



Making Sense of DNA Backlogs — Myths vs. Reality

by Mark Nelson

NIJ addresses the challenge of keeping up with an increasing volume of evidence.

We have all seen the headlines — thousands of untested rape kits have been discovered in law enforcement agencies, and crime laboratories have large backlogs of DNA cases awaiting analysis.

Delays in sending evidence to forensic laboratories and further delays in analysis slow the criminal justice system. In worst-case situations, such delays can contribute to added victimization by serial offenders or imprisonment for people who have not committed a crime.

Why do backlogs persist even after the federal government has spent millions of dollars to address the problem? The backlog picture is complex and requires an understanding of

the types of backlogs that exist and the ways crime laboratories work.

What Constitutes a Backlog?

There is no industry wide definition of a backlog. Some laboratories consider a case backlogged if the DNA has not been analyzed after 90 days. Others consider a case backlogged only if the DNA has not been analyzed and the final report sent to the agency that submitted the DNA. The National Institute of Justice defines a backlogged case as one that has not been tested 30 days after it was submitted to the laboratory.

Discussion of and research about backlogs must take into consideration the varying definitions of the

MYTH — Backlogs are a one-time event. As long as one chips away at the backlog of untested cases, it will eventually go away.

term. In addition to delineating length of time, it also is important to identify the type of backlog being referenced. There are two types: (1) casework backlogs and (2) convicted offender and arrestee DNA backlogs.

Casework backlogs. This type of backlog is comprised of forensic evidence collected from crime scenes, victims and suspects in criminal cases and then submitted to a laboratory. Processing this evidence is time-consuming because it must first be screened to determine whether any biological material is present and, if so, what kind of biological material it is. Only then can DNA testing begin. In addition, some samples can be degraded or fragmented or may contain DNA from multiple suspects and victims.

Convicted offender and arrestee DNA backlogs. DNA samples taken from convicted offenders and arrestees pursuant to federal and state laws are significantly easier and faster to analyze than casework samples because they are collected on identical media (usually a paper product). The standardized collection methods in each state allow the laboratory to use automated analysis of many samples at once. Robotic platforms, for example, can process scores of these samples and

the appropriate controls at the same time, generally in a 96-sample format. In addition, unlike with forensic casework samples, the laboratory analyst does not need to “find” the DNA amidst the evidence.

A related but quite different problem involves untested evidence collected from crime scenes and stored in law enforcement evidence rooms that has not been submitted to a crime laboratory for analysis. Recent headlines about backlogs refer to rape kits being stored in law enforcement evidence rooms. NIJ considers untested evidence awaiting submission to laboratories to be a matter separate and different from backlogs in crime laboratories. Federal funding programs to reduce backlogs in crime laboratories are not designed to address untested evidence stored in law enforcement agencies. (See “Untested Evidence: Not Just a Crime Lab Issue” on page 28 of this issue.)

Why Do DNA Backlogs Persist?

Consider the data in figure 1, “DNA Casework: Supply, Demand, Backlogs,” and the story they tell about crime laboratory backlogs. Each of the three graphs show DNA backlogs at a particular moment in time. While study methodology differed, each graph portrays the same pattern: even though capacity is increasing, the new cases received by DNA laboratories outpace the ability of laboratories to complete the cases — hence, a backlog.

Today’s casework backlog consists of recent cases, not older ones; the backlogged cases from 2004, when Congress passed the DNA Initiative legislation, are gone.¹

REALITY — Backlogs are not a one-time event. They are dynamic and subject to the law of supply and demand. They may go down, but they may go up.

The bottom line: Crime laboratories have increased their capacity to work cases significantly, but they are not able to eliminate their backlogs because the demand continues to exceed the increases made in capacity.

Why Is Demand for DNA Testing Increasing?

Demand for DNA testing of forensic cases is rapidly increasing for several reasons:

