IA) because new information is provided to each case.

Aggregate Counting

Up to this point, we have focused exclusively on how individual laboratories count Investigations Aided and hits. In the real world, however, officials may be asked to describe the performance of CODIS across an entire state. To respond to this question, we must tally results across laboratories. (This is called aggregate counting.) The counting approach we have been using thus far readily adapts to aggregate counting.

Rules

1. Summing the Investigations Aided (IA) from each casework laboratory (LDIS) provides an exact count of all Investigations Aided in the State. Do ***not*** add in the IA_s and IA_n values, or the IA value at the offender laboratory (SDIS) – you will double count!
2. Summing all of the Forensic Hits (FH) made by casework labs in the State with the total number of Forensic Hits (FH) made at SDIS provides an exact count of all Forensic Hits within the State. Again, do ***not*** add in the FH_s and FH_n, values – you will double count.
3. Adding the total number of Forensic Hits in the State (from #2) to the number of Offender Hits (OH), provides an exact count of the total number of hits within the State. Again, to avoid double counting, do not add in FH_s, FH_n, and OH_n.

Example

Examples of aggregate counting are provided in ***What Would You Say?***

What Would You Say?

This section contains questions that may be asked by the press, budget personnel, or your boss. Each question is followed by a description of how to formulate an answer, a sample scorecard, and a sample response (calculated by summing the highlighted cells on the sample scorecard).

[3] In reality, hitting a solved case may add value – knowledge of an additional hit may be used at sentencing, etc. However, for the purpose of hit counting, we do not consider this added value.

Casework Labs

For this group of questions pretend you work for a casework laboratory (LDIS), and that the following scorecard shows the hits and Investigations Aided for your laboratory.

Casework Laboratory (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #1		1				1		1
Day #2		2	1				1	
Day #3		1			1			
Day #4		1			1		1	
Day #5	1	2						
Total	**1**	**7**	**1**	**0**	**2**	**1**	**2**	**1**

1. How many cases submitted to your laboratory has CODIS assisted?

Report the number in the "total" row under the "IA" column.

Casework Laboratory (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #1		1				1		1
Day #2		2	1				1	
Day #3		1			1			
Day #4		1			1		1	
Day #5	1	2						
Total	**1**	**7**	**1**	**0**	**2**	**1**	**2**	**1**

Your response: Seven of our cases have been assisted by CODIS.

2. How many hits have you made in your laboratory?

Report the "total" number under the "FH" column.

Casework Laboratory (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #1		1				1		1
Day #2		2	1				1	
Day #3		1			1			
Day #4		1			1		1	
Day #5	1	2						
Total	**1**	**7**	**1**	**0**	**2**	**1**	**2**	**1**

Your response: Our laboratory has made one internal CODIS hit.

3. How many cases submitted to your laboratory has SDIS assisted?

Sum the numbers in the "IA" column that correspond to SDIS hits (OH_s and FH_s).

Casework Laboratory (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #1		1				1		1
Day #2		2	1				1	
Day #3		1			1			
Day #4		1			1		1	
Day #5	1	2						
Total	**1**	**7**	**1**	**0**	**2**	**1**	**2**	**1**

Your response: Four of our cases were assisted by SDIS.

4. How many hits (Forensic and Offender) have you made at SDIS?

Sum the totals under the "FH_s" and "OH_s" columns.

Casework Laboratory (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #1		1				1		1
Day #2		2	1				1	
Day #3		1			1			
Day #4		1			1		1	
Day #5	1	2						
Total	**1**	**7**	**1**	**0**	**2**	**1**	**2**	**1**

Your response: Our laboratory has participated in three hits at SDIS.

5. How many cases submitted to your lab has NDIS assisted?

Sum the numbers in the "IA" column that correspond to any NDIS hits (OH_n and FH_n).

Casework Laboratory (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #1		1				1		1
Day #2		2	1				1	
Day #3		1			1			
Day #4		1			1		1	
Day #5	1	2						
Total	**1**	**7**	**1**	**0**	**2**	**1**	**2**	**1**

Your response: NDIS assisted one case that was submitted to our lab.

6. How many hits (Forensic and Offender) have you made at NDIS?

Sum the totals under the "FH_n" and "OH_n" columns.

Casework Laboratory (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #1		1				1		1
Day #2		2	1				1	
Day #3		1			1			
Day #4		1			1		1	
Day #5	1	2						
Total	**1**	**7**	**1**	**0**	**2**	**1**	**2**	**1**

Your response: Our laboratory participated in one hit at NDIS.

