

Metrics for the Massachusetts State Police Crime Laboratory Combined DNA Index System (CODIS) for Calendar Year 2008

Purpose

This report was prepared in response to a requirement in the Governor's General Appropriations Act FY2009 (8000-0106), which requires that the Massachusetts State Police Crime Laboratory submit, through the Executive Office of Public Safety and Security (EOPSS), a report to the house and senate committees on ways and means and to the joint committee on public safety and homeland security. The budget language specifies that the agency shall report information including the number of cases introduced to the CODIS database, the number of confirmations attained from the CODIS database and the number of cases referred to district attorneys, delineated by county. This report contains the requested information; further metrics and information concerning other aspects of forensic services offered by the Massachusetts State Police Forensic Services Group are available.

Summary

In 2008, the Massachusetts State Police (MSP) continued to operate its forensic services under the scientific guidance of an Acting Director. Under this organization, the forensic services provided by civilian and sworn examiners were consolidated under unified scientific direction and collectively the team is now called the MSP Forensic Services Group. The civilian forensic scientists retain the Crime Laboratory name as a sub-division of the MSP Forensic Services Group. While improvements in services have been made in CODIS during 2008, other disciplines within the newly consolidated system also achieved great success in 2008. For the first time in Massachusetts, forensic disciplines including latent prints, firearms identification (ballistics), digital evidence, and crime scene response were accredited by the American Society of Crime Laboratory Directors / Laboratory Accreditation Board (ASCLD/LAB). This achievement demonstrates that the forensic services provided by the Massachusetts State Police Forensic Services Group comply with nationally accepted quality assurance standards, and the accreditation provides the criminal justice system with objective external assurance of this compliance.

Following much reorganization in 2007, MSP CODIS operations stabilized in 2008. In 2007 a large backlog of convicted offender samples was nearly eliminated which resulted in an unusually high number of offender profiles being uploaded to the database and an unusually high number hits to cases. Such high numbers are not expected on an annual basis. Once the offender backlog was reduced, the Forensic Services Group Acting Director implemented systems to effectively manage the number of convicted offender samples expected annually. Units were reorganized and staffed appropriately to accomplish tasks necessary to effectively manage CODIS. Though employee resignations and recent budget constraints do

not allow the system to reach its full potential, progress continues to be made and investigations continue to be aided.

In summary for 2008:

- The Crime Lab collected 7,720 offender samples, down from 8,350 offender samples in 2007.
- The Crime Lab uploaded 14,055 offender DNA profiles into the national DNA databank. In 2007, the Crime Lab had uploaded 49,179 offender profiles which represented nearly 7 years of backlogged samples. It is expected that in years forward, the number of offender profiles uploaded annually will approximate the number of offender samples collected annually (allowing for analysis time).
- In 2008, Massachusetts uploaded 910 forensic DNA profiles into the national DNA databank. In 2007, 895 forensic samples were uploaded.
- The CODIS database resulted in 53 forensic case-to-case hits compared to 163 in 2007 (Note that the number of cases involved in hits in 2007 was 382, and in 2008 it is 415).
- There were 365 case-to-offender hits in 2008, a 67% increase compared to the 219 case-to-offender hits in 2007.
- These CODIS hits aided investigations in all counties in Massachusetts except Berkshire County, as well as 6 other states or jurisdictions.

Background

The Combined DNA Index System (CODIS) is a computerized network that stores DNA profiles and enables them to be searched against one another. The most common use of the CODIS database is to search offender DNA profiles and forensic casework DNA profiles to generate investigative leads in criminal cases.

The national DNA network is overseen by the Federal Bureau of Investigation (FBI) and enables DNA profiles from throughout the country to be searched against one another. A national database such as this helps solve crimes committed by perpetrators who re-locate or are transient and commit crimes in many states. The FBI utilizes state Crime Laboratories to maintain state DNA indices that feed-into the national DNA database. As of October 2008, the National DNA Index System (NDIS) contained 6,249,530 offender DNA profiles and 241,685 forensic DNA profiles.

The CODIS database has existed in Massachusetts and been administered by the Massachusetts State Police (MSP) Crime Laboratory since the year 1999. The database experienced tremendous growth in 2004 when state law changed, allowing the inclusion of DNA samples from all felons rather than the specific 33 offenses allowed in the former legislation.

