STATE OF CALIFORNIA
OFFICE *of the* ATTORNEY GENERAL

BILL LOCKYER

AUGUST 2003

Forensic laboratories are crucial to our criminal justice system. Forensic scientists in California's crime laboratories provide invaluable information that aids in the investigation and prosecution of crime through the scientific examination of physical evidence. Their efforts, carried out to the highest standards of scientific objectivity, integrity and quality, give voice to the "silent witness" of physical evidence and contribute to the cause of justice.

The criminal justice system increasingly relies on forensic science as new technology emerges at an ever-accelerating rate. The limited resources of our forensic delivery system are under increasing strain as the demand for scientific evidence continues to grow. To the extent that our laboratories are unable to meet the needs of their clients in a timely fashion, the efficiency and effectiveness of the entire criminal justice system can be undermined. We must ensure that pressure on the laboratories for more and faster results never reduces the accuracy and quality of their work, for that could result in injustice.

To address these challenges, I created the California Task Force on Forensic Services. The Task Force broadly represented California's criminal justice and forensic science communities. I asked the Task Force to assess the current status of our state's forensic service delivery system and to identify the steps we must take to ensure that California will continue to receive the highest quality crime laboratory service.

I am grateful for the expertise, commitment and hard work of the task force members. I strongly endorse the findings and recommendations outlined in this 2003 California Task Force on Forensic Services Force Report, which will provide a foundation and framework for future policy and funding decisions. I urge other public policy makers to lend their support as well.

Bill Lockyer
Attorney General

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EXECUTIVE SUMMARY

I. Assessing California's Forensic Services Delivery System

Forensic disciplines, from fingerprint comparison to firearms examination to DNA analysis, are increasingly relied upon by law enforcement to solve crime, and by district attorneys to prosecute offenders. However, increased use of these services places new strains on the limited resources of our forensic science delivery system.

Attorney General Bill Lockyer created the Task Force on Forensic Services to assess the current status of California's crime laboratories and to identify the changes necessary to ensure the system has the capacity and expertise to deliver timely and accurate forensic services into the future.

STUDY METHODOLOGY

← *See page 3*

This study is based on information gathered from laboratory directors, police chiefs, sheriffs, and district attorneys. The Task Force also surveyed public forensic laboratories in other large states regarding staffing, workload, and turnaround times. Unless otherwise noted, the data is for fiscal year 2000-2001. ■

II. The Big Picture: National Trends in Forensic Science

There are several significant trends that influence the direction of forensic science nationally and in California. These trends come with an increased cost to the laboratory, requiring major investments in training, new equipment and quality assurance oversight.

AUTOMATION AND COMPUTERIZED DATABASES

← *See page 6*

Automation has increased the efficiency for routine procedures, such as blood alcohol analysis in driving under the influence (DUI) cases. Laboratory Information Systems (LIMS) have improved the laboratories' ability to track the internal flow of evidence and case analysis. However, the LIMS currently are not compatible between labs, making it difficult to collect workload and other management information across California and between states.

Automation has also opened up a whole new world of evidence examinations. National automated databases such as **AFIS** (Automated Fingerprint Identification System), **CODIS** (Combined DNA Index System) and **NIBIN** (National Integrated Ballistics Information Network) permit forensic scientists to conduct evidence comparisons and identify suspects in unsolved cases. However, the net impact of computerization and automation has been that gains in efficiency have been more than offset by an increased workload.

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ADVANCES IN SCIENCE AND TECHNOLOGY

Science and technology are advancing at an ever-accelerating rate in forensic science as throughout all modern society. To keep pace with technological improvements, operations budgets must increase to cover the costs for new laboratory equipment and training. The more information the laboratory can generate using new technology, the greater the demand for that service becomes. As the expectations of the criminal justice system increase, so does the laboratory's workload and its need for additional staff.

There is a growing trend nationally toward examination of digital evidence (from personal computers, servers, cell phones, pagers, fax machines, etc.) by specialists within forensic laboratories. The forensic community in California will be expected to meet the challenge of providing this service.

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RECOGNITION OF THE SIGNIFICANCE OF THE CRIME SCENE

Each step in processing a crime scene is critical. If the evidence obtained is compromised, its potential to link the perpetrator to the crime scene is greatly diminished. The value of appropriately trained, equipped and experienced crime scene investigators cannot be overemphasized.

New crime scene challenges, such as terrorist incidents, are outside the current capabilities of most forensic laboratories. Mass disasters pose monumental problems for locating and identifying human remains. The advent of computer crime has created a growing need for recognition and proper preservation of digital evidence. California's current planning process with regard to both terrorism[1] and computer crime does not adequately address forensic resource needs.

There has been a dramatic increase in the need for appropriately trained, equipped and experienced crime scene investigators. The role of the forensic laboratory scientist vis a vis that of the crime scene investigator and the training required for each role clearly need attention.

1 PC 11010, enacted in 2002, has begun to address this issue.

PROFESSIONALISM: QUALITY ASSURANCE, ACCREDITATION, TRAINING, AND EDUCATION

← *See page 17*

Emphasis on quality assurance standards is a major and growing trend in government and private industry worldwide. A strong quality assurance program is an essential foundation – and a necessary "cost of doing business" – for any forensic laboratory. The following are four of the most significant elements of crime laboratory quality assurance:

A. Laboratory Accreditation: Accreditation is a voluntary program whereby an organization is inspected by an external body to determine that its policies, procedures, staff, physical plant, and work product meet published peer-based national standards. The most widely sought crime laboratory accreditation is from the American Society of Crime Laboratory Directors-Laboratory Accreditation Board (ASCLD/LAB). By April 2003, 26 of the 33 California public crime laboratories were ASCLD/LAB accredited, and the other seven labs intend to apply in the near future. The more accurate – and more time consuming – processes and additional documentation in an accredited laboratory have created a need for more resources.

← *See page 19*

B. Certification of Staff: Certification is a peer based, voluntary program of examination, coupled with proficiency test and continuing education requirements, to establish that an individual forensic scientist meets national professional standards of knowledge, skill, and experience. The academic degree and continuing education requirements required for certification will have a significant effect on laboratory budgets.

← *See page 21*

C. Scientific Standards: A number of national Scientific Working Groups (SWGs) that include broad representation from the forensic science community are responsible for developing analytical guidelines, training and educational requirements, and quality assurance standards. The recommendations of these groups can be expected to have a significant impact on both certification and accreditation standards.

← *See page 22*

D. Training and Education: California has one of the most highly regarded forensic science training organizations in the country, the DOJ's California Criminalistics Institute (CCI). Crime laboratory directors consider support for CCI training to be one of their highest priorities. State law requires CCI and the state's public universities to work together to enhance DNA training. The state should also encourage universities to support research and professional education in all facets of the forensic sciences. ■

← *See page 24*

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OVERVIEW AND HISTORY

Unlike many other states whose forensic services are administered entirely at the state level, California's crime laboratory system is composed of a mosaic of state, county and city level entities. The current configuration of the system was established in the early 1970s. There are 33 state and locally funded laboratories recognized by the California Association of Crime Laboratory Directors (CACLD). Nearly 1,500 forensic science professionals[2] and nontechnical support personnel serve California's law enforcement and justice agencies. Each jurisdiction is served by only one primary forensic laboratory for any given type of testing. It is clear that there is no redundancy in the current statewide laboratory system.

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STATE LEVEL LABORATORIES

The largest laboratory organization in the state is the Department of Justice's Bureau of Forensic Services (BFS), which has 13 accredited laboratory operations located at 11 sites and provides forensic services to 46 of California's 58 counties. BFS operates two specialized programs that offer services to the entire state – the CODIS databank (called Cal-DNA) and the California Criminalistics Institute (CCI), which trains forensic scientists throughout the state.

The 173 professional staff in the BFS-operated laboratories complete about 63,000 requests for service each year. The vast majority of these requests are for high volume, relatively routine cases (such as controlled substances, blood alcohol, and toxicology) that are far less time consuming than the more complicated BFS cases (such as DNA, firearms and trace evidence) commonly associated with violent crimes. State laboratories handle the bulk of clandestine laboratory ("clan lab") cases in California because illicit drug manufacturing activities tend to locate in the rural areas serviced by BFS.

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COUNTY-MANAGED FORENSIC LABORATORIES

Forensic laboratories managed by counties normally serve all law enforcement agencies within the county, although larger cities within a county may have their own laboratories. The 535 professional staff working in the 12 county-managed laboratories complete about 280,000 case requests per year, most of which (as with the state labs) consist of controlled substances, blood alcohol, and toxicology analysis. There is considerable variation in the level of services offered by the county labs. All provide controlled substances analysis and firearms examination, many offer DNA analysis, some have full-fledged trace evidence units, and only a few offer questioned documents service.

2 Professional staff includes laboratory scientists and examiners who analyze evidence, issue reports, and testify as to their findings.

MUNICIPALLY-MANAGED FORENSIC LABORATORIES

← *See page 35*

Seven municipal forensic labs employ 278 professional staff that complete about 109,000 case requests per year. All the municipally managed laboratories have a heavy controlled substances workload, but they do not have comparable workloads in terms of other types of cases they process. Some provide limited services, such as controlled substances and latent print comparison only, while others offer a full range of forensic testing .

PRIVATE LABORATORIES

← *See page 36*

Private laboratories in California and throughout the country perform a variety of forensic tests for California law enforcement agencies, prosecutors, and even public laboratories. Private laboratories are most commonly used in blood alcohol and toxicology cases and in a significant portion of DNA cases. With these exceptions, the casework capacity of California's private laboratories is relatively small. Much of their practice is devoted to reviewing the work of public laboratories on behalf of the defense.

FEDERAL LABORATORIES

← *See page 36*

In general, federal laboratories accept only cases related to investigation or adjudication of crimes involving federal statutes or occurring in federal jurisdictions. There are Drug Enforcement Administration (DEA), Bureau of Alcohol, Tobacco, and Firearms (BATF), U.S. Customs and Naval Criminal Investigative Services forensic laboratories in California. The Federal Bureau of Investigation (FBI) Laboratory is in Quantico, Virginia. California agencies rarely send cases to the FBI. ■

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FORENSIC LABORATORY OPERATIONS WITHIN CALIFORNIA

Forensic laboratories offer a wide variety of services, although no single laboratory in California provides every service. A number of factors influence the decision to offer certain forensic services, including cost of offering the service, demand from client agencies, and the expertise of laboratory staff.

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California's government laboratories employ 985 professionals, assisted by 471 support staff. The responding laboratories collectively completed 451,513 cases or "requests for service," 71% of which were for controlled substances, blood alcohol, and toxicology analysis. A relatively small proportion (24%) of the professional staff are assigned to perform these high volume, non labor intensive tests.

Most of the professional staff time in the laboratories is devoted to the examination of complex evidence such as biological stains, firearms, fingerprints and trace evidence associated with violent crime. For example, 15.5% of the professional staff were assigned to forensic biology (DNA/serology) cases, even though DNA/serology requests comprised only a small fraction (1.5%) of the total requests for service.

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The laboratories reported that over half of their equipment is either modern or state-of-the-art. However, a third is old and 10% is obsolete. Laboratories typically do not have a budget for ongoing replacement and upgrading of capital equipment, but must seek and justify these funds each year.

Many laboratories also have identified the need to update, expand, or replace their existing facilities. Although several facilities have been recently replaced, significant facility needs remain to be addressed. There is a small set of services (analysis of soil, glass, paint, gunshot residue and explosives) for which the equipment is expensive and the expertise rarely used and, as a consequence, which might be more efficiently provided by centralized facilities.

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Turnaround time[3] is a key area of concern to laboratory users. The statewide average turnaround time in calendar days is:

- Blood alcohol ..... 5.0 days
- Controlled substances ..... 9.3 days
- Toxicology ..... 15.9 days
- Latent Prints (comparisons) ..... 34.1 days
- Firearms and toolmark ..... 40.3 days
- Trace evidence ..... 62.7 days
- DNA cases ..... 182.0 days

The total number of cases backlogged[4] across the state was relatively low – about 18,000 compared to the over 450,000 cases completed the same year. However, a significant backlog was concentrated in five of the labor-intensive services types closely associated with violent crime.

3 Turnaround time is defined as the calendar days from when the case request is received in the laboratory until the report on the test results is completed.

4 Backlog is defined as the number of case requests received by the laboratory that remain in the queue awaiting testing and completion of a report.

Forensic biology, firearms, trace evidence, fire debris and latent fingerprints comprised 63% of the backlogged cases, and forensic biology (DNA/serology) was clearly the single greatest problem area.

← *See page 45*

The amount of laboratory work requested for each case has increased as new technologies have developed and as the courts and the public have become more aware of the potential value of forensic evidence. Laboratory directors collectively estimated that a 33% increase in staffing levels (326 additional staff) would be required to meet the current needs of their clients in a timely manner.

We conclude from the surveys that laboratories are currently balancing their workload by denying service in property crimes, by focusing on cases where a suspect has already been identified, and by juggling caseloads at the expense of timely service. In essence, they are robbing Peter to pay Paul.

CLIENT FEEDBACK: LAW ENFORCEMENT AND DISTRICT ATTORNEYS

← *See page 50 & 56*

Most responding agencies expressed a high level of overall satisfaction with their laboratory service, although most had areas of concern.

Turnaround time for laboratory results is the most frequent cause for dissatisfaction. Two-thirds of the responding prosecutors believed that slow test results in DUI[5] and controlled substances cases reduced the number of successful plea bargains. Turnaround time can be improved by adding additional staff or assigning overtime.

The second biggest concern for law enforcement was evidence collection at crime scenes. This stems primarily from a laboratory's inability to get a qualified evidence collection team to the scene in a timely manner. Policy makers might address this problem by augmenting training programs for law enforcement officers and paraprofessional crime scene investigators.

The primary reason law enforcement agencies sent work to private laboratories was to achieve faster turnaround time. Local control over priorities was the second most cited reason. The third reason was that the agency's primary forensic laboratory did not offer the service needed.

Given the heavy workload of laboratories across the state, priority is given to cases that are already in the "pipeline" and those with suspects, especially those in custody. The result is that forensic laboratories are seldom used for true investigative purposes – identifying a suspect when investigators have no other leads. Even though automated databases developed for DNA, firearms, and latent prints have a significant chance of identifying a suspect, they are not used to their full potential due to the limited resources of most agencies.[6] Nearly 80% of the responding prosecutor's offices believed that emphasis on applying forensic resources to the prosecution, rather than at the initial investigative stages of a case, was a moderate or serious problem confronting the justice system.

5 DUI, Driving under the Influence (blood alcohol).

6 The COLD HIT grant program funded by the Office of Criminal Justice Planning (OCJP) has had a significant impact on the use of DNA profiling in unsolved sexual assault cases.

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COMPARISON WITH OTHER STATE LABORATORY SYSTEMS

The Task Force sent surveys to the 10 other largest states and received usable results from five: Illinois, New York, North Carolina, Texas, and Virginia. The weighted average turnaround time across all case types in California laboratories was about 15 days, while the average of other states was 37 days. California laboratories also appear to be producing more work per staff member than the other state labs. All in all, results indicated that the California laboratories are performing well from a productivity and turnaround standpoint in comparison with other states. It appears that improvements will need to come from new resources or new ways of doing business overall.

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SHORTFALL IN DNA PROCESSING CAPABILITIES

Bottlenecks in DNA analysis are a significant problem in California. Turnaround times are long, backlogs are high, and prosecutors reported sending over 1/4 of their DNA cases to private labs. One national leader in DNA testing is the State of Virginia, which has by far the largest number of "cold hits" using DNA. Virginia stores profiles of all convicted felons in its CODIS database, as do 28 other states. One study showed that 60% of the "hits" Virginia made on sexual assault cases would not have occurred if its database had been restricted to the same offenses included in California. Virginia also analyzes DNA evidence in a far greater proportion of its cases than does California. California laboratories would have needed over 300 more scientific staff allocated to DNA testing to profile the same proportion of total cases as Virginia.

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THE IMPACT OF INCREASING LAB CAPACITY

Expanding the capabilities of any single component of the justice system has implications for the remaining components. For example, police agencies need the resources to investigate the additional crimes solved via DNA and other databases, and district attorneys need the resources to prosecute them. As laboratory capabilities are enhanced to support more cases, and as the payoff for having the laboratory work done increases, investigators and prosecutors will both need to rethink how they can best use forensic evidence to investigate unsolved cases.