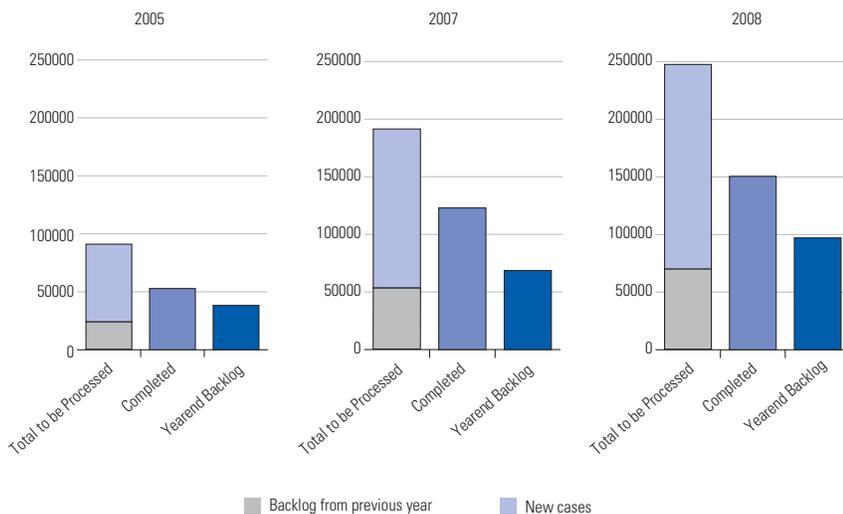
- **Increased Awareness.** Knowledge of the potential of DNA evidence to solve cases has grown exponentially in recent years, not just among professionals in the criminal justice system but also among the general public.
- **Property Crimes.** The number of property crimes being sent for DNA testing is skyrocketing, and property crimes are considerably more common than violent crime. (Most laboratories require violent crime cases to be worked before property crime cases.)
- **Scientific Advances.** Thanks to scientific advances, laboratories can now test smaller DNA samples

Figure 1: DNA Casework: Supply, Demand, Backlogs

The federal funding made available through the DNA Initiative has helped state and local governments increase the capacity of their DNA laboratories and decrease backlogs. Without the funds to purchase automated workstations and high-throughput instruments, hire new personnel, and validate procedures that are more efficient, the backlog problem would be much worse. Capacity has yet to reach the increased demand for this testing. Until demand is met, there will continue to be backlogs.

The 2005 graph is based on information from the BJS report “Census of Publicly Funded Forensic Crime Laboratories.” In that report, 124 of 187 laboratories that self-identified as handling forensic DNA contributed data. The 2007 graph is based on data reported by 153 of 154 laboratories in the study “2007 DNA Evidence and Offender Analysis Measurement: DNA Backlogs, Capacity and Funding.” Data for 2008, reported by applicants for NIJ’s 2009 DNA Backlog Reduction Program, came from 109 applicants representing 160 DNA laboratories. (State laboratory systems with multiple DNA laboratories or consortium applications representing more than one laboratory were asked to provide data for all laboratories included in the application.)

Yearend backlog numbers were computed from the information reported by laboratories: the number of cases they had at the beginning of the year plus the number of new requests they received during that year minus the number of those requests that were completed that year.



Sources:

2005—Durose, Matthew R., *Census of Publicly Funded Forensic Crime Laboratories, 2005*, Washington, DC: US Department of Justice, July 2008, NCJ 222181, www.ojp.usdoj.gov/bjs/content/pub/pdf/cpffc105.pdf.

2007—National Forensic Science Technology Center, “2007 DNA Evidence and Offender Analysis Measurement: DNA Backlogs, Capacity and Funding,” final report to NIJ from grant 2006-MU-BX-K002, January 2010, NCJ 230328, www.ncjrs.gov/pdffiles1/nij/grants/230328.pdf.

2008–2009 grant applications to DNA Backlog Reduction Program, National Institute of Justice.

than ever before. For example, “touch DNA” samples become available when DNA is transferred by the simple touching of an object. This has led to more requests for DNA testing of guns (to find out who may have handled the weapon) and the swabbing of steering wheels from stolen cars to try to identify the last driver of the car.

- **Cold Cases.** Many older and unsolved cases from the “pre-DNA” era are being reopened and subjected to DNA testing in hopes of solving them.
- **Post-Conviction Testing.** Numerous older, pre-DNA cases that resulted in a conviction have been reopened so that DNA testing can be done.

The demand for DNA testing of convicted offenders and arrestee samples, which also is increasing, is being driven by state and federal statutes that require convicted offenders and arrestees to submit DNA samples for testing. As more states pass legislation, there is greater demand for DNA testing of these samples.

What Is Being Done About the Backlog?

In 2004, in response to the emerging backlog, Congress passed the DNA Initiative. The legislation had several objectives, among them to reduce the backlog and build up the nation’s database of DNA profiles. By 2010, hundreds of millions of dollars had been spent on efforts toward these goals. Both scientific studies and anecdotal reports confirm that federal funding has made a tremendous impact on the backlog. Without the influx of federal support between

What Is CODIS?