7. How many cases submitted to other labs in the State has your laboratory assisted?

Report the number in the "total" cell under the "IA_s" column.

Casework Laboratory (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #1		1				1		1
Day #2		2	1				1	
Day #3		1			1			
Day #4		1			1		1	
Day #5	1	2						
Total	**1**	**7**	**1**	**0**	**2**	**1**	**2**	**1**

Your response: Our lab aided two cases in other labs within the State.

8. How many cases elsewhere in the U.S. (outside of your State) has your laboratory assisted?

Report the number in the "total" cell under the "IA_n" column.

Casework Laboratory (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #1		1				1		1
Day #2		2	1				1	
Day #3		1			1			
Day #4		1			1		1	
Day #5	1	2						
Total	**1**	**7**	**1**	**0**	**2**	**1**	**2**	**1**

Your response: Our laboratory assisted one case in another State.

9. How many times have you matched against the State's Convicted Offender Index?

Report the number in the "total" row under the "OH_s" column.

Casework Laboratory (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #1		1				1		1
Day #2		2	1				1	
Day #3		1			1			
Day #4		1			1		1	
Day #5	1	2						
Total	**1**	**7**	**1**	**0**	**2**	**1**	**2**	**1**

Your response: Our laboratory has participated in two Offender Hits within the State.

10. How many of your cases were assisted by the State's Convicted Offender Index?

Sum all of the numbers under the "IA" column that correspond to any SDIS Offender Hits.

Casework Laboratory (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #1		1				1		1
Day #2		2	1				1	
Day #3		1			1			
Day #4		1			1		1	
Day #5	1	2						
Total	**1**	**7**	**1**	**0**	**2**	**1**	**2**	**1**

Your response: Two cases submitted to our lab were assisted by the State's Convicted Offender Index.

11. How many times have you matched against another state's Convicted Offender Index?

Report the number in the "total" cell of the "OH_n" column.

Casework Laboratory (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #1		1				1		1
Day #2		2	1				1	
Day #3		1			1			
Day #4		1			1		1	
Day #5	1	2						
Total	**1**	**7**	**1**	**0**	**2**	**1**	**2**	**1**

Your response: Our lab has participated in one interstate Offender Hit.

12. How many cases were assisted by another State's Convicted Offender Index?

Sum the numbers under the "IA" column that correspond to any NDIS Offender Hits.

Casework Laboratory (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #1		1				1		1
Day #2		2	1				1	
Day #3		1			1			
Day #4		1			1		1	
Day #5	1	2						
Total	**1**	**7**	**1**		**2**	**1**	**2**	**1**

Your response: One case submitted to our lab was assisted by another State's Convicted Offender Index.

Convicted Offender Labs (SDIS)

For this group of questions, pretend you work for an offender laboratory, and that the following scorecard shows the hits and Investigations Aided for your laboratory.

Convicted Offender Laboratory (SDIS)						
Date	**FH**	**OH**	**IA**	**OH_n**	**FH_n**	**IA_n**
Day #1	1		2			
Day #2		1	2			
Day #3				1		3
Day #4		1	3			
Day #5	1		1			
Day #6			2		1	3
Total	**2**	**2**	**10**	**1**	**1**	**6**

1. *How many Offender Hits have you made at SDIS?*

   Report the number in the "total" cell under the "OH" column.

Convicted Offender Laboratory (SDIS)						
Date	**FH**	**OH**	**IA**	**OH_n**	**FH_n**	**IA_n**
Day #1	1		2			
Day #2		1	2			
Day #3				1		3
Day #4		1	3			
Day #5	1		1			
Day #6			2		1	3
Total	**2**	**2**	**10**	**1**	**1**	**6**

   Your response: There have been two Offender Hits at SDIS.

2. *How many Forensic Hits have you made at SDIS?*

   Report the number in the "total" cell under the "FH" column.

Convicted Offender Laboratory (SDIS)						
Date	**FH**	**OH**	**IA**	**OH_n**	**FH_n**	**IA_n**
Day #1	1		2			
Day #2		1	2			
Day #3				1		3
Day #4		1	3			
Day #5	1		1			
Day #6			2		1	3
Total	**2**	**2**	**10**	**1**	**1**	**6**

   Your response: There have been two Forensic Hits at SDIS.

3. How many hits have you made at SDIS?

Sum the "total" numbers under the "FH" and "OH" columns.