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PLANNING FOR THE FUTURE

Although we have identified major trends and challenges in this Task Force Report, the forensic system in California needs to develop a unified strategy for future improvements. An ongoing planning process is needed for the most effective use of public resources, and a coherent voice is needed to advise public policy makers on forensic science issues. ■

ORGANIZATION AND PERFORMANCE

← *See page 69*

- The current organization of California's forensic system is complex but appears to function effectively. There is little impetus for and probably little to be gained by fundamentally altering the configuration of the system.

PLANNING FOR THE FUTURE

← *See page 70*

- The forensic system in California needs to develop a unified strategy for future improvements. There is an ongoing need to forecast the most significant likely changes and determine the near-term steps the laboratory operations and related support systems will need to take to meet them.
- The State should create an ongoing representative body (analogous to the present Task Force) whose mission would be:
  1. To provide a forum for follow-up and to coordinate the implementation of these recommendations;
  2. To develop and continually update a shared vision and priorities for California's forensic services delivery system;
  3. To create a master plan for implementing that vision; and,
  4. To act in an advisory capacity to the Department of Justice, the Office of Criminal Justice Planning, and the Legislature.

DEMAND FOR SERVICE AND IMPROVED TURNAROUND

← *See page 71*

- Based on past history, demand for laboratory services will continue to rise, even if crimes do not, due to the increased technological capabilities of the laboratories and higher public expectations of forensic science.
- To reduce backlogs and improve turnaround times, the State and local agencies should consider funding overtime or limited term staff increases in California's crime laboratories. Over the long term, improving turnaround time and minimizing denial of services will require a net increase in permanent staffing levels.
- State and local agencies should evaluate the role of forensic laboratories in the investigation of computer crime (digital evidence) and in the law enforcement response to terrorist incidents and should incorporate a forensic component into existing plans.

QUALITY ASSURANCE AND ACCREDITATION

← *See page 72*

- The State should require all public forensic laboratories to be accredited by ASCLD/LAB. To the extent that accreditation is mandated, the State should identify costs related to accreditation and assist laboratories with those costs.
- Agencies that manage crime laboratories must recognize and support the costs (both staff time and operating expenses) of accreditation and other quality assurance measures.
- State (for example, POST and CCI) and local agencies should explore ways to ensure that crime scene, digital evidence, and latent print units not controlled by forensic laboratories follow appropriate quality assurance guidelines and meet appropriate training standards.

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USE OF FORENSIC DATABASES IN INVESTIGATIONS

- The State should enact legislation to include all felons in the Cal-DNA databank.
- The State should extend funding for the "Cold Hit" Program and expand the program to cover all DNA cases, with and without suspects.
- Agencies should identify and attempt to fund the increased laboratory, investigative, and prosecutorial resources needed for full use of CODIS, AFIS and NIBIN.
- The State should seek earmarked federal funding for all California public laboratories to increase laboratory capacity and reduce turnaround time, especially in DNA cases.
- Law enforcement and prosecuting agencies should reevaluate their investigative approaches and modify them where appropriate to make the most effective use of forensic laboratory automated database information.
- The state should encourage public universities to support research and professional education in all facets of forensic science.

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EDUCATION AND TRAINING

- The State should continue to support CCI training, including funding travel for forensic scientists employed by both state and local laboratories to attend CCI courses
- The State should implement and fund the DNA internship program and, ultimately, expand it to other disciplines.
- The State and local agencies should augment in-service training and educational programs for crime scene investigators and latent print analysts and ensure that they meet appropriate professional standards.
- The State should encourage the public universities to support research and professional education in all facets of forensic science.

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EQUIPMENT AND FACILITIES FUNDS

- Agencies should develop replacement plans for laboratory equipment and establish revolving funds for this purpose.
- Agencies that manage crime laboratories should make every effort to upgrade, expand, or replace existing laboratory facilities, where the need has been identified.
- The State should continue grant funding for equipment and should explore a "sinking" fund for statewide funding of forensic equipment.

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COLLECTION OF WORKLOAD DATA

- The CACLD should establish a consensus on workload reporting and should conduct a workload survey annually.
- The State should fund development, licensing, and installation of LIMS that provide data conforming to the CACLD workload reporting standards.

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REGIONALIZED SERVICES

- The State and local agencies should consider regionalizing some services where appropriate.
- Laboratories, especially those that serve multiple client agencies, should set up mechanisms that give their agencies input on casework priorities. ■

Acknowledgments

Task Force Report prepared by: Jan Bashinski and Ann Patterson

The Task Force wishes to acknowledge and thank our consultant, Michael C. Mount of Performance Management Partners, for his assistance in developing the surveys, creating the first draft of the report, and for analysis of the management data. We are also grateful to William Fippin of the Department of Justice for his assistance in collation and analysis of the data and to Joan Guelden for her editing, design and layout.

Sergeant Ian Haney of the Oakland Police Department and Inspector Greg Hughes of the Alameda County District Attorney's Office provided helpful input from the perspective of homicide and sexual assault investigators.

Finally, we would like to thank the directors of California's public crime laboratories for their cooperation in providing the data on which this report is based and for their many valuable comments. In particular, we appreciate the input of Benny DelRe, Mary Gibbons, Michael Grubb, Barry Fisher, Frank Fitzpatrick and George Sensabaugh, who reviewed various versions of the draft report.

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I. Assessing California's Forensic Laboratories

INTRODUCTION

Forensic laboratories play a vital role in California's Criminal Justice System. Forensic disciplines, from fingerprint comparison to firearms examination to DNA analysis, increasingly are relied upon by law enforcement to solve crime and by district attorneys to prosecute offenders. In particular, the development of new technologies and of state and federal offender databases (for fingerprints, DNA and firearms) are greatly expanding the demand for forensic analysis of unsolved cases.

Increased use of these services is placing new strains on the limited resources of our forensic service delivery system. Overloads to the system can result in long delays for laboratory test results, which increase costs and cause inefficiencies throughout the criminal justice system. These overloads could also lead to reduced quality and accuracy of results, which would undermine crime solving and may result in injustice.

Recognizing the changes and challenges in the forensic laboratory system, Attorney General Bill Lockyer created the Task Force on California Forensic Sciences (Task Force). The Task Force includes representatives from the following:

- California District Attorney's Association (CDAA)
- California Police Chiefs Association
- California Sheriffs Association
- California Association of Crime Laboratory Directors (CACLD)
- California Association of Criminalists (CAC)
- California League of Cities
- Attorney General's Office, Department of Justice (DOJ)
- Governor's Office of Criminal Justice Planning (OCJP)

This study was commissioned by the Attorney General's Task Force on Forensic Services to assess the current status of California's system and to identify the changes necessary to ensure the system has the capacity and expertise to deliver timely and accurate forensic services into the future.

THE TASK FORCE DEVELOPED THE FOLLOWING OBJECTIVES

✓ Assess System Needs

Define the current status of the forensic sciences system including roles of state, local, and federal laboratories, workloads, facilities, equipment, staffing, and quality assurance.

- Determine future needs, including capacity and capabilities as well as probable future growth.
- Determine unmet client needs including those unrecognized or not addressed by the current system due to lack of crime laboratory resources.
- Address new technology and/or research needs,
- Assess forensic science education and training needs.
- Determine needs unrelated to funding, such as regulatory changes.

✓ Establish Common Priorities

The Task Force intended to provide State decision makers with the jointly held priorities of the Task Force members.

✓ Produce a Master Plan

Once a common understanding of the current system and its deficiencies was developed, the Task Force wished to develop a master plan that identified major steps forward.

✓ Address Funding Issues

It was understood from the outset that funding issues might become a critical element of a successful master plan.

✓ Increase Awareness and Understanding

The Task Force hoped to increase the understanding of the "owning" agencies of laboratories, the public, the media, and public policy makers regarding the impact of fully capable forensic laboratories on the success of the justice system within the State.

✓ Make Recommendations for Legislative Action

The Task Force set out to provide general information and specific recommendations for legislative action in such areas as facilities and ongoing coordination of forensic services policy.

STUDY METHODOLOGY

A. Surveys

This study is based on information gathered from key stakeholders in the forensic laboratory system – laboratory directors, police chiefs, sheriffs, and district attorneys – the policy makers who oversee and fund the forensic laboratories and the suppliers and users of the laboratory services.[1] The Task Force also surveyed public forensic laboratories in ten other large states regarding current staffing, workload, and turnaround times. *(The full text of all surveys are included in Appendices A through E, pages 82-97.)*

Laboratory Directors' Survey

The laboratory directors completed two surveys, the initial main survey document and a supplemental survey with additional questions. All but one of California's 31 public laboratories responded to the survey, providing budget and workload data for FY 2000-2001. Respondents to the initial survey represented over 99.7% of all laboratory staff and tests performed in the state annually. The supplemental survey was completed by all but two public laboratories, representing 92% of annual casework. *(See Appendix A and B, pages 82-91.)*

Law Enforcement Survey

APPENDIX C contains the survey document completed by police and sheriff's departments. Over 150 responses were received from virtually every county and every size agency – nearly 25% of the agencies responded. *(See pages 92-93.)*

District Attorneys' Survey

Responses were received from 19 of the 58 district attorneys' offices – a 33% response rate. The responding offices collectively prosecuted 74,000 cases relying on evidence produced in the forensic laboratories in FY 2000-01. Reliability of empirical data from district attorneys is particularly limited because they rarely track the number of cases submitted to laboratories in a centralized way. Most numerical responses were estimates given by survey respondents. *(See Appendix D, pages 94-95.)*

Other States Surveyed

Questionnaires were sent to state-level forensic laboratories in the 10 largest states. Five – Illinois, New York, North Carolina, Texas and Virginia – responded fully, and we received a partial response from Georgia. It should be noted that surveys were sent only to state-level laboratories. New York and Texas also have local public laboratories that were not surveyed. As a result, for these states, survey results do not reflect total public laboratory capacity. *(See Appendix E, pages 96-97.)*

FORENSIC LABORATORY SURVEY

The California State Attorney General's Task Force on Forensic Sciences is conducting a statewide survey for the purposes of informing state lawmakers of the needs of State and local law enforcement crime laboratories for technology-related support, including funding for personnel, laboratory space, technology acquisition, technology assistance and services, and technology training. In order to allow us to forecast future needs, we have asked you to provide both current information and data reflecting the status of your laboratory in 1985/86. The 15-year-old data is required to make the forecasts both plausible and defensible. Your participation in this survey will ensure that State support is responsive to the needs of your agency.

GENERAL INFORMATION

1. Type of agency: ☐ Municipal Police Crime Lab ☐ County Sheriff's Crime Lab ☐ County District Attorney's Crime Lab ☐ State Crime Lab ☐ Other (specify) _____
2. Size of the jurisdiction (square miles) _____
3. Size of the population served: _____
4. Number of law enforcement agencies served by your laboratory? _____
5. Last calendar year's total part I crimes (FBI statistics) for the jurisdictions you serve? (estimate) _____
6. Number of law enforcement officers served by your laboratory? _____
7. Point of contact for matters related to this survey: _____
8. What type of management information system does your laboratory use?
   ☐ Fully computerized, networked system — Vendor _____
   ☐ Fully computerized, non-networked system — Vendor _____
   ☐ Partially computerized system, some manual record-keeping — Vendor _____
   ☐ Manual record-keeping system
   ☐ Other _____
   Does your information management system track personnel time usage? _____
9. Is your laboratory accredited?
   ☐ Yes, by the ASCLD/LAB. Year of first accreditation? _____
   ☐ Yes, by (specify) _____
   ☐ No
10. If the laboratory is not accredited, are you planning for accreditation? ☐ YES ☐ NO
    When do you expect to apply for accreditation by ASCLD/LAB? _____
    Or other accrediting body? (specify other agency and when) _____
11. Does your laboratory support individual certification? (mark all that apply)
    ☐ Yes, by paying for examination sitting fees.
    ☐ Yes, by paying recertification fees.
    ☐ Yes, by providing on-duty study time.
    ☐ Yes, by offering pay or promotional credits for becoming certified.
    ☐ Yes, by (specify) _____
    List acceptable certifying organizations: _____
    ☐ No

1 The Task Force initially planned to survey public defenders as well. However, while they are also key stakeholders in California's criminal justice system, public defenders very rarely request forensic services from public laboratories.

B. Data Limitations

There are three significant limitations with the data compiled from survey results.

First, laboratories in California and throughout the country "count" their work and estimate their backlogs differently. What is referred to as a "case" may involve multiple disciplines (e.g. firearms examination, drug identification, serology, etc.), each requiring dozens of individual tests on multiple individual items. For example, in a single homicide case, a laboratory might conduct DNA analysis, trace analysis of fibers, and comparisons of tire track impressions, fired bullets and fingerprints on multiple items of evidence. The laboratory might count each test individually, or it might count all tests within a particular discipline for that case as just one "request"[2] or it could count the homicide as one "case." As a result, to the extent that workload was counted differently at different laboratories, overall statistics may be misleading.

Second, many laboratories do not have computerized systems that track the flow of casework and were able to provide only rough estimates or no data at all regarding their turnaround times. Some laboratories could not provide this data at all. Therefore, turnaround data are incomplete and of limited accuracy.

Third, results from surveys of police chiefs, sheriffs and district attorneys were, in large part, based on the impression of the individual completing the questionnaire rather than empirical data. In part, this was due to the fact that these agencies do not track forensic requests in a centralized way. As a result, this data is subjective and imprecise, although it is valuable as an indicator of these agencies' general impressions of the laboratory system.

While these are the most significant limitations, throughout the report other notations have been made where appropriate to highlight specific limitations to the data.

C. Task Force Discussions

Information regarding national trends and crime laboratory workload issues was also gathered from discussions among the Task Force members and with other stakeholders, including members of the CACLD, the American Society of Crime Laboratory Directors (ASCLD), the California Homicide Investigator's Association and the California Sexual Assault Investigators Association.

2 This appears to be the most commonly followed practice.

II. The Big Picture: National Trends in Forensic Science

INTRODUCTION

There are several significant trends that simultaneously influence the direction of forensic science as a service profession nationally and within the State of California.

These trends add value to the profession and benefit the whole justice community. For these benefits to be achieved fully, however, support at the policy level and investment of resources are required. Four major national trends are discussed below.

1. Automation and Computerized Databases
2. Advances in Science and Technology
3. Recognition of the Significance of the Crime Scene
4. Professionalism: Quality Assurance, Laboratory Accreditation, Certification, Training, and Education of Staff

Each trend has a major positive impact on our ability to identify and convict criminals, and some have improved the efficiency of laboratory operations. On the other hand, the advancements associated with these trends come with an increased cost to the laboratory – either more analytical complexity (and more staff time) per test or more samples to analyze (again more staff time) – as well as a major investment in training, new equipment and quality assurance oversight. All of these require additional funding.

The advancements associated with these trends come with an increased cost to the laboratory – either more analytical complexity (and thus staff time) per test or more samples to analyze – as well as a major investment in training, new equipment and quality assurance oversight.

Typically, laboratories have responded by redirecting resources toward processes perceived to be most effective in solving crimes. This response has given rise to other problems. For example, emphasizing DNA analysis at the expense of trace evidence leaves the laboratory vulnerable in a situation where no probative DNA evidence exists and the case may rest instead on transferred paint and fiber traces. In essence, laboratories are robbing Peter to pay Paul.

The following sections include detailed examples of how these trends are currently being woven into the fabric of forensic science. Some developments are born out of multiple trends; professionalism, computerization and technology have combined to bring us much advancement.

AUTOMATION AND COMPUTERIZED DATABASES

Automation within the forensic laboratory has resulted in an increase in efficiency for routine procedures. A classic example is the analysis of blood alcohol samples for "driving under the influence" (DUI) cases. The methodology once was very labor intensive, requiring significant "hands-on" time for the analyst. Automation (and application of different technology) has significantly decreased that "hands-on" to about 1/10 of what it was before.

Laboratories have substituted automated Laboratory Information Management Systems (LIMS) for many of the more cumbersome paper-based systems they previously used to track the flow of evidence and analysis results. These systems have improved internal lab efficiency and, in some jurisdictions, have given the laboratory's clients the ability to view lab results on-line. One drawback of LIMS systems currently in place is that they are not compatible between laboratories, making it difficult to collect comparable workload data and other management information across the state.

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Automation has opened up a whole new world of evidence examinations. Computer technology (primarily databases) and other automation is allowing for the analysis of evidence that simply could not be done manually. For example, a single latent print lifted from a crime scene can now be compared virtually instantaneously to millions of known prints stored in databases across the country. However, the net impact of all computerization and automation has been that gains through improvements in efficiency have been more than offset by the need for additional resources to take advantage of new capabilities.