Administration of CODIS

The administration of the CODIS program can be characterized by six general categories of work conducted by the Massachusetts State Police Crime Laboratory:

1. **Collections:** This category includes scheduling collections, collecting DNA samples and information from offenders, and verifying that each offender has been convicted of a felonious offense that qualifies his/her DNA profile to be maintained in the CODIS database. DNA collections are done primarily by Crime Laboratory personnel in conjunction with County Correctional Facilities, the Department of Correction, and Probation Departments. This category requires technicians who are certified to perform DNA collections and are adept at a multitude of administrative elements needed to schedule and track masses of information, and staff who are trained and certified to assess criminal records through the Board of Probation.
2. **Analysis – Offender Samples:** This category involves conducting DNA analysis on the offender specimens, either at the MSP Crime Laboratory or via outsourcing to a private laboratory. The analysis step requires that qualified DNA analysts perform necessary reviews and quality assurance tasks to ensure the accuracy of DNA data in CODIS.
3. **Analysis – Forensic Samples:** This category involves conducting DNA analysis on forensic casework specimens, either at the MSP Crime Laboratory or via outsourcing to a private laboratory. The analysis step requires that qualified DNA analysts perform necessary reviews and quality assurance tasks to ensure the accuracy of DNA data in CODIS.
4. **Database Search:** The computer compares offender DNA profiles and forensic casework DNA profiles in CODIS, and searches for ones that are the same. This category requires that qualified DNA analysts assess the potential matches identified by the computer search.
5. **Verification:** This category occurs after an offender's DNA profile in CODIS has been determined to be the same as a forensic casework DNA profile in CODIS (e.g., case-to-offender "Hit"). This quality assurance category exists to ensure that correct information about the "Hit" is reported to investigators as investigative leads. Three verification steps occur. One involves retesting the offender DNA sample to verify that the result contained in the CODIS database is correct. The second verification step involves verifying the identity of the offender by comparing the inked-fingerprint provided at the collection to the fingerprint record contained in the Automated Fingerprint Identification System (AFIS). The third verification step involves re-checking the status of the qualifying offense of the offender involved in the putative CODIS Hit. These three verification steps require the resources and expertise of several forensic and police experts including qualified DNA analysts, qualified fingerprint examiners, and individuals trained and certified to assess criminal offenses for qualification in CODIS.

6. **Hit Report:** This category involves the issuance of a formal report of the CODIS Hit and may involve case-to-offender hits or forensic case-to-case hits. The reports are issued to case investigators and jurisdictional district attorney's offices, or to the respective Crime Laboratories in the case of out-of-state CODIS Hits or Hits involving cases from the Boston Crime Laboratory. For accreditation and quality assurance purposes, CODIS Hit Reports are technically and administratively reviewed by qualified individuals before issuance.

In addition to these tasks, there are many other elements of the CODIS program such as compiling and reporting statistics to the FBI, researching and creating systems to ensure all eligible offenders are participating in CODIS, upgrading and validating new database software, and enhancing analytical capabilities through the use of automation and robotics. The CODIS program is a complex operation, requiring collaboration and coordination between many entities both internal to the MSP Forensic Services Group and external to the MSP, and requiring continuous improvement to keep pace with new technologies and voluminous amounts of information. Continued support, collaboration, funding and resources are needed to maintain the successful administration of the complex system of CODIS.

Summary of Work – 2008

In 2008, the MSP uploaded 14,055 profiles from convicted offenders into NDIS, the national level of CODIS. This figure represents slightly more than is expected annually since it includes a few thousand samples which remained on the backlog from 2007. In 2007, the MSP uploaded over 49,000 offender profiles into NDIS as a result of a focused, systematic effort to eliminate the backlog of offender profiles awaiting upload. This effort was successful, and the Crime Laboratory began 2008 with a minimal backlog.

Until April 2008 the Crime Laboratory had grant funds to outsource the analysis of convicted offender samples. When offender samples were outsourced, the DNA data still had to be reviewed by a qualified DNA analyst employed by the MSP Crime Laboratory prior to the data being uploaded to CODIS. Since the Crime Laboratory must retain responsibility for the accuracy of DNA data in CODIS, the data review and assurance of the quality of the DNA data was a responsibility that could not be outsourced. DNA data review was tedious, sometimes time-consuming task that, according to the FBI, had to be conducted by qualified MSP DNA analysts. At the MSP Crime Laboratory, these were the same DNA analysts who were responsible for conducting DNA analysis on forensic samples from criminal cases. Thus, the tasks competed for the analysts' expertise and it was these competing priorities that resulted in the Crime Laboratory having a tremendous backlog of offender profiles prior to 2007.

The Crime Laboratory needed a new approach in order to provide the best DNA analysis service to the criminal justice community. A system was needed that

would ensure quality and timely service not only for forensic cases but also for the DNA analysis of offender samples for CODIS. It is evident that it is inefficient for qualified case-working DNA analysts to perform the redundant, time-consuming step of reviewing thousands of DNA profiles from a vendor laboratory. It is most efficient to conduct the entire testing in-house, and devote qualified employees to perform the DNA analysis of offender samples from start-to-finish.