Convicted Offender Laboratory (SDIS)						
Date	**FH**	**OH**	**IA**	**OH_n**	**FH_n**	**IA_n**
Day #1	1		2			
Day #2		1	2			
Day #3				1		3
Day #4		1	3			
Day #5	1		1			
Day #6			2		1	3
Total	**2**	**2**	**10**	**1**	**1**	**6**

Your response: There have been four hits at SDIS.

4. How many cases have been assisted by your SDIS?

Sum the numbers under the "IA_n" column that correspond to any national Offender Hits with the "total" number under the "IA" column.

Convicted Offender Laboratory (SDIS)						
Date	**FH**	**OH**	**IA**	**OH_n**	**FH_n**	**IA_n**
Day #1	1		2			
Day #2		1	2			
Day #3				1		3
Day #4		1	3			
Day #5	1		1			
Day #6			2		1	3
Total	**2**	**2**	**10**	**1**	**1**	**6**

Your response: Our SDIS has assisted 13 investigations.

5. How many cases within your State have been assisted by your Convicted Offender Index?

Sum the numbers under the "IA" column that correspond to any Offender Hits within your State ("OH" column).

Convicted Offender Laboratory (SDIS)						
Date	**FH**	**OH**	**IA**	**OH_n**	**FH_n**	**IA_n**
Day #1	1		2			
Day #2		1	2			
Day #3				1		3
Day #4		1	3			
Day #5	1		1			
Day #6			2		1	3
Total	**2**	**2**	**10**	**1**	**1**	**6**

Your response: Our Convicted Offender Index has aided five cases in the State.

6. How many cases within your State have been assisted by your Forensic Index?

Sum the numbers under the "IA" column on your scorecard that correspond to any SDIS Forensic Hits ("FH" column).

Convicted Offender Laboratory (SDIS)						
Date	**FH**	**OH**	**IA**	**OH_n**	**FH_n**	**IA_n**
Day #1	1		2			
Day #2		1	2			
Day #3				1		3
Day #4		1	3			
Day #5	1		1			
Day #6			2		1	3
Total	**2**	**2**	**10**	**1**	**1**	**6**

Your response: Our Forensic Index has assisted three cases within the State.

7. How many cases in other states have been assisted by labs in your State?

Report the number in the "total" cell under the "IA_n" column on your scorecard.

Convicted Offender Laboratory (SDIS)						
Date	**FH**	**OH**	**IA**	**OH_n**	**FH_n**	**IA_n**
Day #1	1		2			
Day #2		1	2			
Day #3				1		3
Day #4		1	3			
Day #5	1		1			
Day #6			2		1	3
Total	**2**	**2**	**10**	**1**	**1**	**6**

Your response: Our state laboratories have assisted six cases in other states.

8. How many NDIS hits have been made because of your Convicted Offender Index?

Report the number in the "total" cell under the "OH_n" column.

Convicted Offender Laboratory (SDIS)						
Date	**FH**	**OH**	**IA**	**OH_n**	**FH_n**	**IA_n**
Day #1	1		2			
Day #2		1	2			
Day #3				1		3
Day #4		1	3			
Day #5	1		1			
Day #6			2		1	3
Total	**2**	**2**	**10**	**1**	**1**	**6**

Your response: Our Offender Index was responsible for one interstate hit.

9. How many Forensic Hits has your State participated in at NDIS?

Report the number in the "total" cell under the "FH_n" column.

Convicted Offender Laboratory (SDIS)						
Date	**FH**	**OH**	**IA**	**OH_n**	**FH_n**	**IA_n**
Day #1	1		2			
Day #2		1	2			
Day #3				1		3
Day #4		1	3			
Day #5	1		1			
Day #6			2		1	3
Total	**2**	**2**	**10**	**1**	**1**	**6**

Your response: Our State has participated in one national Forensic Hit.

10. How many hits has your SDIS made for other states?

Sum the numbers in the "total" cells under the "OH_n" and "FH_n" columns.

Convicted Offender Laboratory (SDIS)						
Date	**FH**	**OH**	**IA**	**OH_n**	**FH_n**	**IA_n**
Day #1	1		2			
Day #2		1	2			
Day #3				1		3
Day #4		1	3			
Day #5	1		1			
Day #6			2		1	3
Total	**2**	**2**	**10**	**1**	**1**	**6**

Your response: Our SDIS has made two interstate hits.

11. How many cases in other states have been assisted by your Convicted Offender Index?

Sum the numbers in the "IA$_n$" column that correspond to any national Offender Hits ("OH$_n$" column).