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There are three major developments described below in the field of comparative data bases that have led to quantum leaps in the capability of the justice system to match crime scene evidence with potentially involved parties. These are the Automated Fingerprint Identification System (AFIS); Automated DNA Databases (CODIS); and, Automated Firearms Identification Databases (NIBIN).

A. Automated Fingerprint Identification System (AFIS)

Studies on the feasibility of an AFIS, which would enable analysts to search latent prints retrieved from crime scenes against a database of inked fingerprints from known offenders, began in the late 1970s. This capability is now distributed throughout the country and is well established within California as a multi-jurisdictional system called Cal-ID.

Prior to the advent of the AFIS, it was virtually impossible to manually search an evidence latent print against a department's vast fingerprint files of previously arrested persons. In effect, it was practical only to compare a latent print found at a crime scene against the on-file prints of known suspects in that case. Investigators were on their own to develop investigative leads concerning potential suspects. If no suspects were developed, the case was shelved.

Since 1985, using Cal-ID's Automated Latent Print System (ALPS), the Department of Justice and local law enforcement agencies in California have made over 37,000 cold search "hits," identifying suspects for various felonies committed in California. This improvement alone translates into identifying suspects in 2,000 felonies per year that would probably not have even been pursued before the AFIS existed.

The current "hit rate" (percent of cases where a suspect is identified via computer search) in AFIS systems varies among agencies from 15% to 30%. Unfortunately, not all agencies have the resources to process all suitable crime scenes for latent prints and submit the recovered prints to AFIS for searching. Backlogs of unsearched latents exist, preventing the system from being used to its full potential.

AFIS capabilities continue to be expanded. In May 2000, the Department of Justice completed a feasibility study for an automated palm print system, which will provide latent print analysts across the state with the capability of conducting cold search inquiries against latent palm prints retrieved from crime scenes. By 2002, the DOJ completed installation of 601 live-scan terminals at law enforcement agencies. This equipment, which replaces the classic method of inking the fingers and collecting the fingerprints manually on cards, allows the fingerprints of arrestees to be digitally scanned and electronically submitted to the state and national fingerprint files.

It is important to recognize that, in making major contributions to solving crime, AFIS technology has also created a demand for additional resources. In addition to massive investment in computer equipment and software, new staff had to be trained in both latent print identification and the use of the automated equipment. Although the computer rapidly narrows the search for a possible match, in the end an expert fingerprint examiner must evaluate the list of potential matches and make the final identification. The thousands of new suspects identified each year via AFIS searches translates into a need for many more trained latent print examiners.

B. Automated DNA Databases (CODIS)

During the 1990s, the FBI developed the Combined DNA Identification System (CODIS), an automated databank to which states contribute DNA profiles from convicted offenders and from crime scene evidence. The DNA profile of evidence from a crime scene can be searched against the CODIS file to identify a suspect, just as latent print evidence is searched against the AFIS file. All states now have laws mandating the collection and profiling of DNA samples from individuals convicted of a variety of crimes. Eligible offenses range from only sex crimes, to sex and other violent crimes, to all felonies, and there is an ongoing effort in many states to expand the eligible offenses. (As of May, 2003, 29 states included all felons.) CODIS also has a growing database of profiles from missing persons that can help identify recovered human remains.

From 1990-2002, CODIS grew from a program with only a dozen participating forensic laboratories to one with more than 150 laboratories in 49 states. By late 2002, the national DNA database, National DNA Index System (NDIS) contained over 1 million convicted offender DNA profiles. Thousands of offenders had been linked to their crimes, and serial crimes had been linked to each other via DNA "hits."

The state level CODIS database in California (Cal-DNA) is maintained by the DOJ BFS DNA Laboratory in Richmond. Cal-DNA currently contains more than 200,000 DNA profiles from offenders convicted of sex and other violent crimes, and residential burglary. By the end of 2003, 15 of the 23 California crime laboratories with DNA units will have direct access to Cal-DNA and the national DNA database through local CODIS terminals. The remaining laboratories are expected to come on line within one year. Cal-DNA staff profile the tens of thousands of convicted offender samples submitted to the database each year, review the evidence profile data submitted for searching, and conduct follow-up analysis needed to confirm each "hit" in the databank.

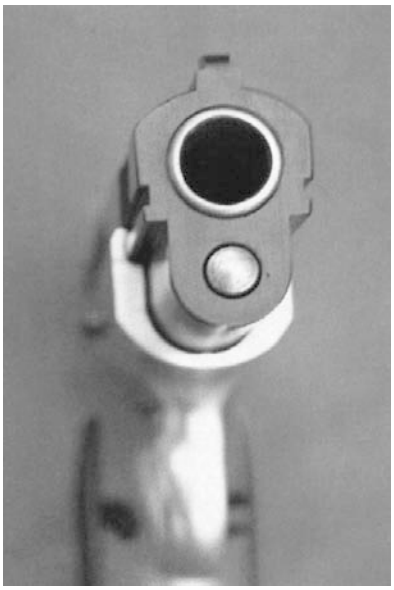
In mid-2000, California launched the multi-year "COLD HIT" Program, funded by the Office of Criminal Justice Planning (OCJP). This grant program, which funds crime laboratories to locate and profile DNA evidence on unsolved sexual assault cases – including homicides with a sexual component – will end in January 2005. The "COLD HIT" Grant Program has supported the training of dozens of additional DNA analysts to help address the massive backlog of DNA casework currently facing the entire state.

By June 2003, 6,600 of these unsolved cases with DNA evidence had been located. DNA profiles had been completed on over 3,000. CODIS searches had been completed on almost 2,100 cases, resulting in cold hits identifying 139 suspects and 99 "case-to-case" hits. Altogether, CODIS hits have aided about 420 investigations in California, a hit rate of about 11%. Hundreds of violent crimes, some of which had remained unsolved for decades, are being solved via CODIS searches.

C. Automated Firearms Identification Databases (NIBIN)

In the early 1990s, the concept of being able to search a database to link shooting incidents came to fruition in the form of the DrugFire™ and BrassCatcher™ systems, which stored digitized images of firearm-related marks on cartridge cases in searchable form. These systems were later expanded to accommodate digitized images of fired bullets as well. Between 1993-99, the Federal Bureau of Investigation (FBI) and Bureau of Alcohol, Tobacco and Firearms (BATF) proffered these rival, incompatible systems and installed them in crime laboratories across the nation. In 2001, the federal government adopted the National Integrated Ballistic Information Network (NIBIN), which combines attributes from both earlier systems, and began nationwide installation of the new system. NIBIN, which is administered by the BATF, guarantees interoperability between all of its networked sites. By 2003, NIBIN had made over 7,500 hits nationwide.

The emergence of NIBIN as an investigative tool has increased the firearms examiners' workload dramatically. About two hours of work is added to a firearms case to enter the bullets and cartridge casings from a test fired weapon into the NIBIN system and to check for possibly linked cases. In addition, many seized weapons that would not previously have been sent to the laboratory are now routinely submitted to be test fired and added to NIBIN. Furthermore, additional training is required to prepare staff to use the automated system.



As with AFIS or CODIS searches, NIBIN searches do not produce an automatic "match." Instead, the system provides a list of candidate matches or "hits" which must be evaluated by a trained firearms examiner who makes the final identification or confirmation of a hit. As it is not uncommon to have multiple high-ranking hits per search, a great deal of additional firearms examination work has been created verifying the results of NIBIN searches.

Because a NIBIN search of fired cartridge casings and bullets found at a crime scene can now be expected to lead to a possible suspect, gun related caseloads have increased substantially. At some of the laboratories gun cases have doubled, mostly due to NIBIN confirmation requests. The Los Angeles Police Department laboratory reportedly has a workload for gun analysis that is growing even more rapidly than its workload for DNA analysis.

Since 1990, the progression in DNA analysis from Restriction Fragment Length Polymorphism (RFLP) "state-of-the-art," to Short Tandem Repeat (STR) happened so quickly that many laboratories never had time to bring the earlier technologies on-line.

The need to remain abreast of ever accelerating technological change poses a major challenge to laboratory resources.

Advances in science and technology will always influence the forensic community, and they are occurring at an accelerating rate. For example, the country is already operating in the third generation of DNA technology. Since 1990, the progression in DNA analysis from Restriction Fragment Length Polymorphism (RFLP) "state-of-the-art," to Short Tandem Repeat (STR) happened so quickly that many laboratories never had time to bring the earlier technologies on-line. The amount of research that went into these advancements was phenomenal, as is the amount of training required to establish and maintain an analyst's proficiency in each new type of DNA analysis.

The development and implementation of forensic DNA analysis also has raised the bar with regard to the need for foundational research and validation. As new scientific knowledge and technologies come onto the scene, the amount and depth of research effort needed to translate them into legally admissible forensic applications can be expected to parallel the effort that went into DNA analysis. Even categories of evidence that have achieved historical acceptance, such as fingerprints and firearms, are now being questioned about the adequacy of their research base; additional research using up to date science and technology is called for in these areas as well.

Progress comes with a price tag. Keeping pace with technological improvements means routinely replacing equipment as it becomes obsolete and investing staff time validating new methodology to support its use in court. Operating budgets must increase to cover the increased costs for laboratory supplies and training. To maintain their qualifications as expert witnesses, scientific staff must receive continuous in-service training, both in the specifics of new technology and in the fundamental science that supports it.

The more information the laboratory can generate from physical evidence using new technology, the greater the demand for that service becomes. As the expectations of the criminal justice system increase, so does the laboratory's workload and its need for additional staff. The need to remain abreast of ever accelerating scientific change poses a major challenge to laboratory resources.

A. DNA Analysis of Biological Samples

Since the early 1990s, substantial strides have been made in using DNA to solve crimes. The application of the polymerase chain reaction (PCR) enabled forensic scientists to obtain far more information from a much wider variety of biological evidence than previously possible. In addition to its great value for analysis of mixed body fluids in cases of sexual assault, DNA profiling has been successful on hairs, ligatures, robbery masks, envelope flaps, chewing gum, and cigarette butts, as well as on badly burned, fragmented and decomposed human remains.

This success has resulted in a dramatic increase in the number of samples that can be analyzed ("typed" or "profiled") in any criminal investigation, with a concurrent increase in analysis time per case. Further, even samples that are very old can now be successfully typed by PCR-based DNA typing. As a result, there has been an increase of evidence submissions from old, unsolved cases.

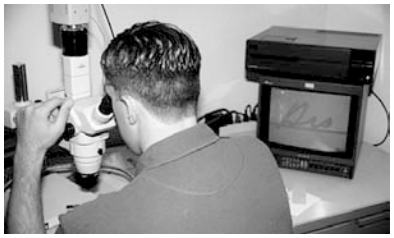
DNA analysis is time consuming and requires highly trained and educated personnel. If biological evidence is not properly handled and analyzed by qualified personnel, it can become useless as evidence. With the advent of PCR technology came the need for improved laboratory facilities that are designed to prevent cross-contamination and to provide a temperature-controlled environment.

The creation of DNA databases has now permitted biological evidence to be used as a tool to identify perpetrators in unsolved violent crimes. However, the creation and maintenance of these databases has required additional staff and increased budgets beyond the resources that would have been required to handle the much smaller number of evidence submissions by criminal investigators under the less effective older methods.

B. Instrumental Chemical Analyses: Toxicology, Trace Evidence and Clandestine Laboratory Investigation

Forensic chemists and trace evidence analysts use a wide variety of analytical instrumentation to perform their work. This equipment can cost from $50,000 to $150,000 or more per unit. The materials and complex mixtures that they analyze include: Routine submissions of narcotics and other controlled drugs in their solid dose form; clandestine laboratory reaction mixtures and accessory chemicals related to the illicit manufacture and distribution of controlled substances; suspected arson accelerants; blood, breath and urine samples collected for determination of alcohol and/or drugs and drug metabolites; fibers, paints, plastics, poisons, building materials and explosives; and a variety of miscellaneous trace evidence.

Increasingly sophisticated analyses are being required as time and technologies progress. Modern analytical instrumentation is computer controlled, capable of supporting batch automated processes, and complete with dedicated software designed to assist the analyst in interpreting the analysis results of complex samples. For example, while it used to be sufficient for arson analysts to report that a flammable material was present in a mixture, today's standards of performance require analysts to distinguish between medium- and lightweight fractions of specific petroleum products. To take advantage of these updated technologies, and to meet increasingly rigorous scientific standards and court expectations, forensic laboratories must constantly upgrade their analytical instrumentation and technical procedures.



Evolving capabilities also allow drug analysts to detect, recognize and interpret the significance of reaction impurities and by-products in clandestinely manufactured methamphetamine and other drugs. This capability can help law enforcement tie drugs found in the field to the illicit lab that produced them. Laboratory analysts dealing with products of clandestine laboratories are continually encountering new trends in esoteric drug analogues and blends of controlled substances.

These new developments require continuous educational updates for all involved lab staff about the findings of analysts in other labs.

Forensic laboratories also support law enforcement by providing chemical test equipment that traffic officers can use in the field in Driving Under the Influence (DUI) cases. An Evidential Portable Alcohol System (EPAS) breath device that can be relied on for use as both a screening and evidential instrument is a powerful tool for DUI enforcement that eliminates the need for the patrol officer to transport the subject to a jail or law enforcement agency for the test. Additionally, many of the frivolous court arguments based on doubt about the blood alcohol concentration (BAC) at the time of the stop, versus the time of the test, will be reduced. Hand-held fuel cell EPAS instruments that can be used for both screening and evidential breath testing have recently been developed and successfully tested.

For breath alcohol test results to be accepted in evidence in California, crime laboratories licensed as forensic alcohol laboratories must provide equipment, technical support, test operator training, and expert testimony as specified by Title 17 of the California Code of Regulations. As agencies across the state adopt EPAS equipment, a significant improvement in traffic enforcement will occur. However, this program will also affect the workload of the forensic laboratories.

C. New Methods for Latent Print Processing

Over the last 20 years, the complexity with which latent print programs operate in the laboratory and at crime scenes has significantly increased due to a myriad of technological and chemical advancements in latent print development (lasers, digital cameras, vacuum metal deposition, sequential processing, etc.). New chemical treatments and computerized imaging technology have made it possible to enhance latent print images on patterned backgrounds and difficult to process surfaces, greatly increasing the chances of obtaining useable latent fingerprints in many cases.

There is a natural expectation that improvements in technology and automation will result in increased efficiencies. In this area, however, the added alternatives have actually resulted in longer processing and staff time per case. For example, BFS has found that the average time it takes to process a case for latent impressions has increased from approximately two to eight hours due to incorporating these new development techniques. Because these improved methods result in successful identification of more suspects, their use has also encouraged agencies to submit more cases for processing.

Finally, the greatly increased scientific sophistication of these new methods requires that fingerprint examiners have much more training and a more rigorous scientific education than was required in the past. All these factors combine to place additional demands on laboratory resources.

D. Digital Evidence

As computerized technology has begun to pervade every aspect of modern life, awareness of a new form of evidence –"digital evidence"– has begun to develop. Many crimes such as identity theft are committed with the aid of computers and the Internet. Criminals often leave traces of their criminal activity, such as child pornography images or records of illicit drug transactions, on their hard drives. Cell phones, pagers, personal desktop assistants (PDAs) and fax machines all contain digital records that can have great value in investigating a crime. Recognizing, preserving, and properly analyzing digital information requires special software tools, equipment, training, and protocols not commonly in place in law enforcement agencies and crime laboratories.

It can be expected that as awareness of all the various forms on digital evidence increases, the forensic community in California will be expected to meet the challenge.

Several federal laboratories have been created, (at the FBI and the Department of Defense for example), specifically to examine digital evidence, and there is a growing trend nationally for digital evidence units to be established within forensic laboratories. In California, multi-agency law enforcement task forces have been created around the state to address computer crime. These task forces include specialists trained in recognizing, preserving and analyzing some forms of digital evidence, primarily from hard drives on personal computers. Federally funded regional computer forensic laboratories exist in San Diego and the Silicon Valley.

Only two California crime laboratories (Santa Clara and San Diego Counties) offer computer crime services. It can be expected, however, that as awareness of all the various forms of digital evidence increases, and as the sophistication of the required analysis grows, the forensic community in California will be expected to meet the challenge of providing this service to law enforcement.

RECOGNITION OF THE SIGNIFICANCE THE CRIME SCENE

The value of an appropriately trained, equipped and experienced crime scene investigator cannot be overemphasized.

Collecting evidence incorrectly can be just as damaging as not having recognized or collected the evidence at all.