Organizing the laboratory in this manner with staff having designated tasks also provides professional development for inexperienced DNA analysts, who may begin a career in forensic DNA analysis by learning analytical techniques on straight-forward samples collected directly from individuals. Then, as their skills evolve, they may be tasked to analyze complex crime scene samples often involving mixtures of DNA. This approach creates a progressive work environment with a system prepared to minimize the impact of staff turn-over, as analysts are available to assume more complex roles.

Since April 2008, the Crime Laboratory has been analyzing offender samples in-house. The Crime Laboratory procured sufficient resources to analyze the expected annual influx of offender samples collected under current legislation. This is estimated at 10,500 samples requiring analysis annually (including quality assurance controls). Grant funds enabled the purchase of equipment and data management software. State funds provided the resources for staff, training, and consumable supplies and chemicals such as DNA testing kits. Each convicted offender DNA test is estimated to cost \$37 in consumable chemicals and supplies, resulting in a projected annual consumable laboratory supply cost of \$388,500. (Note that this figure is for CODIS samples only and does not reflect the projected cost of consumables for forensic cases and crime scene samples).

The goal was for the DNA Unit to be able to analyze collected offender samples as soon as possible after they were collected. This required that the DNA Unit have the capacity to analyze up to 875 samples per month (including necessary controls). During 2008, the Crime Laboratory ramped-up its capacity to achieve this goal and is presently able to analyze the number of samples collected each month.

In 2008, the Crime Laboratory collected 7,720 offender samples or an average of 643 samples per month. This figure is less than last year, where nearly 700 offender samples were collected each month. The reduction in collections can be explained in several ways. First, it is unlikely that the Crime Lab is collecting from every eligible offender, and the number of monthly collections is dependent on how many individuals are presented for collection. The Crime Laboratory collects DNA from offenders at correctional facilities when the facility employees present the offenders for collection. The Crime Lab also collects DNA from offenders who self-identify as instructed by the court (e.g., as a condition of probation). It is possible that there are offenders who are eligible to be in the CODIS database but who have not identified themselves for DNA collection.

Another explanation for the reduction in collections compared to last year is that the Crime Laboratory unit that schedules and collects DNA samples from offenders was operating at a staff level of 67% for much of 2008 and is currently operating at 50% staff. The staffing level is not expected to improve with current fiscal constraints, which will result in even fewer collections in the future.

Annual Metrics – 2008

Number of Cases Introduced to CODIS:

The General Appropriations Act for FY2009 requires that the Crime Laboratory provide information concerning the number of cases introduced to the CODIS database. There are several metrics to consider. The first metric to consider is the number of samples *collected* from Massachusetts offenders in 2008. Those figures are shown below in Table 1. The figures shown represent samples that have been collected and could potentially be uploaded to CODIS, pending successful DNA analysis and satisfactory review for inclusion in the database. Table 1 depicts the agencies from which the offenders originate, as well as the number of samples collected by month. A total of 7,720 offender samples were collected in 2008, with a monthly average of 643.

The Crime Laboratory still estimates that annually there are up to 10,000 eligible convicted offenders who should be providing DNA samples for CODIS under current legislation.

Table 1: Summary of Offender Collections for CODIS - 2008

Month	CCF	DOC	DYS	Parole	Probation	Total
Jan	295	145	5	1	211	657
Feb	297	130	5	0	236	668
Mar	277	170	5	0	243	695
Apr	348	163	4	0	166	681
May	281	171	1	1	261	715
June	281	150	4	0	242	677
July	244	154	2	1	196	597
Aug	176	113	0	0	177	466
Sept	277	108	5	0	232	622
Oct	511	166	3	0	196	876
Nov	209	120	7	0	256	592
Dec	222	132	0	0	120	474
Total	3418	1722	41	3	2536	7720

CCF = County Correctional Facility
 DOC = Department of Correction
 DYS = Department of Youth Service

Another metric to consider is the actual number of offender profiles uploaded to the national DNA network, NDIS. There are currently 63,041 Massachusetts offender DNA profiles at NDIS, and 14,055 of them were uploaded in 2008.

The final metric to consider regarding this request is the number of forensic case DNA profiles that were uploaded to the DNA databank in 2008. Forensic case DNA profiles are derived from evidence collected from crime scenes and are distinct from offender samples, which are collected from known individuals. During 2008, 910 forensic profiles were uploaded to NDIS. This figure includes 754 forensic profiles analyzed by the Massachusetts State Police Crime Laboratory (and its sub-contractor) and 156 forensic profiles analyzed by the Boston Police Department Crime Laboratory.