Convicted Offender Laboratory (SDIS)						
Date	**FH**	**OH**	**IA**	**OH$_n$**	**FH$_n$**	**IA$_n$**
Day #1	1		2			
Day #2		1	2			
Day #3				1		3
Day #4		1	3			
Day #5	1		1			
Day #6			2		1	3
Total	**2**	**2**	**10**	**1**	**1**	**6**

Your response: Our Convicted Offender Index has assisted three investigations in other States.

12. How many cases in other states have been assisted by your cases in your State?

Sum the numbers in the "IA$_n$" column that correspond to any national Forensic Hits ("FH$_n$" column).

Offender Laboratory (SDIS)						
Date	**FH**	**OH**	**IA**	**OH$_n$**	**FH$_n$**	**IA$_n$**
Day #1	1		2			
Day #2		1	2			
Day #3				1		3
Day #4		1	3			
Day #5	1		1			
Day #6			2		1	3
Total	**2**	**2**	**10**	**1**	**1**	**6**

Your response: Three investigations in other states have been aided by cases in our State.

13. How many cases in your State were assisted by other states' Forensic Indexes?

Sum the numbers in the "IA" column that correspond to any Forensic Hits that occurred at NDIS ("FH_n" column).

Convicted Offender Laboratory (SDIS)						
Date	**FH**	**OH**	**IA**	**OH_n**	**FH_n**	**IA_n**
Day #1	1		2			
Day #2		1	2			
Day #3				1		3
Day #4		1	3			
Day #5	1		1			
Day #6			2		1	3
Total	**2**	**2**	**10**	**1**	**1**	**6**

Your response: Two cases in our State have been assisted by other States' Forensic Indexes.

Aggregate Questions (Answered by SDIS)

Aggregate questions apply to all laboratories in the State. Aggregate totals based on this methodology are guaranteed not to double-count. In order to determine aggregate totals, state laboratories must combine SDIS data with data from casework laboratories in the State. To answer the following questions, we will refer to data from two casework laboratories and a convicted offender laboratory. Once again, pretend you work for the convicted offender laboratory.

1. How many cases in your State have been assisted by CODIS?

Sum the numbers in the "total" cell under the "IA" columns on Casework Laboratory A's and Casework Laboratory B's scorecards.

Casework Laboratory A (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #1		1				1		1
Day #2		2	1				1	
Day #3		1			1			
Day #4		1			1		1	
Day #5	1	2						
Total	**1**	**7**	**1**	**0**	**2**	**1**	**2**	**1**

Casework Laboratory B (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #1	1	3						
Day #2		1	1				2	
Day #3		1		1				1
Day #4		1				1		
Total	**1**	**6**	**1**	**1**	**0**	**1**	**2**	**1**

Your response: Thirteen investigations in our State have been aided by CODIS.

2. *What is the total number of Forensic Hits in your State?*

Sum the "total" numbers for the "FH" column on Casework Laboratory A's, Casework Laboratory B's, and the Offender Laboratory's scorecards.

Casework Laboratory A (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #1		1				1		1
Day #2		2	1				1	
Day #3		1			1			
Day #4		1			1		1	
Day #5	1	2						
Total	**1**	**7**	**1**	**0**	**2**	**1**	**2**	**1**

Casework Laboratory B (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #1	1	3						
Day #2		1	1				2	
Day #3		1		1				1
Day #4		1				1		
Total	**1**	**6**	**1**	**1**	**0**	**1**	**2**	**1**

Offender Laboratory (SDIS)						
Date	**FH**	**OH**	**IA**	**OH_n**	**FH_n**	**IA_n**
Day #1	1		2			
Day #2	1		3			
Day #3			1		1	1
Day #3		1	1			
Day #4		1	1			
Day #5	1		1			
Total	**3**	**2**	**9**	**0**	**1**	**1**

Your response: There have been five Forensic Hits in our State. (Note: Two entries are listed under Day #3 on the offender laboratory's scorecard because a national Forensic Hit and a state Offender Hit both occurred on the same day.)

3. *What is the total number of Offender Hits, at SDIS and NDIS, in which your State participated?*

Sum the "total" numbers for the "OH_n" column on Casework Laboratory A's and Casework Laboratory B's scorecards with the numbers in the "total" cells under the "OH" and "OH_n" columns on the Offender Laboratory's scorecard.