Most of the discussion in this report focuses on the analysis of samples brought to the laboratory. However, the crime scene is the birthplace of evidence. There is typically just one opportunity to recognize evidence and start the process of preserving it for further examination. The integrity of the evidence will never be higher than at its origin. Therefore, each step in processing a crime scene – including recognition, documentation, collection, and preservation of evidence – is critical. If the evidence obtained is compromised, its potential to link the perpetrator to the scene is greatly diminished. The value of an appropriately trained, equipped and experienced crime scene investigator cannot be overemphasized.

Spurred in part by dramatization of crime scene investigation in the media, the criminal justice community and the public have a refreshed and expanded awareness of the importance of ensuring that crime scenes are handled appropriately. This truth has hit home: collecting evidence incorrectly can be just as damaging as not having recognized or collected the evidence at all. The implications of this realization range from a higher demand for forensic scientists to attend crime scenes to additional requests for training of on-scene personnel and a demand for more formalized procedures for processing scenes. All of this translates into a need to devote more personnel to the crime scene function.

The increased awareness of the significance of the crime scene has also led to more contentious questioning in court and much greater scrutiny by judges. If crime scene evidence is to be of value, then personnel must be appropriately trained, equipped and experienced to handle whatever they may encounter at crime scenes. Further, they must be able to articulate clearly and persuasively the basis for their actions at scenes and the opinions derived from them.

Quality control of the examiner's behavior in crime scene processing has become more complex. For example, tools must be cleaned and gloves must be changed far more frequently than was done in the past. Greater consideration must be given to the order of processing and the need for segregation of materials. Another result of this increasingly more complex crime scene process is that there must be far more coordination between various team members to consider the implication of each of their actions on each other's investigations.

DNA analysis is an area of new technology with major implications for crime scene processing. More and more information is being obtained from smaller and smaller individual samples. DNA was first forensically applied primarily to blood samples the size of a quarter. Now DNA profiling is routinely done on blood samples as small as a $1/16^{th}$ of an inch in diameter. DNA testing can also applied to non-visible samples like saliva from bite wounds or the skin residue on the bridge of a pair of sunglasses.

In the 1970s and 80s, a crime scene analyst would not have considered sampling items unless they had visible blood on them. This is no longer the case. Now, at a crime scene more items lend themselves to collection of "invisible" biological evidence and laboratory analysis. With every technological advancement in evidence examination, there is a corresponding drive to see it applied to crime scene investigations.

The use of forensic alternate light source (ALS) is another such example. First used with fluorescent dyes and fingerprint development, the ALS can also be used for the detection of various body fluids and synthetic fibers. The ALS allows the examiner to search a total crime scene or the victim's body prior to autopsy for trace evidence and/or non-victim body fluids and to detect types of evidence that previously could not be found and analyzed. For this instrumentation to be properly used, the analyst needs to understand the principles of energy excitation and how specific wavelengths of light function with respect to the substrate.

The three-strikes law has added its own twist to this situation. Because any potential felony could result in an extended sentence, the evidence from "lesser" crimes becomes as valuable as evidence at "major" crime scenes. In other words, a small bloodstain at the point of entry in a burglary scene could be just as significant in terms of the penalty applied as evidence at a scene where there was great bodily injury. Therefore, every piece of evidence at every scene has the potential to be critical and has to be treated as such.

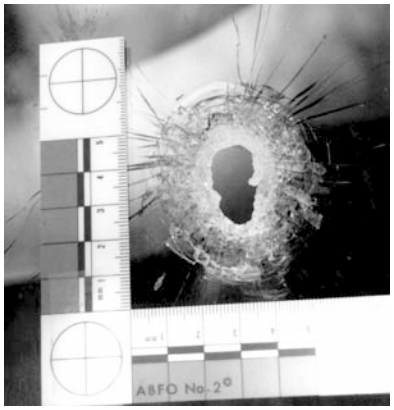
Furthermore, new crime scene challenges are being posed by the emergence of new types of crime. The growing problem of clandestine drug manufacturing laboratories presents major safety and environmental concerns, as these sites are notorious sources of toxic waste. The advent of computer crime has created a growing need for recognition and proper preservation of digital evidence at crime scenes.

Terrorist incidents bring with them the potential for biological and chemical evidence outside the current capabilities of most forensic laboratories. Mass disasters, such as the World Trade Center, pose monumental problems for locating and identifying human remains. Should California be hit with a similar disaster, we are currently unprepared to cope with DNA identification of the victims. Although some strides have been made toward addressing these problems, the state's current planning process with regard to both computer crimes and terrorism[3] does not address forensic resources adequately.

All these factors have exponentially increased the need for appropriately trained, equipped and experienced crime scene investigators, who are already in short supply. Because of the increasing investment needed for forensic scientists to remain proficient in their laboratory examinations, fewer and fewer are available for crime scene responses.

With every technological advancement in evidence examination, there is a corresponding drive to see it applied to crime scene investigations.

3 PC11010, enacted in 2002, requires the DOJ, in concert with the Department of Health Services and other public laboratories, to develop standards for laboratory examination of forensic evidence in terrorist incidents.



The crime scene function as a whole, including the roles of the forensic laboratory scientist vs. the paraprofessional crime scene investigator, clearly needs attention.

There are philosophical questions as to what level of training and forensic background is needed at the crime scene. Many scenes (especially property crimes) can be and are processed effectively by paraprofessional crime scene investigators with training in evidence recognition, latent print processing, photography, diagramming, and general evidence preservation. Many agencies maintain dedicated crime scene units of this sort, calling forensic scientists out from the laboratory rarely, and then to only the most unusual or complex death investigation scenes. Other agencies maintain the crime scene response as an integral part of the crime laboratory, acknowledging the important role that the forensic laboratory professional's enhanced knowledge and scientific approach can play in recognition and preservation of vital evidence at the scene.

Many agencies are scrambling to find ways to meet the crime scene processing need, and the forensic community at large in California is looking for assistance in this matter. For example, the Los Angeles Chiefs Association and the Los Angeles District Attorney's Office have asked the Department of Justice to provide training for the law enforcement officers and crime scene investigators in their jurisdictions, but CCI does not have the resources.

There is a dearth of training programs for crime scene investigators and scant oversight of the quality of those programs that are available. The crime scene function as a whole, including the roles of the forensic laboratory scientist vs. the para-professional crime scene investigator and the training required for each role, clearly needs attention.

PROFESSIONALISM: QUALITY ASSURANCE, ACCREDITATION, CERTIFICATION, TRAINING AND EDUCATION

The forensic science community gained great visibility and notoriety during the last decade. High profile court cases have underscored the necessity of quality forensic work that conforms to national standards and can withstand rigorous scrutiny in court. One of the continuing and beneficial effects of that exposure is the increasing realization that forensic science organizations and staff must adhere to the principles that transform a practice into a profession. These include defining a core body of knowledge, establishing standards of practice, and defining ethical conduct.

The credibility of the forensic laboratory and its scientists rests on the quality of their work product. Forensic scientists must be scientifically knowledgeable, technically skilled, objective and ethical. Laboratory procedures must be scientifically sound and carried out according to good laboratory practices. Written reports and testimony must be scientifically correct yet comprehensible to a lay audience. A strong quality assurance program is an essential foundation – and a necessary "cost of doing business"– for any forensic laboratory.

There is a high price for failure to attend to quality assurance and other professional issues. Injustice can result if verdicts are based on flawed laboratory analysis. When case review uncovers evidence of sloppy work or dishonesty, the confidence the public and the courts place in the individual scientist or his laboratory is undermined. By extension, the trust placed in all forensic evidence can be affected. There can also be a heavy direct cost to laboratory operations. For example, in 2002 a review of DNA cases in an unaccredited Texas city crime laboratory revealed significant omissions in the testing protocols. Subsequently, over 500 DNA profiles the lab had submitted on unsolved cases were rejected from CODIS. The laboratory was forced to shut down its DNA unit and reopen hundreds of DNA cases for reexamination, and the inquiry into quality practices has now spread to other units of the laboratory.

Forensic science is clearly not a static field. One of the implications of just about every trend in forensic science is the need for ongoing training and education of professional staff. Many of today's technologies were not in use when current practitioners of forensic science were in school. Advanced degrees will soon be required for those who wish to reach the top levels in their specialties. At a more basic level, the ever-growing forensic community needs a pool of well-educated students to draw upon, ideally students possessing fundamental scientific skills, an aptitude for critical thinking, and a professional ethic. To prepare these bright minds, educational institutions need to be a partner in development of forensic science and scientists.

There is a high price for failure to attend to quality assurance and other professional issues.

One area of concern is the absence of many of these quality assurance measures in crime scene processing, digital evidence, and latent print units.

A. Quality Assurance

Emphasis on quality assurance standards is a major and growing trend in government and private industry worldwide. The term "quality assurance" encompasses all the activities an organization undertakes to ensure that users of its services can have confidence in the verity and reliability of its work product. The guiding principle is that quality can never be assumed, but must be demonstrated and documented continually.

A forensic laboratory's quality assurance program should cover:

1. Staff qualifications, training, and proficiency testing
2. Administrative policies and technical procedures
3. Security and evidence integrity
4. Quality control checks of chemical reagents and equipment
5. Documentation of laboratory analysis
6. Review of casework, reports, and testimony

A properly administered forensic laboratory will have a written quality assurance program, monitored by a quality assurance manager who has the authority to take lab operations off line whenever there is an indication of a problem affecting the reliability of the lab results. Quality assurance records should be maintained and available for appropriate discovery to support the laboratory's claims of reliability.

One area of concern is the absence of many of these quality assurance measures in crime scene processing, digital evidence, and latent print units that may be operating outside the control or influence of accredited forensic laboratories. To the extent that these units do not follow currently accepted quality practices, questions can arise as to the reliability of their forensic work.

B. Laboratory Accreditation

Crime laboratory accreditation is increasingly the way of doing business in this country. Accreditation is a voluntary program whereby an organization is inspected by an external body to determine that its policies, procedures, staff, physical plant, and work product meet published peer-based standards. The most widely sought accreditation within the forensic science community is from the American Society of Crime Laboratory Directors, Laboratory Accreditation Board (ASCLD/LAB). This body accredited 11 laboratories in its first year, over 20 years ago (1982). By June 2003, there were a total of 237 accredited laboratories, including the majority of the major public crime labs in the nation and in California. The chart below, "Total Accredited Laboratories", shows the growth in the total number of ASCLD/LAB accredited laboratories over this period.

Crime laboratory accreditation is increasingly the way of doing business in this country.

ASCLD/LAB accreditation has become an indispensable credential in the forensic laboratory community.

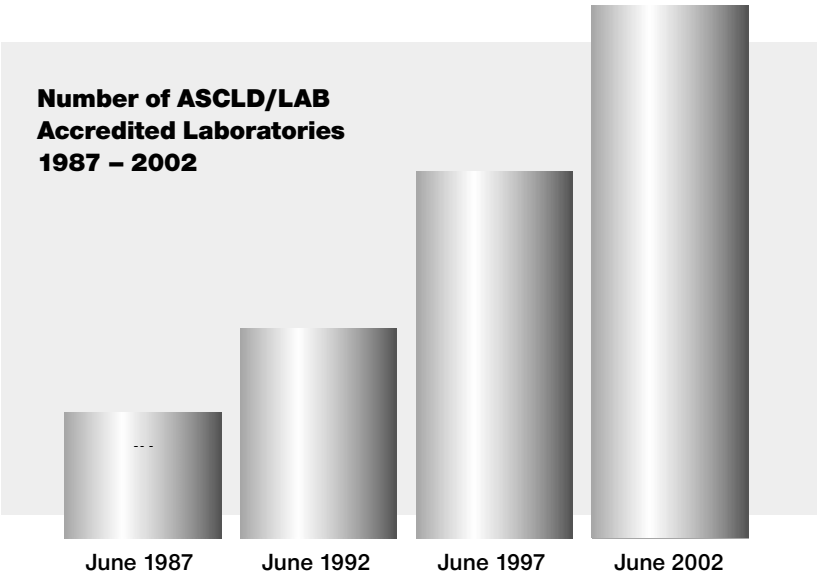
ASCLD/LAB accreditation has become an indispensable credential in the forensic laboratory community. In one State (New York), forensic laboratories are licensed, and ASCLD/LAB accreditation is required. Other states (e.g. Texas) are currently considering a state mandate for ASCLD/LAB accreditation. Under California law, forensic DNA laboratories must be ASCLD/LAB accredited, or certified by a body (such as the National Forensic Science and Technology Center, NFSTC) which is recognized by ASCLD/LAB, in order to contribute DNA evidence profiles to the Cal-DNA databank.

In 2002, laboratories applying to the OCJP for Paul Coverdell Crime Laboratory Improvement Funds were required to be ASCLD/LAB accredited or to certify their intention to apply for accreditation as a prerequisite for funding. By June 2003, only seven California crime laboratories (El Cajon Police, Long Beach Police, Kern District Attorney, Fresno Sheriff, San Diego Sheriff, San Mateo Sheriff and San Francisco Police) were unaccredited, and all had signified their intention to apply in the near future.

Under the ASCLD/LAB program, a forensic laboratory must be inspected in all the ASCLD/LAB accredited disciplines in which it provides service. Currently these are latent prints, questioned documents, firearms and toolmarks, controlled substance analysis (including clandestine labs), toxicology (including blood alcohol), firearms and toolmarks, trace evidence analysis (accelerants, hairs, fibers, glass, paint, etc.), DNA/serology and digital evidence. Accreditation for the crime scene function is optional.

Each laboratory must conduct an annual quality assurance audit and certify compliance with the accreditation requirements each year. An on-site re-accreditation inspection is required every five years. Accredited laboratories must participate in external proficiency test programs, and the proficiency test results are reviewed by the ASCLD-LAB on an ongoing basis. ASCLD/LAB accredited laboratories must inform the ASCLD/LAB of problems that could affect the reliability of their work product and must document the corrective actions they have taken in such situations.

The time and resources involved in the accreditation process are considerable. Labs are required to designate a quality assurance manager and must have and follow a written training program in each discipline. Much more documentation regarding the quality control functions conducted in crime laboratories is required. Casework must be thoroughly documented and reviewed. Analysts must complete annual proficiency tests in each discipline in which they do casework (two tests per year for DNA).



The additional personnel time for expanded quality assurance procedures and their associated paperwork has been allocated from existing staff for nearly all accredited crime laboratories.

The more accurate, but more time consuming, processes and documentation in an accredited laboratory have created a need for additional resources that most laboratories have not been able to identify fully or explain to those who would have to authorize additional staff.

We found no study measuring the exact impact of accreditation on lab workload.[4] However, it is likely that there have been drops in casework production in most accredited laboratories, as they must put staff time into quality assurance and training activities. The more accurate, but more time consuming, processes and documentation in an accredited laboratory have created a need for additional resources that most laboratories have not been able to identify fully or explain to those who would have to authorize additional staff.

There are two major factors that will also affect accredited laboratories in the near future. First, ASCLD/LAB has adopted accreditation standards for the disciplines of crime scenes and digital evidence. Since these are "new" disciplines as far as accreditation is concerned, the majority of laboratories have not yet been accredited in them. Preparation for that will be significant. Secondly, ASCLD/LAB is in the process of making sure that its standards are compatible with those of international accreditation bodies. Additional criteria, especially relating to document control, are likely to be added to the existing standards.

4 Some anecdotal information is available. For example, in the BFS, productivity fell from an estimated 48 complex criminalistics cases per assigned FTE before accreditation to 36 such cases per analyst after the agency was ASCLD/LAB accredited in 1994, a drop of 25%.

C. Certification of Staff

Certification is a voluntary, formal process to ensure that individual professionals meet peer-based education, experience, and knowledge standards. Recognized certification programs in forensic science include written examinations, ongoing proficiency testing, and continuing education requirements for re-certification. Most forensic laboratories do not make certification mandatory before casework is conducted, but many do encourage employees to become certified in their particular discipline – for example by paying for the costs of the certification test, providing a pay differential to certified employees, and/or making certification a requirement for promotion.

The American Board of Criminalistics (ABC) was established in 1989. The ABC offers a Diplomate certificate in general criminalistics, based on a program pioneered by the California Association of Criminalists (CAC). The ABC also offers Fellow status in the specialty disciplines of forensic biology/DNA, drug chemistry, fire debris analysis, paints and polymers, and hairs and fibers. Applicants must pass the general knowledge test to be eligible to take one of the specialty examinations. As of August 2002, there were 559 ABC Diplomates nationwide (including 161 in California).