The FBI's Combined DNA Index System, known as CODIS, is a software platform that blends forensic science and computer technology.

CODIS has multiple levels where DNA profiles can be stored and searched: the local level (for city and county DNA laboratories), state level and national level.

Data stored at the national level is kept in the National DNA Index System, or NDIS. At this level, an analyst can try to match a DNA profile from a local crime scene sample (also known as a forensic unknown) with an offender's profile from across the nation to solve cases that span states.

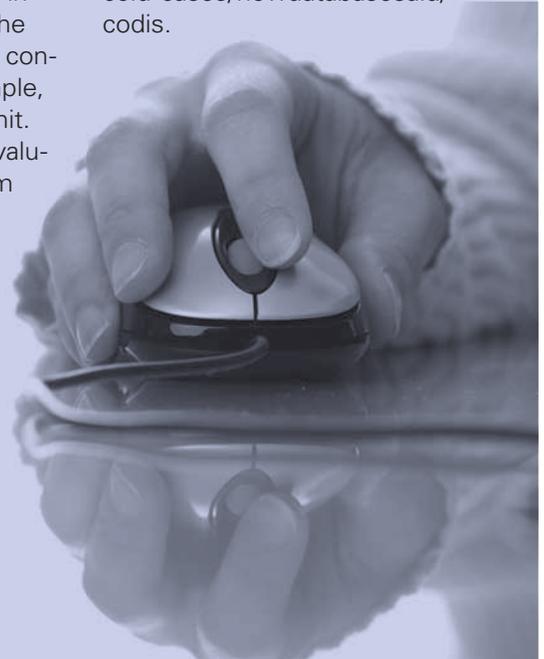
Analysts use CODIS to search DNA profiles obtained from crime scene evidence against DNA profiles from other crime scenes and

from convicted offenders and arrestees. CODIS can generate investigative leads in cases when a match is obtained. For example, if the DNA profile from a crime scene matches a sample taken from another crime scene, the cases may be linked in what is called a forensic hit. If the crime scene sample matches a convicted offender or arrestee sample, the result is called an offender hit. Hits give investigating officers valuable information that helps them focus their investigation.

At the end of 2004, CODIS contained just over 2 million offender profiles. As of June 30, 2009, according to FBI reports, more than 7 million offender profiles and 272,000 forensic profiles from crime scene samples had been uploaded to CODIS. The result has been more than 93,000

hits and more than 91,000 investigations aided nationwide.

Learn more about CODIS at the DNA Initiative's Web site: <http://www.dna.gov/solving-crimes/cold-cases/howdatabasesaid/codis>.



2005 and 2008, the backlog problem would be much worse. Crime laboratories would be completely unable to meet the demand for DNA testing.

Addressing the Casework Backlog

NIJ's largest funding program is the DNA Backlog Reduction Program, which has provided \$330 million in direct grants to accredited public-sector DNA laboratories between 2004 and 2009.

The program's short-term goal is to reduce the backlog of untested cases by providing crime laboratories

with funds to work more cases. The crime laboratories can either outsource backlogged cases to private laboratories or test more cases in-house.

The long-term goal is to build the capacity of crime laboratories by providing funds to purchase high-throughput instruments capable of processing multiple samples simultaneously; automated robotic systems; and information management systems to manage the data generated more efficiently and validate newer, more efficient laboratory procedures. Funds also can be used to hire additional personnel.

Without the federal funds to purchase better equipment and hire additional personnel, many laboratories would not have been able to increase their capacity much beyond the reported 2005 levels.

MYTH — If we test every single backlogged case in one huge effort, then we will solve the backlog problem and will never have to deal with it again.

According to grant reports submitted to NIJ and surveys of crime laboratories, NIJ’s DNA Backlog Reduction Program has helped fund crime laboratories nationwide to reduce backlogs by 135,753 cases. State and local DNA laboratories have significantly increased their capacity to work cases since 2005. Without the federal funds to purchase better equipment and hire additional personnel, many laboratories would not have been able to increase their capacity much beyond the reported 2005 levels.

Addressing the Convicted Offender and Arrestee Backlogs

In addition to casework backlogs, there are backlogs in the processing of DNA collected from convicted offenders and arrested persons and the subsequent uploading of the DNA profiles into the national DNA database, called the Combined DNA Index System, or CODIS.