Casework Laboratory A (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #1		1				1		1
Day #2		2	1				1	
Day #3		1			1			
Day #4		1			1		1	
Day #5	1	2						
Total	**1**	**7**	**1**	**0**	**2**	**1**	**2**	**1**

Casework Laboratory B (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #1	1	3						
Day #2		1	1				2	
Day #3		1		1				1
Day #4		1				1		
Total	**1**	**6**	**1**	**1**	**0**	**1**	**2**	**1**

Offender Laboratory (SDIS)						
Date	**FH**	**OH**	**IA**	**OH_n**	**FH_n**	**IA_n**
Day #1	1		2			
Day #2	1		3			
Day #3			1		1	1
Day #3		1	1			
Day #4		1	1			
Day #5	1		1			
Total	**3**	**2**	**9**	**0**	**1**	**1**

Your response: There have been a total of four Offender Hits to which our State contributed.

Sample Statements

Casework Lab (LDIS)

The Casework Scorecard below will be used for the sample statement that follows:

Casework Laboratory (LDIS)								
Date	**FH**	**IA**	**FH_s**	**FH_n**	**OH_s**	**OH_n**	**IA_s**	**IA_n**
Day #1	1	2						
Day #2	1	1						
Day #3	1	3						
Day #4		1		1				1
Day #5		1			1			
Day #6	1	4						
Day #7		1				1		
Day #8	1	2						
Day #9	1	3						
Day #10		1			1			
Day #11		1	1				2	
Day #12		1				1		
Day #13		1			1			
Day #14			1				3	
Day #15	1	2						
Day #16	1	2						
Day #17		2	1					
Day #18		1			1			
Day #19	1							
Day #20			1				1	
Day #21		1	1				1	
Day #22		1			1			
Day #23		1			1			
Day #24	1	3						
Day #25		2				1		
Total	**10**	**37**	**5**	**1**	**6**	**3**	**7**	**1**

As many of you are aware, our laboratory has been using DNA to solve crimes involving biological evidence for several years. In addition to comparing evidentiary samples collected at

crime scenes to samples from known suspects collected by the police, we also have an initiative targeted at solving cases with no suspects. This initiative, known as the Combined DNA Index System, or CODIS, is a collaborative effort among our laboratory, the Federal Bureau of Investigation, and other DNA laboratories throughout the US.

CODIS enables state and local crime laboratories to exchange and compare DNA profiles electronically, thereby linking serial violent crimes to each other and to known sex offenders.

Within our laboratory, CODIS has produced 10 hits (***FH***), aiding 22 investigations (***IA for FH***). Each of these hits was made from evidence submitted to our laboratory.

We are also committed to sharing our data with other laboratories in the state in an effort to fight crime. We periodically send our data to Laboratory X where it is compared against the State's convicted offender database, as well as cases submitted from other laboratories. This sharing initiative has paid-off: we have made six hits against the offender database (***OH_s***), aiding six cases in our lab (***IA for OH_s***). We have also made five hits with cases from other laboratories in the state (***FH_s***). These five hits have aided four of our cases (***IA for FH_s***), and seven cases belonging to other laboratories (***IA_s***).

We also share our data with the rest of the country by participating in the FBI's National DNA Index System, or NDIS. We have made four NDIS hits, three against individuals convicted of sex offenses in other states (***OH_n***), and one against another unsolved case in State Z (***FH_n***). These NDIS hits have assisted a total of five cases in our laboratory (***IA for FH_n and OH_n***), and one case in another State (***IA_n***).

In conclusion, by using CODIS, we have aided 37 cases submitted to our laboratory (***IA***), as well as eight cases from other jurisdictions (***IA_s plus IA_n***).

Convicted Offender Lab (SDIS)

The Offender Scorecard below will be used for the sample statement that follows:

Offender Laboratory (SDIS)						
Date	**FH**	**OH**	**IA**	**OH_n**	**FH_n**	**IA_n**
Day #1		1	2			
Day #2	1		3			
Day #3		1				
Day #3					1	
Day #4				1		2
Day #5	1		1			
Day #6		1	3			
Day #7		1	1			
Day #8			2		1	
Day #9		1	1			
Day #10					1	1
Day #11	1		2			
Day #12		1	2			
Day #13	1		1			
Day #14	1		1			
Day #15				1		1
Day #16	1		1			
Day #17			1		1	1
Day #18		1	1			
Day #19		1	2			
Day #20		1				
Day #21				1		1
Day #22	1		2			
Day #23	1		2			
Day #24		1	3			
Day #25		1				
Day #26	1		1			
Day #27		1	1			
Total	**9**	**12**	**33**	**3**	**4**	**6**

In addition to working DNA cases, our laboratory performs two other important crime-fighting functions. First, we collect and analyze DNA samples from individuals convicted of felony sex offenses, like rape. Second, our laboratory is the central repository for all of the forensic DNA profiles in the State. Combined, these two functions allow us to solve violent crimes that would otherwise go unsolved.