The International Association for Identification (IAI) began certifying latent fingerprint examiners in 1977, and by 2000, had certified 1,500 examiners. More recently, the IAI has added certification examinations in the disciplines of crime scene processing, bloodstain pattern analysis, footwear examination, forensic art, and forensic photography. Forensic toxicologists can receive certification from the American Board of Forensic Toxicology (ABFT), questioned documents examiners from the American Board of Forensic Document Examiners (ABFDE), and firearms and toolmarks examiners from the Association of Firearms and Toolmark Examiners (AFTE). National certification boards also exist for forensic pathologists, odontologists (dentists) and anthropologists.

In the future, certification can be expected to have a major impact on the minimum educational requirements for entry in the various forensic disciplines. Many forensic disciplines already require examiners to have scientific degrees. On the other hand, the comparative disciplines of questioned document, latent print and firearms examination, which are largely learned in an apprenticeship fashion, have traditionally been open to individuals without college degrees. However, the ABFDE, IAI and AFTE certification programs now have degree requirements, reflecting the increasing scientific complexity of the modern laboratory methods used in these types of examination.

A significant impact on laboratory budgets will come from the degree and continuing education requirements present in the certification programs (and in the accreditation program as well). In the future, laboratories will be held more accountable for ensuring that their staffs have reasonable opportunities to be involved in professional activities and to receive ongoing training to maintain their technical skills.

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Certification can be expected to have a major impact on the minimum educational requirements for entry in the various forensic disciplines.

D. Scientific Standards and Specialization

The development of forensic science standards at the national level goes hand in hand with laboratory accreditation and staff certification. A pioneering effort toward standardization came in 1989, when the FBI established the Technical Working Group on DNA Analysis Methods (TWGDAM), later renamed the Scientific Working Group on DNA Analysis Methods, or SWGDAM. TWGDAM was composed of representatives from the major forensic DNA laboratories around the country, whose goal was to develop peer-based consensus guidelines for quality control, DNA analysis methods, and training, as well as to provide a forum for inter-laboratory studies to validate new technology. The original TWGDAM guidelines have evolved over the years and became the basis for standards that must be adhered to by all forensic DNA laboratories that use CODIS for database searching.

By promoting good laboratory and analytical practices, the work of the these groups has provided a framework from which the probative and investigative value of physical evidence has been enhanced.

The recommendations of the Scientific Working Groups can be expected to have a significant impact on both certification and accreditation standards as time goes on.

Subsequently, numerous Technical and Scientific Working Groups (TWGs and SWGs) have emerged, sponsored by federal agencies such as the FBI, the Drug Enforcement Agency (DEA), the Bureau of Alcohol Tobacco and Firearms (BATF) and the National Institute of Justice (NIJ). These groups include broad representation from the forensic science community and are developing analytical guidelines, training and educational requirements, and quality assurance standards for:

- Fingerprints (SWGFAST)
- Trace evidence materials (SWGMAT)
- Controlled substances (SWGDRUG)
- Questioned documents (SWGDOC)
- Imaging technology (SWGIT)
- Fire and explosives (TWGFEX)
- Digital evidence (SWGDE)
- Firearms (SWGGUN)
- Bloodstain Pattern (SWGSTAIN)
- DNA (SWGDAM)

By promoting good laboratory and analytical practices, the work of these groups have provided a framework from which the probative and investigative value of physical evidence has been enhanced. The recommendations of these groups can be expected to have a significant impact on both certification and accreditation standards as time goes on.

One major effect of the increasingly rigorous training and experience standards recommended by the working groups is that individual forensic examiners are forced to become more specialized in order to cope with the ever-expanding knowledge base and the rapid changes in technology in their particular field. Historically, many crime laboratories, especially in California, were established on a generalist concept, where forensic scientists are trained and proficient in multiple disciplines. As a practical matter, however, the specialist approach is rapidly becoming the only viable approach, and the classical forensic generalist is an endangered species.

One major effect of increasingly rigorous training and experience standards is that individual forensic examiners are forced to become more and more narrowly specialized.

The trend toward specialization creates great tension for smaller laboratories that may not have enough people to have a specialist in each discipline. If the specialized workload in these laboratories cannot justify the cost of maintaining the expertise in-house, specialization could have the unintended effect of diminished client satisfaction. Specialization can also reduce the pool of staff with the broad experience needed to take on the role of a laboratory manager or major case coordinator, who must oversee numerous disciplines within a single laboratory. Specialization can also result in inefficiencies if workload fluctuations within a given discipline in a lab cannot be offset by sharing workload peaks and valleys across disciplines.

The ABC certification program models a middle ground between the generalist and specialist approaches, where analysts must demonstrate a broad general knowledge of forensic science as well as in depth knowledge in a technical specialty. Analysts trained in this way will possess the overall knowledge and skills to recognize and preserve evidence of many kinds at a crime scene (and ultimately to manage a multi-disciplinary laboratory) while still achieving mastery of their particular laboratory specialty. Educational programs for forensic scientists need to address and balance the generalist/specialist concept.

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In the long term, the level of specialization required to meet national standards, along with the increasing cost of equipment and training, may significantly alter the current concepts about how small a laboratory can be and still effectively serve its clients. This is likely to apply not only to a laboratory as a whole, but more specifically to the various disciplines within a laboratory. One approach may be to regionalize or centralize less commonly needed or more esoteric types of analysis (or to refer the work to a private laboratory), allowing the local laboratory to focus its efforts on those types of cases most frequently submitted by its clients. Based on our surveys of crime laboratory directors, there is support for this approach in California.

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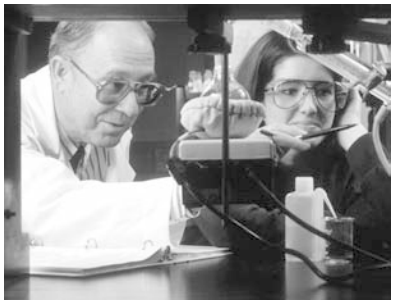
E. Training and Education

As the perceived importance of forensic science and physical evidence has increased around the country, so has the demand for well-qualified crime laboratory staff. Most of the professional staff in forensic laboratories has been educated in one or more of the physical sciences (chemistry, biology, etc.), buttressed by on-the-job training in the specifics of forensic science and competency tests prior to being assigned to casework. The bulk of this training is via in-house laboratory mentoring programs. Many of the Scientific and Technical Working Groups specify mandatory continuing education; for example, SWGDRUG requires a minimum of 20 contact hours per year for continuing professional development of each controlled substances analyst.

National in-service training opportunities for forensic scientists are still relatively limited.

California is especially fortunate to have one of the most highly regarded forensic science training organizations in the country.



National in-service training opportunities for forensic scientists are still relatively limited. A small number of courses are offered at the FBI Academy in Quantico, Virginia, training a few hundred scientists each year. DNA, fire debris, and controlled substance analysis are offered at the NFSTC and the National Center for Forensic Science (NCFS), both in Florida. Academies for document examiners, drug analysts, and firearms examiners are sponsored by the Secret Service, DEA, and BATF respectively, but these courses can accommodate only a few examiners annually. Sporadic courses in instrumental analysis are offered by various instrument manufacturers. A number of technical workshops are sponsored each year by the American Academy of Forensic Sciences (AAFS) and by various regional forensic science societies, such as the CAC.

California is fortunate to have one of the most highly regarded forensic science training organizations in the country. Recognizing that the on-the-job education and training of all crime laboratory staff had to be addressed or the laboratories would become obsolete and ineffective in their mission, the Legislature provided for the California Criminalistics Institute (CCI) in Penal Code sections 11060-11061.5.

CCI has been in operation since 1988 and has provided over 541 classes to approximately 7,720 students, the vast majority of which come from the 37 federal, state, and local crime laboratories of California. Currently, about 50 classes are given to over 600 students each year. Technological changes have been incorporated fairly smoothly into California's crime laboratories, due in large part to CCI's efforts. Recently CCI has entered into partnerships with the FBI Academy, the NFSTC and the NFSC to leverage the national training effort by sharing curricula and instructors and by developing web-based training. CCI's Users Advisory Board, representing the professional organizations and the state universities, has provided valuable direction to CCI and helped maintain its focus on ensuring that the forensic scientists of California have available the highest quality technical training.

Until 2003, travel for California local laboratory staff attending CCI courses was underwritten by the Commission on Peace Officer Standards and Training (POST) which also defrayed costs of some instructor travel. This funding provided major assistance to local forensic laboratories, although the state-run laboratories were not eligible to receive it. State budget constraints recently caused POST to eliminate these travel subsidies. This cost cutting will deliver a major blow to the training programs of California's crime labs and may even threaten the survival of CCI. The Directors of both state-run and local crime laboratories consider support for CCI training to be one of their highest priorities.

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Ideally, newly hired staff would come to the crime laboratories possessing both a sound education in basic science and an academic background in the precepts of forensic science. There are only a few forensic science programs around the nation, mostly at the master's level, with a broad spectrum of quality among them. Recently, the NIJ established a Scientific Working Group on Education and Training (SWGED), which developed guidelines for bachelors and masters level programs in forensic science. In 2002, the AAFS followed up by establishing the Forensic Science Educational Programs Accreditation Commission (FEPAC), an organization dedicated to accrediting forensic science academic programs based on the SWGED guidelines. This accreditation program should go a long way toward ensuring the academic rigor of forensic science programs around the country.

There is a national trend toward developing partnerships between working crime labs, training institutes, and academic institutions. The New York State Police in Albany, the Division of Forensic Sciences in Richmond, Virginia, and the Illinois State Police in Chicago, have all established educational partnerships with local academic institutions. In California, the new joint Los Angeles Police Department / Los Angeles Sheriff's Office Crime Laboratory facility will be located on the California State University, Los Angeles (CSULA) campus and will house a federally-funded forensics institute, a branch of the CCI, and laboratory space for the forensic science master's program. The new BFS Fresno Regional Laboratory is located on the campus of the California State University Fresno. CCI is working closely with the newly established forensic science master's degree program at the University of California at Davis.

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California state lawmakers acknowledged an urgent need for forensic scientists qualified to perform DNA analysis by enacting legislation[5] requiring the Department of Justice, the California State University, and the University of California to work together to enhance collaborative opportunities for DNA training of university students, graduates, and existing employees of crime laboratories. This would include an internship program for graduate level students, administered by CCI, in participating California crime laboratories designed to prepare students to meet national standards for DNA analysis. We believe that, in time, this internship program should be extended to cover the other forensic disciplines beyond DNA.

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5 Senate Bill 824, Chapter 477, Statutes of 2001.

It is important for the State to encourage its public universities to support research and professional education in all facets of forensic sciences. The recently defined standards for graduate education in forensic science recognize the significance of a research experience in preparing for a career in the field. Research is obviously important for the advancement of the field, and exposing students to research provides the opportunity for them to invest in this advancement. Research plays a vital role in education as well, giving the student experience in problem solving and critical thinking, both central elements of forensic practice.

III. California Forensic Laboratory Operations

OVERVIEW AND HISTORY

California's crime laboratories have a rich and varied history. Unlike many other states, whose forensic services are administered entirely at the state level, California's crime lab system is composed of a mosaic of state, county and city level entities. The Los Angeles Police Department Laboratory, established in 1923, is one of the oldest in the country. In 1931, the State established a crime laboratory in its Criminal Information and Identification (CII) bureau in Sacramento. In the 1940s and 1950s, county- and city-funded laboratories began to appear in other urban areas of the state, staffed primarily by alumni of Dr. Paul Kirk's pioneering criminalistics program at the University of California at Berkeley. Later, small drug identification labs were established by the State to support the DOJ's narcotics enforcement efforts.

In the early 1970s, under the auspices of the federal Law Enforcement Assistance Administration (LEAA), the California Department of Justice (DOJ) undertook a study to assess the State's forensic needs. Despite the existence of several well-established and respected crime labs, it became clear that many jurisdictions were severely underserved. As a consequence, there was concern for the consistent quality of justice across the state. Ultimately, the State proposed to establish a statewide system of regional forensic laboratories, incorporating the original CII lab and the drug identification labs and funded initially by the LEAA. Existing local laboratories were invited to participate, and two of them (Riverside and Santa Barbara) joined the new state system. Thus, in 1972, the DOJ Bureau of Forensic Services (BFS) was established and continues to serve 46 of California's 58 counties. Citing the importance of local control, 12 counties (and several cities within those counties) elected to continue to fund and administer their own forensic laboratories.

Today, nearly 1,500 forensic science professionals and nontechnical support personnel serve California's law enforcement and justice agencies. State, county and city-run forensic laboratories are located throughout the state, from Eureka in the Northwest to San Diego in the South. Every jurisdiction has access to good quality forensic science. In general, the less urbanized and inland areas throughout the state are served by the state funded DOJ laboratory system. The more populous urban areas are generally served by country-funded laboratories or by a combination of county and city-run facilities.

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The forensic laboratories located throughout the state have wide ranges in size and breadth of their operations. There are 33 state and locally funded laboratories recognized by the California Association of Crime Laboratory Directors (CACLD), 26 of which are accredited by the American Society of Crime Laboratory Directors/ Laboratory Accreditation Board (ASCLD/LAB). They range in size from very large laboratory operations managed by the City of Los Angeles, the County of Los Angeles, and the State DOJ, down to small laboratories serving only one city, such as El Cajon or Huntington Beach. Thirteen of the 33 recognized labs are DOJ managed laboratories, each of which serves a multi-county region. The maps on pages 32 and 33 show the locations of service of the various laboratories.

Table 1 **Overview: Forensic Laboratories in California - 2001**[6]

2001 Statistics	State (DOJ)	County	Municipal	Total
Population Served	8 million	19 million	7 million	34 million
Part I Crimes[7]	280,000	675,000	315,000	1.27 million
Percent of Total	(22%)	(53%)	(25%)	
Sworn Officers Served	17,000	23,407	15,784	56,191
Percent of Total	(30%)	(41%)	(28%)	
Professional Staff[8] (FTE's)[9]	173	535	278	986
Percent of Total	(17.5%)	(54.3%)	(28.2%)	
Cases per FTE	363	524	391	458
Total Cases Processed	62,705	280,117	108,691	451,513
Percent of Total	(13.9%)	(62%)	(24.1%)	
Total Budget	$38 million	$68 million	$25 million	$131 million[10]

The number of cases completed per professional FTE varies significantly depending on the number of cases falling into a limited number of highly automated high-volume categories, which are not proportionally distributed between the various lab systems.

Table 2 **Overview: Types of Cases (2000 -2001)**

Case Category	State (DOJ)	County	Municipal	Total
Blood/Breath Alcohol	21,288	59,593	5,067	85,948
Percent of Total	(25%)	(69%)	(6%)	
Latent Print Comparison	2,649	14,431	10,684	27,764
Percent of Total	(10%)	(52%)	(38%)	
Toxicology	9,852	85,264	2,170	97,286
Percent of Total	(10%)	(88%)	(2%)	
TOTAL CASES	33,789	159,288	17,921	210,998
Percent of Total	(16%)	(75.5%)	(8.5%)	

6 Comparisons among laboratories of total tests per staff member are not particularly meaningful because there is significant variation in how work is counted , different laboratories perform a different mix of test types, and some tests take substantially more resources than others. The ratio between Part I crimes and completed cases is not very comparable either.

7 PART I Crimes reported in the FBI's Uniform Crime Report (UCR) are murder, forcible rape, robbery, aggravated assault, burglary, larceny, auto theft, and arson. UCR statistics are commonly used to compare the relative levels of crime between jurisdictions.

8 Professional staff includes laboratory scientists and examiners who report the results of evidence examination and testify in court and supervisors, if they do casework.

9 FTE = Full Time Equivalent staff.

Collectively, California's crime laboratories serve the forensic needs of over 56,000 law enforcement officers dealing with nearly 1.3 million Part I crimes each year, at a cost to taxpayers of about $131 million per year.[10] The 1,456 staff FTEs (986 are professional positions) provide analysis on over 451,000 cases per year. The staff level is up significantly from 15 years earlier – with half of the individual laboratories growing 75% or more during that period. By comparison, Part I crimes statewide grew much less during that period. Laboratory facilities (currently about 518,000 square feet) also grew during this period – with half the reporting agencies adding about 65% to their space over that 15-year period.

Given the wide array of options, it might be thought that there would be a duplication of effort between the various laboratories. In fact, we found that little duplication of resource utilization or effort actually exists. Each jurisdiction is served by only one primary forensic laboratory for any given type of test. Occasionally, when the accuracy of the work of one laboratory is in question, the evidence may be sent to another public laboratory or to a private laboratory for verification.

Organizations such as the DOJ with more than one laboratory may shift samples to one of their less congested laboratories, and a laboratory that lacks a particular expertise may refer evidence to one that specializes in the test type required. Whether any of these could be considered duplication is questionable, but they are the only time more than one laboratory deals with a sample.