Number of Confirmations Attained from The CODIS Database:

The General Appropriations Act for FY2009 requires that the Crime Laboratory provide information concerning the number of confirmations attained from the CODIS database. Here too, there are several things to consider. Hits resulting from the CODIS database can be categorized as either case-to-case hits or case-to-offender hits. Sometimes several cases are linked to each other and also to an offender, solving many cases at one time. When the Crime Laboratory issues a Hit Report, it often contains information from many cases in one report if, for example, several cases were linked to each other and also to an offender. For this reason, the number of actual hit reports issued by the Crime Laboratory differs from the number of cases that were linked – either to each other or to an offender - by the database. Presented herein is the summary of cases aided; the number of reports issued is not presented.

Table 2 summarizes the number of new cases that had investigative leads developed by CODIS in 2008. Table 2(a) shows the number of cases that were involved in hits, while Table 2(b) shows the number of offenders that were involved in hits. Note that cases aided by CODIS from the Boston Police Department Crime Laboratory (BPDCL) are reported separately from those from the Massachusetts State Police Crime Laboratory.

Table 2: Summary of Cases Involved in Hits in 2008

(a) Cases with Hits in 2008

Jurisdiction	Number of Cases
Massachusetts cases (except Boston)	323
Boston Police Department cases	88
Other State cases	7
Total	418

(b) Offenders with Hits in 2008

Jurisdiction	Number of Cases
Massachusetts Offenders	329
Other State Offenders	36
Total	365

Many different types of cases are solved using the CODIS database. Table 3 summarizes the types of cases that had CODIS hits in 2008. Most of the Massachusetts CODIS hits involved Breaking & Entering cases, but 105 Reported Sexual Assault cases and 10 fatal investigations were aided by CODIS hits in 2008.

Table 3: Summary of CODIS Hits in 2008, by Case Type

Case Type	Number of Cases
Unknown*	118
Armed Robbery	12
Breaking & Entering	169
Fatal	10
Stolen Vehicle	3
Investigation	8
Larceny	1
Non-Fatal	7
Property Damage	3
Reported Sexual Assault	105
Total	436

* Case-types are classified as "unknown" because when hits occur to cases from other states or to cases from the Boston Police Department, the MSP Crime Laboratory is not automatically privy to the case-type. Complete case-type information is only available for cases originating from the Massachusetts State Police Crime Laboratory.

Number of Cases Referred to District Attorneys, Delineated by County

The General Appropriations Act for FY2009 requires that the Crime Laboratory provide information concerning the number of cases referred to District Attorneys, delineated by county. Generally, hits are reported to the investigator and to the jurisdictional district attorney's office. Some CODIS hits identified by the MSP Crime Laboratory involve cases from jurisdictions outside of Massachusetts, and these hits are reported to the respective Crime Laboratory responsible for the DNA profile in CODIS. Likewise, hits involving Boston Police Department cases are reported to the Boston Police Department Crime Laboratory, which reports those

cases to the Suffolk County District Attorney's Office, if applicable. Table 4 summarizes the jurisdictions of the cases that were aided by CODIS hits in 2008.

Table 4: Summary of CODIS Hits in 2008, by County/Jurisdiction

District Attorney's Office	Number of Cases
Other* (e.g., other states, BPDCL)	141
Berkshire	0
Bristol	29
Cape & Islands	6
Essex	39
Hampden	60
Middlesex	60
Norfolk	43
Northwestern	7
Plymouth	14
Suffolk	6
Worcester	46
Total	451

* The "other" classification is used to summarize hits that occurred for cases from other states or hits for cases from the Boston Police Department. These cases are referred to the respective Crime Laboratory responsible for the forensic DNA profile in CODIS.

Approximately 88% of the CODIS Hits in 2008 involved cases from Massachusetts; this includes all those shown in the Massachusetts counties above as well as approximately 88 cases from the Boston Police Department, representing additional Suffolk County cases. Twelve percent of the CODIS Hits that occurred in 2008 involved cases from other states. Table 5 summarizes the other states to which the MSP Crime Laboratory issued CODIS Hit reports in 2008 (i.e., the offender's DNA sample was collected in Massachusetts).

Table 5: Summary of CODIS Hit Reports Issued to Other States – 2008

State or Jurisdiction	Number of Reports
CT	1
MD	1
ME	1
NH	1
NY	2
RI	3
Total	9

In 2008, investigations were aided in our neighboring states as well as Maryland. The availability and widespread use of CODIS as a national tool to help solve crimes is so important for the criminal justice community.

Conclusion

The MSP Crime Laboratory is grateful for the legislature's support to effectively administer the CODIS system in Massachusetts. Continued fiscal support for staff and consumable supplies and chemicals such as DNA testing kits are essential to the effective use of this powerful investigative tool. Future enhancements to the program include advanced data-tracking systems as well as enhanced collaborations with other agencies such as the Probation Department. Such enhancements will ensure the most effective application of the CODIS program to aid as many investigations as possible for public safety.