Using the Combined DNA Index System, or CODIS, which was developed by the Federal Bureau of Investigation, we search DNA profiles from unsolved cases against DNA profiles from convicted offenders and other cases. Matches made against other cases can link crime scenes together; possibly identifying serial offenders. Based on a match, police in multiple jurisdictions can coordinate their respective investigations, and share the leads they developed independently. Matches made against the Convicted Offender indexes provide investigators with the actual identity of the perpetrator(s).

We believe that our CODIS program has proven to be an effective tool for solving violent crimes. Our convicted offender database has produced 12 hits (***OH***) aiding 16 investigations in our State (***IA for OH***). That's 16 times we have provided the police with the name of a putative perpetrator! The convicted offender program has also proven useful to the rest of the U.S. – producing three hits (OH_n) and aiding four investigations in other states (IA_n ***for*** OH_n).

CODIS has also helped link serial cases across laboratories in the State. CODIS has produced nine hits among separate laboratories in the State (***FH***), aiding 14 separate investigations (***IA for FH***).

Our laboratory shares all of the DNA profiles with the rest of the U.S. by participating in the FBI's National DNA Index System, or NDIS. This data-sharing initiative has also proven effective: we have made four hits with other states (FH_n), assisting three investigations in our State (***IA for*** FH_n) and two investigations elsewhere in the U.S. (IA_n ***for*** FH_n).

In conclusion, our State CODIS database has assisted 33 cases submitted to laboratories in our State (***IA***), as well as six cases from other jurisdictions (IA_n).

Other Metrics

The hit counting methodology presented in this document is flexible and easily adapts to other metrics. For example, Offender and Forensic Hits can be further subdivided into cold and warm hits. Or, you can distinguish between hits that provide the police with names of suspects and hits that link unknown-suspect crime scenes. The definitions and rules provided in this document are flexible enough to accommodate any additional metrics you may use to measure the "value" of CODIS.

Appendix A: Scorecards

Casework Scorecard

Casework
Hit Counting Scorecard

Date	FH	IA	FH_s	FH_n	OH_s	OH_n	IA_s	IA_n
Total								

FH Forensic Hit made by searching your CODIS database. (One hit can link multiple cases.)

IA Cases belonging to your laboratory that were assisted by a CODIS hit at LDIS, SDIS, or NDIS. (Each case is counted only once!)

FH_s Forensic Hit made at SDIS that matched one or more cases from your laboratory.

FH_n Forensic Hit made at NDIS that matched one or more cases from your laboratory.

OH_s Offender Hit made at SDIS that matched one or more cases from your laboratory.

OH_n Offender Hit made at NDIS that matched one or more cases from your laboratory.

IA_s Cases belonging to other laboratories in your State that were linked to one or more cases from your lab through an SDIS hit. (Each case is counted only once!)

IA_n Cases belonging to other laboratories in the Country (outside of your State) that were linked to one or more cases from your lab through and NDIS hit. (Each case is counted only once!)

Convicted Offender Scorecard

Convicted Offender
Hit Counting Scorecard

Date	FH	OH	IA	OH_n	FH_n	IA_n
Total						

FH Forensic Hit made by searching your SDIS database. (One hit can link multiple cases within the State.)

OH Offender Hit made by searching your SDIS database. (One hit can link multiple offenders and cases)

IA Investigations Aided in the State by an SDIS or NDIS hit.

OH_n Offender Hit made at NDIS linking an offender from your State to one or more cases in other states.

FH_n Forensic Hit made at NDIS linking a casework sample from your State to one or more cases in other states.

IA_n Cases belonging to other laboratories in the country (outside of your State) that were linked to one or more cases from your State through an NDIS hit.

Entire State Lab Scorecard

Entire State Lab
Hit Counting Scorecard

Date	FH	OH	IA	$OH_n(1)$	$OH_n(2)$	FH_n	IA_n
Total							

FH Forensic Hit made by searching your SDIS database. (One hit can link multiple cases within the State.)

OH Offender Hit made by searching your SDIS database. (One hit can link multiple offenders and cases)

IA Investigations Aided in the State by an SDIS or NDIS hit.

OH_n (1) Offender Hit made at NDIS that matched one or more cases from your laboratory.

OH_n (2) Offender Hit made at NDIS linking an offender from your State to one or more cases in other states.