It is clear that there is no redundancy in the current statewide laboratory system. Each laboratory serves its jurisdiction(s) with little or no overlap. However, while each California crime laboratory is justifiably proud of its own accomplishments, the lack of statewide management makes it virtually impossible to coordinate efforts to reduce unusual workloads in a given laboratory if excess capacity exists elsewhere within the total system. Further, there appears to be nothing in the law that would preclude any municipality from ceasing operations of its laboratory and effectively forcing the county in which it is located to pick up that workload (or a county, for that matter, from abdicating to the State).

It is clear that there is no redundancy in the current statewide laboratory system. Each laboratory serves its jurisdiction(s) with little or no overlap.

10 This is an incomplete figure. It includes most costs for the 30 responding laboratories. However, except for the State labs, budgets for most labs do not include utilities or facilities leasing cost.

The largest laboratory organization in the state is the Department of Justice's Bureau of Forensic Services (BFS), which has 13 accredited laboratory operations located at 11 sites. BFS regional laboratories each serve a multi-county region. The map on page 32 shows BFS laboratory locations and service areas.

The ten multi-discipline BFS regional laboratories and three specialized laboratories (Latents/Questioned Documents, Toxicology, and DNA) provide forensic services to over 500 law enforcement agencies that serve nearly 8 million people in 46 of the State's 58 counties, primarily in more rural communities. The law enforcement agencies in these jurisdictions employ about 17,000 peace officers or nearly 30% of the state's sworn personnel. There were about 280,000 Part I crimes reported in these jurisdictions in 2000-01, approximately 22% of all Part I crimes statewide.

BFS operates two specialized programs that offer services statewide. The Cal-DNA CODIS databank in the Richmond DNA Laboratory receives DNA samples from qualifying offenders throughout California, enters their DNA profiles into the Cal-DNA databank, and compares them to DNA profiles from crime scene evidence. This service is provided to all California law enforcement agencies. The BFS California Criminalistics Institute (CCI) provides POST-certified criminalistics in-service training to students from all public laboratories in California. Classes range from basic DNA testing procedures to advanced training in crime scene reconstruction.

BFS forensic laboratories have grown moderately over the past twenty years. Excluding CCI and the Cal-DNA databank programs,[11] BFS laboratories had a combined budget of over $38 million in 2000-01 and approximately 173 professional staff and 331 total staff. Total staff levels increased from approximately 191 FTEs in 1985-86 – an average increase of 3.7% per year. BFS currently is building new laboratories to replace outdated facilities in Redding, Santa Barbara and Santa Rosa. New laboratories were completed in early 2002 for Ripon and Riverside as well as the Richmond DNA facility, and the new Fresno regional laboratory was completed in 2003.

The BFS operated laboratories complete about 63,000 cases each year, an average of 363 cases per FTE per year. This constitutes about 14% of all tests completed in the State each year. This does not necessarily mean, however, that State laboratories perform only 14% of the labor, because cases involve differing numbers of tests, each test type takes widely different amounts of a scientist's time and not all laboratories offer equivalent levels of service.

Forensic laboratory workload can be generalized into two basic categories:

1) High volume, relatively straightforward cases; and,
2) Complex, time and resource intensive cases.

11 Because the Cal-DNA databank and CCI fell outside of the parameters of this study, personnel for these statewide duties are not included in the FTE (full time equivalent) staffing numbers throughout this report, nor are they included in the workload and budget totals.

The first category of high volume tests is comprised of three disciplines: Alcohol tests associated with driver stops (Blood and Breath Alcohol), tests of substances to determine if drugs and other controlled substances are present (Controlled Substances), and tests of bodily fluids for drugs or chemicals (Toxicology). Over 87% of BFS cases fall under this category, but only 27% of staff is assigned to this work.

The second category comprises all other forensic disciplines offered at BFS, including Firearms, Latent Prints, Trace Evidence, DNA, and conventional Serology. These are collectively termed "criminalistics" cases and generally are violent offenses, such as sexual assault and homicide. The vast majority (73%) of BFS professional staff is assigned to this relatively small proportion (12%) of complex cases.

The average turnaround[12] for cases at BFS is approximately 15 calendar days. This average is driven by the disproportionate percentage of the workload that falls into the high-volume, routine category of blood alcohol, controlled substances and toxicology cases (this is true also in city and county labs, as discussed later in this chapter), which alone have turnaround times ranging from 6–13 days. It disguises the fact that second-category more complex tests take much longer to be processed. For instance, DNA tests in 2000-01 took an average of 122 days, or over 17 weeks.[13] Furthermore, at year-end the BFS laboratories had a backlog of unanalyzed DNA cases equal to 14 months of work. While DNA tests constitute a small percentage of BFS tests and thus do not heavily impact the laboratory's overall average response time, such long turnaround times clearly impact the capacity to fight the types of crimes in which the these tests are crucial – murders, rapes, many other violent crimes, and crimes without a suspect.

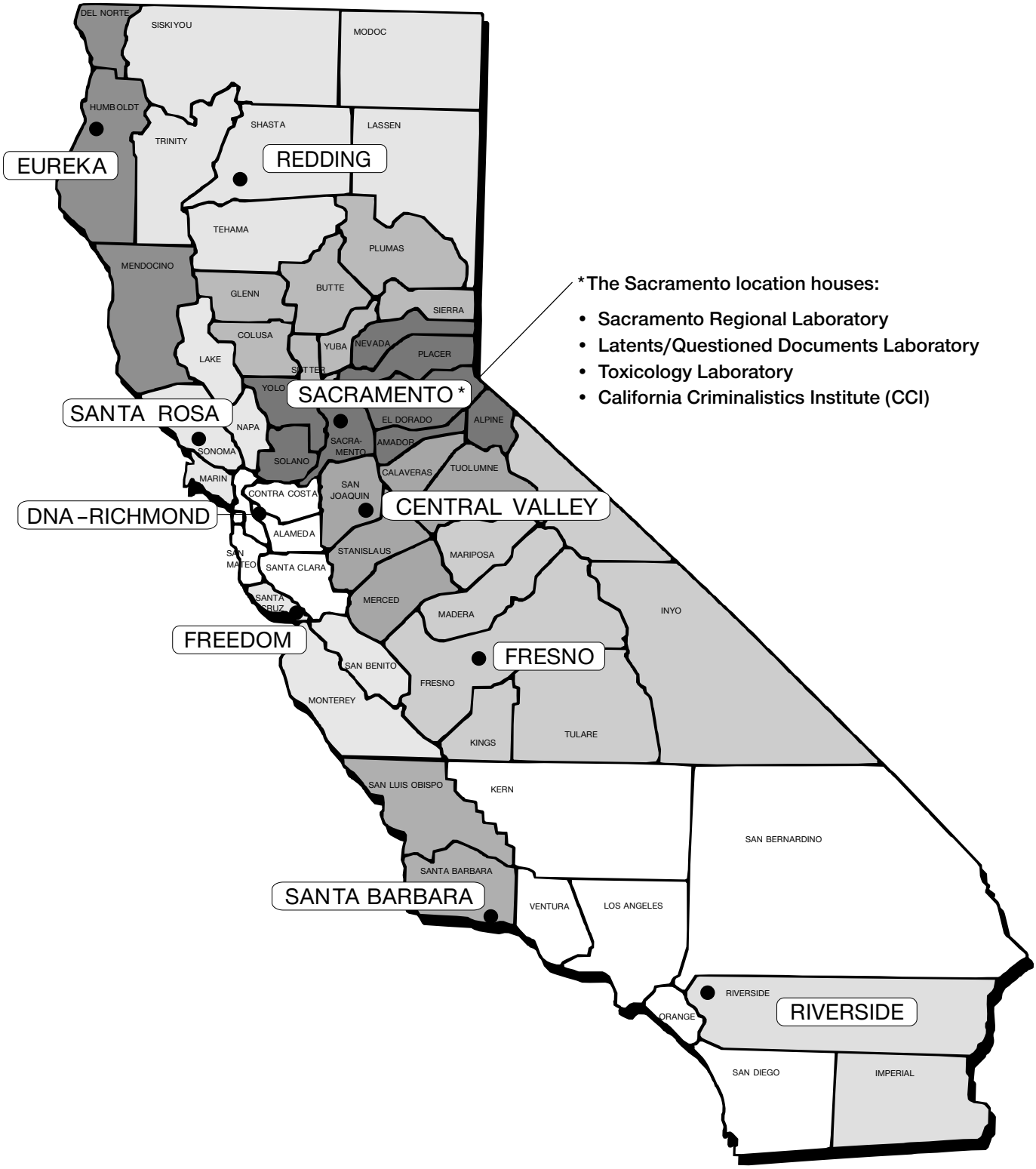
State laboratories handled the preponderance of clan lab cases because clan labs tend to locate in the rural areas serviced by BFS and because BFS serves the DOJ Bureau of Narcotic Enforcement (BNE), which is a statewide law enforcement agency. Some local city and county crime labs have opted not to respond at all to clan lab scenes, leaving that responsibility to BFS. Due to the rural, multi-county character of its service area, BFS personnel expend more personnel time in travel to crime scenes and court appearances than most county or municipal laboratory personnel.

BFS Central Valley Regional Laboratory in Ripon, CA.

12 Turnaround time is measured from the date of the request until the report on the test results is completed in calendar days.

13 This is the weighted average where the numbers of DNA cases completed by each BFS DNA unit were taken into account.

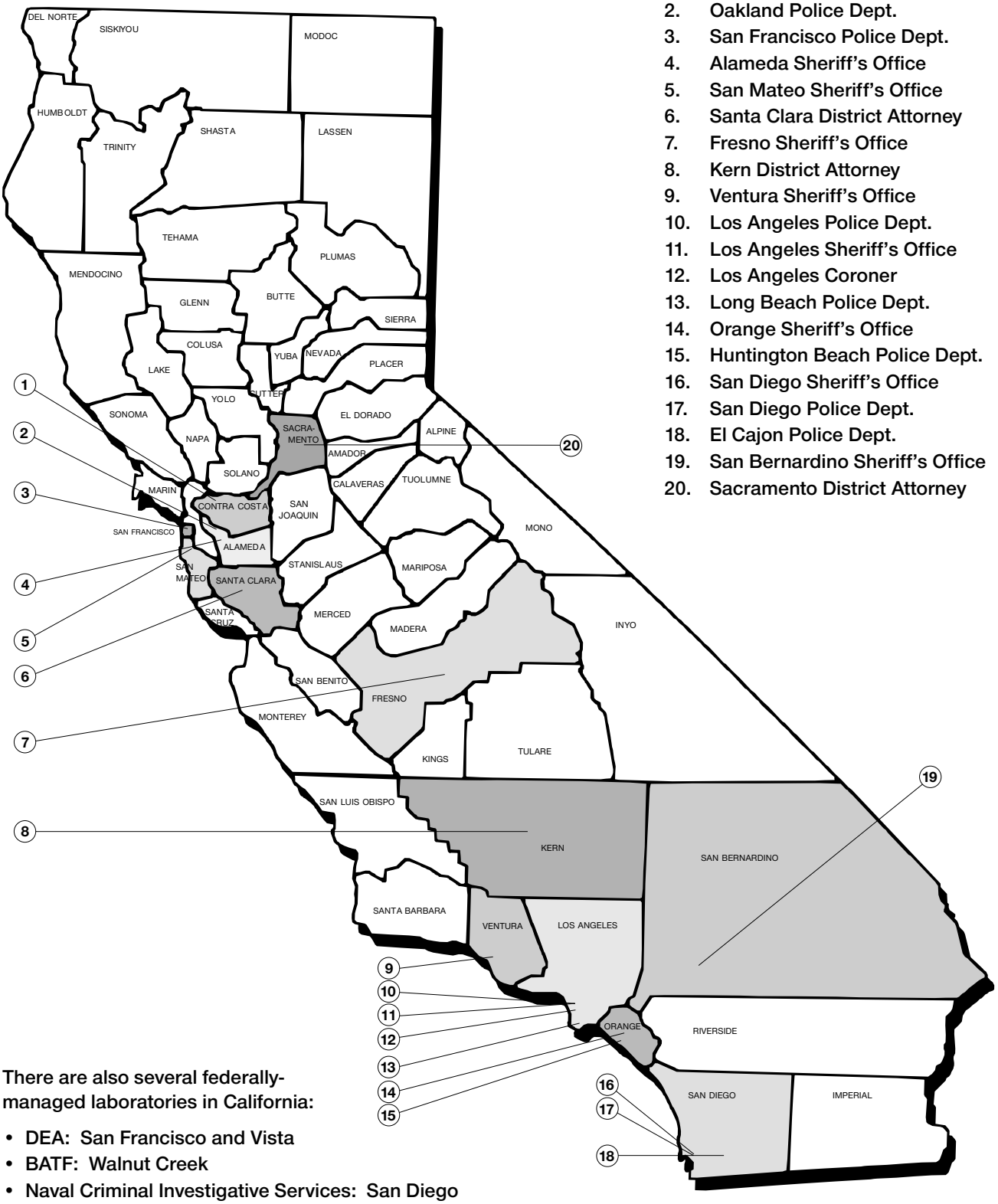
State BFS Forensic Laboratory Locations in California



*The Sacramento location houses:

- Sacramento Regional Laboratory
- Latents/Questioned Documents Laboratory
- Toxicology Laboratory
- California Criminalistics Institute (CCI)

County and Municipal Forensic Laboratory Locations in California



1. Contra Costa Sheriff's Office
2. Oakland Police Dept.
3. San Francisco Police Dept.
4. Alameda Sheriff's Office
5. San Mateo Sheriff's Office
6. Santa Clara District Attorney
7. Fresno Sheriff's Office
8. Kern District Attorney
9. Ventura Sheriff's Office
10. Los Angeles Police Dept.
11. Los Angeles Sheriff's Office
12. Los Angeles Coroner
13. Long Beach Police Dept.
14. Orange Sheriff's Office
15. Huntington Beach Police Dept.
16. San Diego Sheriff's Office
17. San Diego Police Dept.
18. El Cajon Police Dept.
19. San Bernardino Sheriff's Office
20. Sacramento District Attorney

There are also several federally-managed laboratories in California:

- DEA: San Francisco and Vista
- BATF: Walnut Creek
- Naval Criminal Investigative Services: San Diego
- U.S. Customs: San Francisco and Terminal Island

COUNTY-MANAGED LABORATORIES

Forensic laboratories managed by counties normally serve all law enforcement agencies within the county, although larger cities within a county may have their own laboratories (discussed under municipal labs, in the next section). In California, there are 12 county laboratories.[14] Nine counties have sheriff-managed laboratories, while three are run by district attorneys.

The 12 county laboratories are shown on the map on page 33. The approximate number of cases, staff (full-time equivalent or FTE), and Part I crimes associated with each laboratory are as follows:

Table 3 **County Labs in California**

County	Managed By	Cases Completed per Year	Professional FTEs	Part I Crimes
Alameda [15, 16]	Sheriff	7,000	10	7,000
Contra Costa [16]	Sheriff	20,000	42	55,000
Fresno [15]	Sheriff	No data	5	14,000
Kern	District Attorney	28,000	20	26,000
Los Angeles [15]	Sheriff	76,000	159	200,000
Orange	Sheriff/Coroner	30,000	103	77,000
Sacramento	District Attorney	16,000	28	46,000
San Bernardino	Sheriff	23,000	50	66,000
Santa Clara [16]	District Attorney	38,000	37	49,000
San Diego [15]	Sheriff	18,000	42	45,000
San Mateo	Sheriff	20,000	18	19,000
Ventura	Sheriff	6,000	20	18,000
TOTAL		282,000	534[17]	622,000

The county laboratories are responsible for processing tests for county and municipal law enforcement agencies. Roughly half of all Part I crimes in the state occur in the jurisdictions served by these laboratories. The county laboratories employ approximately 55% of all forensic professionals in public laboratories and processed about 280,000 cases in 2000-2001 (62% of all the tests conducted in the state), approximately 524 cases per FTE. The weighted average turnaround time per case at county laboratories is about 12 calendar days. However, the turnaround time for DNA tests, which in this instance was driven by the exceptionally long turnaround reported by one laboratory with a very large caseload, is over 212 days (30 weeks).

Again, as noted in the state laboratory system, the vast majority (82%) of county crime lab cases are of the less complex variety (e.g. controlled substances, toxicology and blood alcohol) which have a low turnaround time and greatly skew this average. Likewise, there is considerable variation in the level of services offered by these laboratories. All provide controlled substances analysis and firearms examination, many offer DNA analysis, some have full-fledged trace evidence units, and only a few offer questioned documents service.