The processes and procedures used in casework DNA testing are very different from those for convicted offenders and arrestees. Thus, the two types of backlogs should be

considered and discussed separately to avoid the common mistake of “comparing apples with oranges.”

The federal government and all 50 states have laws requiring the collection of DNA samples from individuals convicted of certain crimes. In addition, the federal government and some states have laws concerning the collection of DNA from individuals arrested for certain crimes. DNA profiles from convicted offenders and arrestees are uploaded into CODIS so that law enforcement can compare the DNA gathered from crime scenes against DNA profiles in CODIS. If a match is found, investigators get a lead as to the potential perpetrator of an unsolved crime. Delays in uploading profiles into CODIS could present an opportunity for an offender whose profile is in the system to commit other crimes.

REALITY — DNA backlogs will exist until the supply (the capacity of the nation’s crime laboratories to test cases) surpasses demand (new service requests).

NIJ’s program to reduce the backlog of DNA from convicted offenders and arrestees allows laboratories to use grant funds to either process samples in their own facilities or outsource the work to private laboratories. Between 2005 and

Figure 2: Convicted Offender and Arrestee DNA Backlog Data, 2007 and 2008

	2007 Convicted Offender*	2008 Convicted Offender**	2008 Arrestee	2008 Totals (Convicted Offender and Arrestee)
Beginning backlog on January 1	841,847	426,620	28,544	455,164
New samples received	1,021,930	1,267,504	80,609	1,348,113
Samples completed	1,206,612	952,039	57,386	1,009,425

* 2007 data from National Forensic Science Technology Center, *2007 DNA Evidence and Offender Analysis Measurement: DNA Backlogs, Capacity and Funding*, Final report for the National Institute of Justice, Washington, DC: National Institute of Justice, January 2010, NCJ 230328, <http://www.ncjrs.gov/pdffiles1/nij/grants/230328.pdf>.

** 2008 data provided to NIJ by applicants to the FY 2009 DNA Backlog Reduction Program.

2009, NIJ made more than \$53.8 million available to reduce the backlog of samples of convicted offenders and arrestees. Federal funding has helped analysts test more than 1.6 million convicted offender and arrestee samples since 2005 and conduct more than 56,000 reviews of the data produced by these analyses. The result has been more than 15,000 CODIS hits.

Figure 2, "Convicted Offender and Arrestee DNA Backlog Data, 2007 and 2008," shows how the number of convicted offender and arrestee DNA samples sent to and processed by crime laboratories increased dramatically between 2007 and 2008. At the beginning of 2008, the backlog of samples

was 455,164. By the end of the year, laboratories had completed analysis of 1 million samples but had received 1.3 million samples — hence, a backlog.

Laboratory capacity to process convicted offender and arrestee DNA, like laboratory capacity to process casework DNA, has increased significantly but not enough to keep pace with the increased demand for this testing. Until demand is met, backlogs will persist.

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For more information on crime laboratory reports and data:

- Dunrose, M.R., *Census of Publicly Funded Forensic Crime Laboratories, 2005*, Bulletin, Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics, July 2008, NCJ 222181, <http://bjs.ojp.usdoj.gov/content/pub/pdf/cpffcl05.pdf>.
- National Forensic Science Technology Center, *2007 DNA Evidence and Offender Analysis Measurement: DNA Backlogs, Capacity and Funding*, Final report for the National Institute of Justice, Washington, DC: National Institute of Justice, January 2010, NCJ 230328, <http://www.ncjrs.gov/pdffiles1/nij/grants/230328.pdf>.
- Cantillon, D., K. Kopiec, and H. Clawson, *Evaluation of the Impact of the Forensic Casework DNA Backlog Reduction Program*, Final report for the National Institute of Justice, Washington, DC: National Institute of Justice, February 2009, NCJ 225803, <http://www.ncjrs.gov/pdffiles1/nij/grants/225803.pdf>.

Note

1. Some law enforcement agencies are storing untested evidence, such as rape kits, but such untested evidence is not part of the crime laboratory backlog.



Visit NIJ's Web topic page on backlogs at <http://www.ojp.usdoj.gov/nij/topics/forensics/lab-operations/evidence-backlogs/welcome.htm>.

For information on training, go to <http://www.dna.gov/training/#catalog>.



DNA backlogs were a topic of discussion at the 2009 NIJ Conference. To listen to the panel, go to <http://www.ojp.usdoj.gov/nij/multimedia/audio-nijconf2009-dna-backlog.htm>.