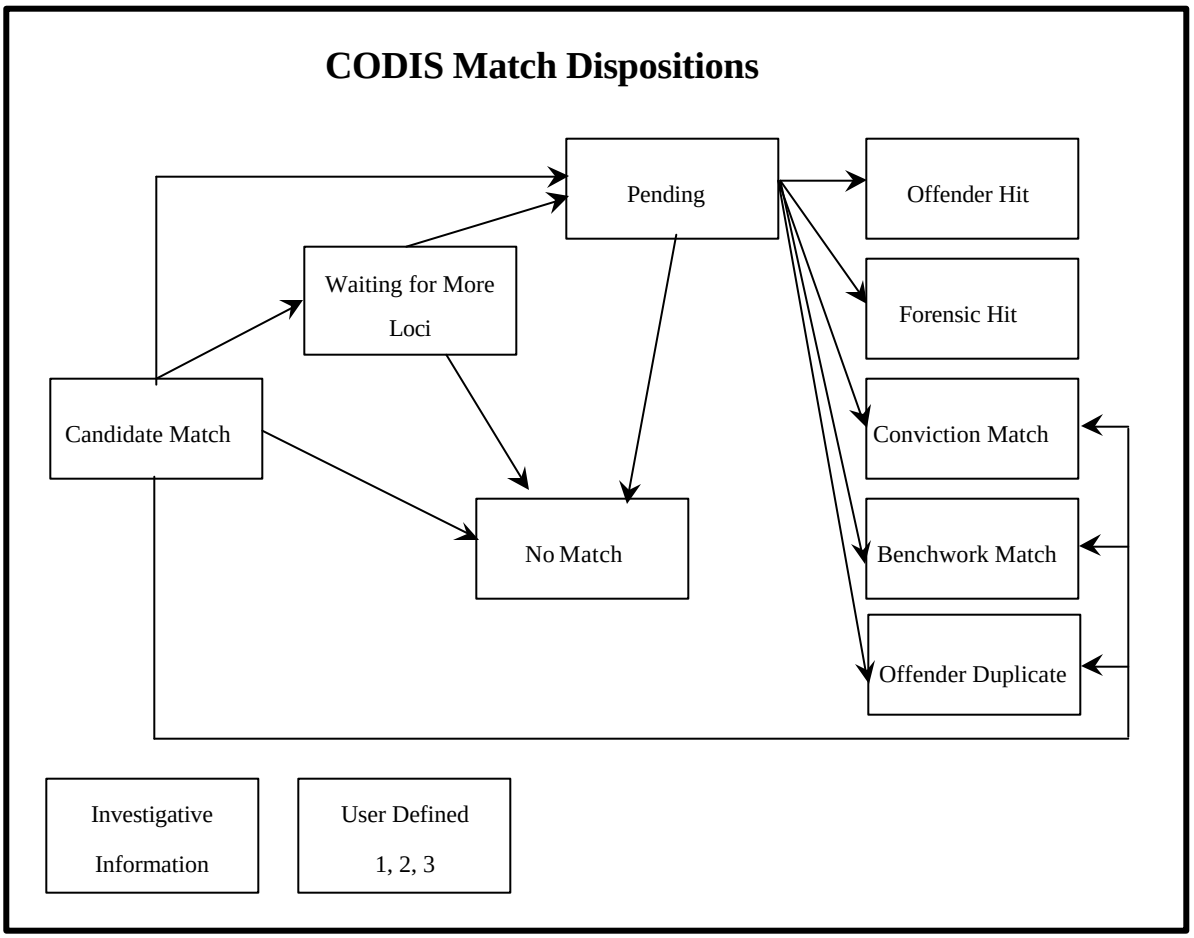
FH_n Forensic Hit made at NDIS linking a casework sample from your State to one or more cases in other states.

IA_n Cases belonging to other laboratories in the country (outside of your State) that were linked to one or more cases from your State through an NDIS hit.

Appendix B: CODIS Match Dispositions

CODIS Match Dispositions

Following is a list of CODIS Match Dispositions, and how they are interrelated.