14 The Los Angeles Coroner also maintains a forensic laboratory specifically to work on death investigation. This accredited laboratory was inadvertently omitted from this survey.

15 Alameda, Los Angeles and San Diego County statistics do not include cities of Oakland, Los Angeles and San Diego respectively, which are serviced by municipal laboratories. The Fresno County statistics include only the unincorporated areas of the county, as all the municipalities in Fresno County are served by the BFS Fresno Regional Laboratory.

16 Alameda, Contra Costa and Santa Clara Counties all have fee-for service programs, which charge municipalities for all or part of their services.

17 The total number of staff derived from the numbers assigned to different services (Table 6, page 38) was 535.

MUNICIPALLY-MANAGED LABORATORIES

In addition to State- and County-managed laboratories, seven individual Police Departments administer their own laboratories. These are: Los Angeles, San Diego, San Francisco, Long Beach, Oakland, Huntington Beach, and El Cajon.

Approximately 315,000 Part I crimes occur annually in these seven cities (about 25% of the statewide total), and 278 forensic professionals work for municipal laboratories (about 27% of the total working in governmentally managed laboratories in the state). In 2000-01, these seven laboratories processed about 109,000 cases (or about 24% of all cases processed in all laboratories), equivalent to 391 cases per FTE.

Table 4 **Municipal Labs in California**

City	Cases Completed per Year	Professional FTEs	Part I Crimes
El Cajon (No response)			
Huntington Beach[18]	5,000	8.0	5,000
Long Beach	15,000	16.0	18,000
Los Angeles	62,000	169.5	166,000
Oakland	5,000	13.0	31,000
San Diego	10,000	53.0	50,000
San Francisco	12,000	18.5	45,000
TOTAL	109,000	278.0	315,000

Although all the municipally-managed laboratories have a heavy controlled substances workload, they do not have comparable workloads in terms of other types of cases they process. For example, 2/3 of Long Beach's 15,000 cases are latent comparisons, latent fieldwork, or questioned documents. On the other hand, Los Angeles reports only 30% of its total caseload in these three categories; San Diego only about 17%; and San Francisco less than 1/2 of 1% (San Francisco's latent print unit is not housed within its forensic laboratory).

Since cases from some disciplines, such as DNA or trace evidence, take much longer to process, comparing average turnaround time between laboratories is not very meaningful. For all municipal laboratories, the weighted turnaround for the "average" test is 9.4 calendar days and turnaround time on DNA tests is about 50 days – the lowest in the state.

18 Since this survey was completed, Huntington Beach has reduced services provided at its municipal laboratory, transferring much of the workload to the Orange County Sheriff/Coroner Laboratory.

PRIVATE FORENSIC LABORATORIES

Private laboratories in California and throughout the country perform a variety of forensic tests for California law enforcement agencies, district attorneys, and even public laboratories. Private laboratories do not routinely offer all of the various types of forensic tests and are most commonly used in blood alcohol and toxicology cases. Some private laboratories perform DNA analysis on blood samples for paternity determinations or DNA databank profiling, and a few specialize in DNA analysis of criminal case evidence. Some of these laboratories conduct a significant number of DNA tests for California law enforcement. A much smaller number of private laboratories offer a broader spectrum of "criminalistics" services, which includes firearms examination, trace evidence analysis and crime scene reconstruction. With the exception of toxicology/blood alcohol services, the casework capacity of California's private laboratories is relatively small. Much of their practice is devoted to the important function of reviewing the work of public laboratories on behalf of the defense.

FEDERAL FORENSIC LABORATORIES

In general, federal laboratories accept only cases related to investigation or adjudication at the federal level or crimes occurring in federal jurisdictions (such as national parks, military bases and prisons).[19] There are forensic laboratories operated by DEA, BATF, U.S. Customs, and Naval Criminal Investigative Services that are located in California. The FBI operates the nation's largest and most diversified crime laboratory in Quantico, Virginia, but is not staffed to handle more than a tiny fraction of the workload generated by local law enforcement. Although this laboratory will accept local cases if the referring local laboratory lacks the expertise to complete the case, the FBI will not re-examine a case that has already been worked by another forensic laboratory, and its turnaround time for local cases is usually very long (up to one year for DNA cases). For this reason, California agencies rarely refer cases to the FBI Laboratory. The DEA Laboratories receive casework from federal drug enforcement agents and often work on cases stemming from joint federal, state and local law enforcement investigations. These generally involve major drug trafficking and clandestine laboratory operations, rather than the simple drug possession cases which make up the bulk of local crime laboratories' workload. The BATF Laboratory works on specialized cases involving firearms violations and assists local laboratories in major arson scenes, bombings, and other explosions.

19 Most state and local California crime laboratories also accept federal case that occur in their jurisdictions.

IV. Assessing California's Forensic Laboratory Workload and Performance

INTRODUCTION

This chapter summarizes the results of survey data received from laboratories, law enforcement, district attorneys and other state laboratories. Survey questions primarily focused on workload and performance data of California's government laboratories, specifically the types of cases performed at each laboratory, staffing levels, and annual workload. In addition, the study evaluated laboratory performance based on average turnaround time, client agency satisfaction and, very broadly, how California laboratories compared with their counterparts in other large states. Unless otherwise noted, the data in this chapter is from 2000-2001. *(Copies of the surveys are found in Appendices A through E, pages 82-97.)*

FORENSIC LABORATORY OPERATIONS WITHIN CALIFORNIA

The results from the two California laboratory questionnaires were extremely comprehensive.[20] All but the smallest laboratory in the state completed the questionnaire, and 29 laboratories returned a supplemental questionnaire requesting additional clarifying information. In addition to the questionnaire responses, laboratory directors provided verbal input at meetings during the course of the study.

Laboratory directors noted that accreditation requirements have generally reduced productivity, but had improved quality control. Accreditation requires additional space (separation of test environments for contamination control), more training for staff, time consuming documentation, stringent review processes, and additional security. As noted elsewhere, these quality assurance measures are an essential "cost of doing business" and are critical to the credibility of the laboratories' work. Despite cost implications, 26 laboratories have already received accreditation, and most unaccredited laboratories indicated they planned to become accredited in the near future.

A. Services Provided

Forensic laboratories offer a wide variety of services, although no single laboratory in California provides every service.[21] A variety of factors influence the decision to offer certain forensic services, including cost of offering the service, demand from client agencies, and the expertise of laboratory staff. If a laboratory does not provide a particular service, it can send work to a nearby county or state laboratory, or in some instances, to a federal or private laboratory.[22]

20 The Task Force appointed a committee to work with the California Association of Crime Laboratory Directors (CACLD) to develop the questionnaire for the laboratory directors. In nearly every case, questionnaires were completed by laboratory directors, who are the most informed on the needs of laboratories.

21 A full description of each service is available in the glossary of this report.

22 Occasionally, this might result in a duplicate count in the following sections, as the original lab and the lab to which the work is sent may both track these cases.

Table 5 **Number of Government Laboratories Offering Various Forensic Services**

Controlled Substance	29	Hairs	24	Toxicology	12
Firearms	28	Forensic Biology Conventional	23	Fire Debris	12
Crime Scenes	28	Misc. Trace	22	Gunshot Residue - SEM	11
NIBIN (IBIS/DRUGFIRE)	27	Clan Lab	20	Questioned Documents	11
Toolmarks	27	DNA - STR	18	DNA - DIS80	9
Alcohol Breath	26	DNA - DQA1 + PM	16	DNA - RFLP	3
Explosives	26	Latent Prints Field	16	Computer Crime	2
Impressions	26	Latent Prints Comparison[23]	12	Gunshot Residue - AA	2
Alcohol Blood/Breath	26	Cal-ID	12	DNA - Mitochondrial	0
Fibers	24	CODIS	12		

Numbers current through the end of FY 2000-01

B. Staffing

California's government laboratories employ 986 professional staff who specialize in a wide variety of forensic services. Over half (55%) of all professional laboratory staff work at county-managed laboratories, another 27% work at city laboratories, and 18% at state laboratories. Staff levels have increased significantly over the past 15 years – with half of the individual laboratories growing 75% or more.

TABLE 6 **Professional Staff Distribution within Forensic Laboratories**

Service Category	Total FTEs	City Labs	County Labs	State Labs
Latent Prints Field	132.8	45.3	77.0	10.5
Latent Prints Comparison	132.3	53.3	70.5	8.5
Controlled Substance	115.1	28.0	67.5	19.6
Forensic Biology–DNA[24]	93.3	22.3	50.1	21.0
rearms/Tool marks	66.5	25.3	30.5	10.7
Other	62.9	37.1	25.3	0.5
Toxicology	61.9	5.5	46.4	10.0
Alcohol Blood/Breath	60.4	8.8	34.4	17.2
Forensic Biology–Conventional[24]	59.4	13.0	31.3	15.1
Crime Scenes	48.1	12.9	20.8	14.5
Trace Evidence	37.6	5.0	26.2	6.4
Clan Lab	37.3	5.0	15.3	17.0
Questioned Documents	22.7	9.0	7.7	6.0
GSR	18.3	2.5	15.2	0.6
Fire	16.1	2.6	5.3	8.2
Impressions	14.0	1.1	7.4	5.5
Explosives	4.2	1.5	1.4	1.3
Computer Crime	3.0		3.0	
TOTAL	985.61	278.0	535.0	172.6

By comparison, Part I crimes statewide grew at a much slower rate during that period. As discussed extensively elsewhere in this report, the amount of forensic analysis requested on a given case increased as new technologies developed.

23 This question was not asked in the survey. The number is derived from the number of labs reporting personnel resources devoted to comparisons.

24 This data was collected prior to the OCJP "COLD HIT" Grant Program. As a result, the number of staff dedicated to Forensic Biology (conventional and DNA) has grown significantly since this data was collected, as has the number of DNA tests requested.

Advancements in forensic science, such as DNA analysis, have dramatically expanded the types of forensic tests available. As the menu of options for forensic analysis has grown, law enforcement has placed increasing demands for testing on each case.

Table 6 estimates of the number of professional staff assigned in 2000-01 to perform various forensic services. It is notable that, while blood alcohol, controlled substances, and toxicology are the three most highly requested services (71.4% of all tests requested),[25] a relatively small percentage of FTE's (24.1%) is assigned to perform these analyses. Blood alcohol, controlled substances, and toxicology are high volume, non-labor intensive tests. By contrast, because forensic biology analysis is extremely labor intensive, 15.5% of professional FTE's were assigned to perform forensic biology (DNA/serology) analysis, even though DNA/serology comprises a small fraction (1.5%) of total service requests.

Computer crime is a newly emerging discipline, and most law enforcement agencies do not have this activity assigned to the forensic laboratory at this time. In many areas of the state, regional High Tech Task Forces that are not associated with a forensic laboratory provide computer crime services.

There is an important caveat with respect to the figures for latent prints and crime scene analysis. If they go to scenes at all, laboratory professionals are called primarily to crime scenes involving death or other violent crime. Many agencies use non-laboratory crime scene investigators or other law enforcement employees to perform most crime scene functions. As a result, the actual number of FTE's performing crime scene analysis and latent print work statewide is substantially higher than the laboratory FTEs reflected in this table.

When asked about resource shortfalls,[26] laboratory directors collectively felt that it would require 326 additional staff (at an estimated annual cost of $26.2 million) to meet the needs of their clients. This is an average increase of 33.1% over the 986 professional staff now funded. Responses from laboratories varied widely, ranging from no additional staff needs in one agency to 220% additional staff needs in another. As a composite, laboratories run by police agencies felt they needed 41% more staff, state laboratories 35% more, sheriff-managed county laboratories averaged 30%, and district attorney-managed county laboratories averaged 14%.

We conclude from our surveys that the laboratories are currently balancing their workload by denying service in property crimes, by focusing on cases where a suspect has already been identified, and by juggling caseloads at the expense of timely service. Unfortunately, this leads to a tendency for laboratories to reject (and clients not to submit) requests in cases without suspects, the very cases where new technology has most improved the ability of the forensic laboratory to help solve crimes.

Laboratory directors collectively felt that it would require 326 additional staff – at an estimated annual cost of $26.2 million – to meet their clients' needs. This is an average increase of 33%.

25 There were 322,381 requests for blood alcohol, controlled substances, and toxicology testing, requiring 237.4 FTEs. There were 6,578 requests for forensic biology (DNA/conventional serology), using 152.7 FTEs. See Table 7 on page 40 for comparison with requests for other services.

26 Responses to this question were the opinions of laboratory directors about the needs they have in their laboratories.

C. Workload

Table 7 indicates how laboratory workload breaks down among the various services. One of the limitations of using this data for inter-laboratory comparisons is that laboratories count their work in different ways. Most track "cases" or "requests for service," not individual "tests" performed. An individual criminal event may involve multiple requests for analyzing several different pieces of evidence involving several different forensic disciplines. Most labs quantify their work by the number of "requests" they complete in a particular service or discipline – that is, the number of firearms cases equals the number of instances in which the lab received and completed a request for firearms services. In this report, the terms "cases" and "requests" are used interchangeably in estimating laboratory workload.

Table 7 **Laboratory Workload – Completed Requests for Services**

Service Category	City Labs	County Labs	State Labs	Total
Alcohol Blood	5,067	59,593	21,288	85,948
Clan Laboratory	164	366	1,648	2,178
Computer Crime		380		380
Controlled Substance	38,055	87,507	23,585	149,147
Crime Scenes	2,403	1,828	196	4,427
Explosives	13	19	9	41
Fire	74	183	239	496
Firearms	2,926	3,764	787	7,477
GSR	224	223		447
Impressions	22	117	71	210
Latent Prints Comparison	10,684	14,431	2,649	27,764
Latent Prints Field	17,843	18,665	399	36,907
Questioned Documents	5,201	1,043	294	6,538
Forensic Biology - Conventional	661	1,473	957	3,091
Forensic Biology - DNA	457	2,628	394	3,479
Toxicology	2,170	85,264	9,852	97,286
Trace Evidence	252	1,308	177	1,737
Other	22,475[27]	1,325	160	23,960
TOTAL	108,691	280,117	62,705	451,513

Although laboratories at all levels in the state provide a wide variety of services, some types of tests are more frequently performed at certain levels. State laboratories, primarily due to the large geographic regions they support, perform less latent print fieldwork, but handle over 75% of the clan lab cases and almost 1/2 of the fire debris analyses. By contrast, City-managed laboratories, which handle about 24% of total tests, perform about 44% of the latent print work and 39% of the firearms work.

27 This figure includes over 21,000 "photography" requests completed by one large city lab, a service not reported by the other responding labs.

County laboratories are heavily involved in Toxicology testing, with over 80% of all toxicology tests at that level. DNA tests are also a clear focus of county managed laboratories, which conducted 75% of the DNA tests in 2000-01. Questioned documents are primarily a municipal focus, with 75% of all tests on documents being performed at the municipally-managed laboratories.

D. Costs of Various Services

We considered various ways in which we could approximate the cost of laboratory testing. As different equipment with widely varying costs is used by different laboratories (and in some cases by the same laboratory), and since some equipment is utilized in different types of analysis, we found that we could not readily associate an equipment cost with a specific type of analysis. We also did not have facility space allocations associated with various services, and in fact facilities are separated only for certain types of tests. Thus, we based our cost by type of service on labor allocations only. As we did not ask the participating laboratories for information about the level of laboratory staff utilized for different types of tests, the following assessment is based on a presumption that the cost per hour of laboratory staff is the same across all types of tests. This is not accurate, but is the best approximation we could make given the data available to us.

Table 8 **Approximate Costs by Type of Service**

Service Category	Tests in 2000-01	FTEs in 2000-01	Estimated Cost	Approx. Cost per Test
Alcohol Breath	85,948	60.35	$ 8,026,550	$ 93
Clan Laboratory	2,178	37.25	4,954,250	2,275
Computer Crime	380	3.00	399,000	1,050
Controlled Substance	149,147	115.10	15,308,300	103
Crime Scenes	4,427	48.13	6,400,625	1,446
Explosives	41	4.20	558,600	13,624[28]
Fire	496	16.08	2,137,975	4,310
Firearms	7,477	66.45	8,837,850	1,182
GSR	447	18.30	2,433,900	5,445
Impressions	210	13.98	1,858,675	8,851[28]
Latent Prints Comparison	27,764	132.25	17,589,250	634
Latent Prints Field	36,907	132.75	17,655,750	483
Questioned Documents	6,538	22.70	3,019,100	462
Forensic Biology - Conventional	3,091	59.40	7,900,200	2,556
Forensic Biology - DNA	3,479	93.30	12,408,900	3,567
Toxicology	97,286	61.85	8,226,050	85
Trace Evidence	1,737	37.60	5,000,800	2,879
Other	23,960[27]	62.88	8,362,375	349
TOTAL	451,513	985.55	$ 131,078,150	$ 291

28 These high cost figures are likely statistical flukes resulting from the very small number of explosives and impression cases and from the use of FTE estimates only as the cost basis.