Disposition	Description
Candidate Match	A possible match between two or more DNA profiles discovered by CODIS software (AutoSearcher, Searcher, or Batch Search). Candidate Matches must be confirmed or refuted by qualified DNA analysts. If profiles from multiple laboratories are included in a Candidate Match, a qualified DNA analyst from each laboratory must participate in the

	confirmation process. The Searcher family of programs is capable of generating many candidate matches, depending on the configuration of stringency, match window, equivalent alleles, number of missing loci, etc.
Waiting For More Loci	Waiting for More Loci is an intermediate step, indicating that the match is undergoing confirmation by at least one qualified DNA analyst (see *NDIS Operational Procedures, Confirm an Interstate Candidate Match*). The qualified DNA analyst confirming the Candidate Match has determined that one (or more) additional loci must be analyzed before the match can be confirmed or refuted. The Candidate Match enters the Waiting for More Loci step until the loci are completed. This situation is likely to occur with RFLP data because of changes to NDIS core loci requirements for Convicted Offenders. Before January 1, 1997, the NDIS core loci for convicted offender RFLP data were D2S44, D4S139, and D10S28. On January 1, 1997, this requirement was expanded to include D5S110. However, D5S110 was not required for profiles generated before January 1, 1997. Because many convicted offender profiles produced before this date have only three loci, the NDIS procedure *Confirm an Interstate Candidate Match*, requires the laboratory to run D5S110 as one of the first steps in the confirmation process.
Pending	Pending is also an intermediate step, indicating that the Candidate Match is being confirmed by at least one qualified DNA analyst (see *NDIS Operational Procedures, Confirm an Interstate Candidate Match*). Based on an initial review of the match report, one (or more) qualified DNA analyst(s) has determined that the match requires confirmation. The Candidate Match enters the Pending step until the qualified DNA analyst(s) completes the confirmation process and either declares or refutes the Pending match. The confirmation process may include many activities – from pulling an offender sample from the freezer to verifying sizing results. All such activities are considered Pending.
Offender Hit	An Offender Hit (**OH**) occurs when one or more forensic samples are linked to a convicted offender sample at SDIS or NDIS. Offender Hits are sometimes called case-to-offender hits. Cold and warm hits are counted as Offender Hits. Note:

	states permitted to have "suspect" indexes should classify hits against this index as Offender Hits.
Forensic Hit	A Forensic Hit (**FH**) occurs when two or more forensic samples are linked at LDIS, SDIS, or NDIS. Forensic Hits are sometimes called case-to-case hits. Cold and warm hits are counted as Forensic Hits.
The difference between cold and warm hits	In a cold hit, there is no prior indication that the DNA profiles are related. Cold hits add value by linking cases that are previously unlinked, or by providing investigators with the identity of a known convicted offender. In a warm hit, investigators have a hunch that there may be a match in CODIS. A typical example of a warm hit is when several cases or offenders are searched with the suspicion that two or more match. Warm hits add value by reducing the investigative resources that would otherwise be required to link the cases.
Conviction Match	A Conviction Match occurs when CODIS matches a DNA profile developed from crime scene evidence to a DNA profile from a convicted offender, but the crime from which the evidence was collected has already been solved and linked with the offender. For *intra*state matches, a Conviction Match is usually between the convicted offender's DNA profile and the evidence used to convict him/her. For *inter*state matches, a Conviction Match usually indicates that the perpetrator has been convicted of a different crime in another State. This is not an Offender Hit, because the information is most likely already captured in the States' criminal history record system. In some instances, a Conviction Match can be determined directly from reviewing the Candidate Match; the Pending and Wait for More Loci steps can be skipped. In a sense, Conviction Matches are a form of blind external testing –the offender ought to match the evidence for which s/he was convicted.
Benchwork Match	A Benchwork Match is like a Conviction Match, except it applies only to the Forensic index. Benchwork Matches occur when profiles from several cases linked external to CODIS (i.e., the examiner links the cases by matching DNA profiles on the workbench) are also matched subsequently by CODIS.
Offender Duplicate	An Offender Duplicate indicates that two convicted offender

	profiles match. Offender Duplicates occur when the Offender index is searched against itself. While an Offender Duplicate match does not provide probative information, it is a form of blind testing. Offender Duplicates also provide insight into the efficacy of the sample collection and analysis infrastructure.
No Match	During the confirmation process, a qualified DNA analyst determines that a Candidate, Pending, or Waiting for More Loci Match is not a true DNA match.
User Defined #1 User Defined #2 User Defined #3	The User Defined dispositions exist for the convenience of state and local laboratories. For example, they can be used to further refine the Pending disposition.
Investigative Information	The Investigative Information disposition is a cross between a No Match and a Warm Match. Consider the following scenario: a police officer develops a suspect in a violent crime and has the suspect's profile searched in CODIS. The suspect's profile does not match any other profiles in CODIS. Although the search is a No Match, it does provide probative information. Based on the suspect being excluded by the CODIS search, the investigating agency can redeploy resources to other suspects/leads. The Investigative Information disposition will usually be set from the Searcher program.

APPENDIX H

List of SPOCs

March 12, 2001Single Point of Contact

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