The survey identified a total budget for the surveyed laboratories of $131 million and total scientific staff of 986. This means that the "loaded" cost per average staff member averages about $133,000 per scientific FTE. This includes management and support staff costs as well as some equipment and facilities maintenance costs. Depending on the budgeting practices of the various agencies, it may not include an allocation of overhead costs from central city or county departments (such as personnel departments, budget departments, city council or board of supervisors costs, etc.), facility leases, and one-time capital equipment.

As noted, these are very rough approximations of the costs for the various categories of tests. Approximately half of the laboratories in the state would have higher costs than the median, and half lower costs. However, the numbers above may be useful to policy makers in considering various funding options.

E. Turnaround Times / Timeliness of Results

We found, as reflected throughout this report, that turnaround times are a key area of concern to laboratory users. Turnaround time is defined as the time period (in calendar days) from when a request is received at the lab until the final report is completed. It is a combination of the time it takes to perform the testing and write the report and the time a case spends waiting (for lab resources, court dates, or additional information from the field so testing can be started). Depending on the type of test, 2/3 or more of the turnaround time is associated with time waiting in the queue – either for additional information from the submitting agency or (more commonly) for laboratory resources. Table 9 provides turnaround times for different forensic services.

The accuracy of the turnaround data from this survey is limited by the fact that many of the labs do not have the LIMS capability to track turnaround and could provide only a "best estimate." Some labs, including a few with very large caseloads, provided no turnaround data at all.

When comparing turnaround time between laboratories, it must be borne in mind that there are differences in the number of tests performed on different cases and there may be both qualitative and quantitative differences in the typical work done within any given test category between various laboratories. That is to say, by policy, different labs may expend more or less resources (and therefore working days) on identical cases. For example, state labs routinely test negative blood alcohol samples for drugs, while some other laboratories may not.

Table 9 **Average[29] Turnaround Times By Service (Calendar Days)**

Test Category	Average[29] All Labs	City Labs	County Labs	State Labs
Alcohol Blood	5.0	3.0	4.7	6.5
Clan Laboratory	19.7	9.5	18.8	20.8
Computer Crime	44.3		44.3	
Controlled Substance	9.3	1.6	14.4	11.0
Crime Scenes[30]	25.8	2.0	66.2	27.3
Explosives	48.9	47.0	59.9	18.0
Fire	38.7	21.0	39.3	43.6
Firearms/Toolmarks	40.3	46.0	28.9	42.9
GSR	26.4	15.0	37.0	
Impressions	38.0	21.8	38.2	41.0
Latent Prints Comparison	34.1	28.5	35.4	69.6
Latent Prints Field	3.9	1.1	6.1	3.3
Questioned Documents	51.9	57.1	21.0	54.2
Forensic Biology - Conventional	39.1	38.5	38.3	40.8
Forensic Biology - DNA[30]	182.0	49.8	212.6	122.0
Toxicology	15.9	22.2	16.9	7.0
Trace Evidence	62.7	83.5	63.9	44.2
Other	3.8	2.0	37.9	25.8
Total (weighted average[31])	14.8	9.4	11.9	12.8

29 Weighted average is calculated by multiplying the turnaround days reported by each lab for a particular service, by the number of requests for that service completed by that lab. The sum of the result for all labs was divided by the total requests for that service completed by all labs.

30 Almost all the crime scene data for county labs was reported by one lab, which had a long turnaround for crime scene reports (67.2 days). Most other county labs did not provide turnaround data for their crime scene work. The average DNA turnaround for the county labs and the statewide average were driven by the exceptionally long turnaround reported by one county lab with a very large caseload. With the advent of the COLD HIT Program, turnaround time for DNA in many labs may have improved since the survey.

31 Weighted average is calculated by multiplying the weighted average turnaround for each service, by the number of requests completed for that service, summing the results across all services, and dividing by the total number of requests completed by all labs.

F. Acceptable Turnaround Times: Urgent vs. Routine Requests

Laboratories generally accommodate urgent requests from their client agencies.

The turnaround for "urgent" cases is about 1/3 of that for "routine" cases.

Laboratory directors expressed concern that average turnaround times needed improvement. However, laboratories generally accommodate urgent requests from their client agencies. As noted below, the turnaround for "urgent" cases is about 1/3 of that for "routine" case. Generally speaking a case is considered urgent if it has an immediate court date, information is needed to take the next step in the investigation, the crime is against a person, or there is a high profile suspect or high profile public interest in the case. Table 10 indicates the percentage of tests considered routine and urgent.[32] Also shown are laboratory directors' estimates of the acceptable turnaround times for routine and urgent tests in working days.

As can be seen by Table 10, even ignoring crime scene related activity, as much as one in five of all requests in some categories is urgent. In general, the number of working days required for completing the urgent request is less than 1/3 of the time required to turn around a routine case. By implication then, 2/3 of the average turnaround time results from cases waiting in the queue for resources to become available to conduct the work. It could be more than that (the same wait for resources could occur in urgent cases) but it cannot be less.

Table 10 **Acceptable Turnaround Times: Routine vs. Urgent Requests**

Service Category	Routine Request (calendar days)	Routine %	Urgent Requests (calendar days)	Urgent %
Alcohol Blood/Breath	6	96%	2	5%
Clan Laboratory	11	91%	4	10%
Computer Crime	90	90%	10	10%
Controlled Substance	4	91%	1	9%
Crime Scenes	5	50%	1	50%
Explosives	15	87%	4	13%
Fire	18	93%	6	8%
Firearms/Toolmarks	27	89%	4	12%
GSR	18	87%	4	15%
Impressions	20	87%	5	14%
Latent Prints Comparison	15	85%	2	12%
Latent Prints Field	30	63%	7	38%
Questioned Documents	21	84%	4	19%
Forensic Biology – Conventional	32	81%	7	18%
Forensic Biology – DNA	45	77%	12	19%
Toxicology	15	93%	6	7%
Trace Evidence	27	94%	8	7%
Other	30	95%	6	6%

32 This data is based on laboratory directors' response to the supplementary survey. In some cases, laboratories may track this information, but in some cases the data may be a "best estimate."

G. Laboratory Backlog

A laboratory's workload is often evaluated in terms of its backlog – i.e., the number of cases received by the laboratory that remain in the queue awaiting testing and completion of a report. Obviously some standing backlog must exist. There is always some lag, as cases cannot be started and completed instantly upon entering the laboratory.

Large standing backlogs may indicate resource shortfalls and can be used to support requests for additional staffing. However, laboratories count and manage their backlogs differently, and inter-comparisons between laboratories and other analysis of backlog data must be done with these limitations in mind. For example, low priority requests may be received and placed in the queue for a period of time, after which the laboratory may check with the submitting agency and find that the work is no longer needed. At that point, the case can be closed without any work and removed from the backlog count.

Table 11 **Backlogs Reported by Laboratories Statewide**

Type of Service	Requests Completed	Average[33] Turnaround Time	Requests Backlogged
Alcohol Breath	85,948	5.1	820
Clan Lab	2,178	19.9	180
Computer Crime	380	38.7	18
Controlled Substance	149,147	11.4	2,629
Crime Scenes	4,427	16.4	332
Explosives	41	58.8	30
Fire	496	47.9	128
Firearms	7,477	41.3	2,370
GSR	447	33.0	111
Impressions	210	38.7	83
Latent Prints Comparison	27,764	31.8	5,761
Latent Prints Field	36,907	8.8	451
Questioned Documents	6,538	30.5	201
Forensic Bio Conventional	3,091	37.2	1,785
Forensic Biology–DNA	3,479	86.7	1,079
Toxicology	97,286	21.9	1,729
Trace Evidence	1,737	61.3	515
Other	23,960	30.3	171
TOTAL	451,513	16.4[34]	18,393

33 Numerical average across all labs.
34 Weighted average, by numbers of each type of test.

Five services, which comprise only 10% of the completed case requests, represent the majority (63%) of the backlogged cases across the state.

Forensic Biology (DNA/ serology) is clearly the single greatest problem area.

The total standing backlog (18,393) represents only 4.1% of the total cases completed during the reporting period. Once again, however, the relatively low backlogs and fast turnaround of the high volume blood alcohol, toxicology and controlled substances cases obscures the issue. Closer analysis demonstrates a significant backlog problem in five labor intensive services (forensic biology, firearms, trace evidence, latent print and fire debris) that are closely associated with violent crimes.

Table 12 **Completed Requests and Backlogged Cases**

Type of Service	Completed Requests	Backlog	Percentage
Biology (DNA/Serology)	6570	2864	(43.6%)
Firearms	7477	2370	(31.7%)
Trace Evidence	1737	515	(29.6%)
Fire debris	496	128	(25.8%)
Latent Comparisons	27,764	5761	(20.7%)
TOTAL	44,044	11,638	

These five services, which comprise only 10%[35] of the completed case requests, represent the majority (63%[36]) of the backlogged cases across the state. Forensic biology (DNA/serology) is clearly the single greatest problem area.

35 44,531 / 451,531 = .975
36 1,638 / 18,393 = .633

H. Laboratory Equipment and Facilities

Laboratory Directors were asked to identify the various types of laboratory equipment utilized by their laboratory and to indicate how current each item was in comparison to what was available within the field for that function.[37] The following table summarizes their responses.

Table 13 **Status of Laboratory Equipment – June 2001**

Equipment Type	Not Applicable	Obsolete	Old	Modern	State of the Art
CG/MS	5	5	25	40	34
FTIR	3	3	15	23	13
GC	4	16	30	14	11
UV	9	4	12	12	6
SEM	11	5	3	6	3
Microscope, Compound	2	17	70	79	30
Microscope Polarizing	4	1	30	23	38
Microscope Comparison	4	10	30	37	9
Computers	1	54	182	393	62
Case System	4	7	10	19	3
Evidence Tracking	8	8	4	11	4
Evidence Security	22	88	60	27	
Testimony	5	8	6	9	
Toxicology	15	4	10	15	7
DNA Equipment	7	16	22	20	
Crime Scenes	4	6	56	26	2
Other	1	16	21	22	24
TOTAL	87	178	610	808	302
(Overall Percentage)	(5%)	(9%)	(30%)	(41%)	(15%)

As can be seen from Table 13, over 1/2 of the equipment is either modern or state-of-the-art. However, nearly 1/3 is old, and nearly another 10% is obsolete. Although individual items of equipment have substantially different useful life expectancies,[38] the trend toward computerization of test equipment and its interface to the laboratory management information systems is driving most equipment toward quicker obsolescence. The laboratories must purchase scientific equipment that capitalizes on new technology as it becomes available. If equipment is not replaced on a regular basis, the laboratories cannot provide state of the art services to law enforcement or continue to meet the rigorous standards of the courts.

Laboratories typically do not have a budget for ongoing replacement and upgrading of capital equipment, but must seek and justify these funds each year.

37 The State of California appropriated $25 million to the Office of Criminal Justice Planning in 2001-02 to be disbursed to local government laboratories as grants for the purchase of equipment and for facilities upgrades. As a result of this Forensic Laboratory Improvement grant program, data for old and obsolete equipment may have changed significantly since this survey was conducted.

38 For planning purposes, BFS estimates the average predictable life expectancy is about eight years.

Laboratories typically do not have a budget for ongoing replacement and upgrading of capital equipment, but must seek and justify these funds each year. They are generally unable to justify a constant funding stream that would allow them to develop long range, multi-year plans for replacing their capital equipment. Thus, the ability to obtain equipment fluctuates with the fiscal situation faced by each operating organization each year, rather than responding primarily to changes in forensic technology.

Grant funding has been a significant source for equipment purchases for many of the laboratories. However, grants are typically "one-time" and are not a consistently reliable source. Another option is the creation of a self-amortizing or "sinking" fund, with depreciation charges. These can be structured in different ways, but a common approach would be for all jurisdictions to contribute their current equipment to the fund; for them to be credited with the estimated "current value" of the equipment; and for them (and/or state or federal grants) to pay an annual amount estimated as needed to replace the equipment they donated on a reasonable replacement schedule. Their payments would be used to fund replacements on a routine schedule, effectively removing these from the annual "service betterment" discussion and leaving those discussions to focus on new equipment that actually provides some new and improved capabilities not available through the normal routine replacement process.

Although new facilities have recently been built, significant local needs remain to be addressed across the state.

Over the 15 years prior to this 2000-01 survey, the size of California's crime laboratory facilities grew from 251,509 square feet to a total of 518,000 square feet, with half the reporting agencies adding about 65% to their space. A needs assessment conducted by DOJ in 1996 identified severe problems in several of the BFS facilities and led to a plan to replace six of them. Three of the new labs (Riverside, Ripon, and Fresno) have been completed and the others are in progress.

A study conducted in 1998 by the State Auditor identified facilities issues in many of the city and county crime laboratories as well. Many were found to be outmoded, severely overcrowded, and to have safety issues. In 2001, the State approved a $96 million bond issue for the construction of a regional forensic science center on the campus of California State University at Los Angeles (CSULA). This facility will be managed under a joint powers agreement between the CSULA, the City of Los Angeles and Los Angeles County and will house the Los Angeles Police and Sheriff's Laboratories, and the CSULA forensic science program.

Although new facilities have recently been built (for example, the new San Mateo Sheriff's Department laboratory opened in 2002), significant local needs remain to be addressed across the state. In some cases, overcrowding has prohibited adding staff and equipment, hampering efforts to improve service levels. Several local laboratories have used funds from OCJP's 2001-02 Forensic Laboratory Improvement Program to conduct facilities needs assessments and design studies.

I. Regionalization of Testing

One of the approaches that is frequently suggested to save costs (especially the cost of new facilities) is to centralize laboratories and have each serve a very large geographical area. The information provided by the laboratory directors in other states we surveyed and that provided by the State's own various laboratories demonstrates both beneficial and disadvantageous aspects of centralization of laboratory resources.

Crime scene evidence gathering as well as expert witness testimony would be highly inefficient if done through a few centralized laboratories, due to travel delays and other logistical problems. A study conducted in the 1970s, around the time the BFS was being formed, showed that utilization of the crime laboratory dropped off exponentially once the laboratory was over 50 miles from the police agency it served. On the other hand, career paths and technical expertise of laboratory professional staff might both be enhanced in centralized laboratories with many people who work in specialized disciplines. Certainly, it is inefficient to have a single scientist perform a wide range of test types in a given day, as that person is likely to be less proficient in the processes if expected to be knowledgeable in many disciplines.

There are also a comparatively small set of services for which the equipment is expensive and the expertise rarely used. Of the 29 laboratory directors who responded to our supplemental survey, about 2/3 believed that there were certain types of tests that were more appropriate for regional testing than for continued focus by all laboratories. There were five test types that half or more of the laboratory directors felt were either outstanding or possible candidates for regionalization – specifically, examination of three types of trace evidence (soil samples, glass and paint), SEM tests for gunshot residue, and explosives tests. Toxicology tests and trace fiber tests were also frequently mentioned, although by less than half of the directors.

The primary case against increased centralization is the apparent slower response times of large laboratories and the willingness of local agencies to put up their own funds to pay for in-house managed laboratory services and private laboratory work even when free service is available at a county or state laboratory nearby. The decisions to spend local funding on crime laboratory operations clearly indicate a strong desire on the part of those agencies for greater local control over the prioritization and processing of cases.

Most responding agencies expressed a high level of overall satisfaction with their laboratory service, although most also had one or more areas of concern.

We sent separate questionnaires to California police and sheriff's departments that focused on the following topics:[39]

- Use of private vs. governmentally operated laboratories for forensic testing.
- Level of satisfaction in various categories with the governmental laboratory providing primary service to their jurisdiction.
- Perceived degree of control over cases submitted to the laboratory.
- Unmet need for service, i.e. cases they do not even attempt to send to the laboratory given their perception of the laboratory's capacity constraints.

Over 140 agencies responded from agencies comprising 45% of all cases submitted to governmental laboratories.[40] Most responding agencies expressed a high level of overall satisfaction with their laboratory service, although most also had one or more areas of concern.

A. Use of Private Laboratories

Responding agencies estimated that 9% of their forensic cases were submitted to private laboratories for analysis.[41] The responding agencies spent a about $2,250,000 with private laboratories at an average cost of $107 per test. By extrapolating from actual respondents to a statewide total, we estimate that California law enforcement agencies send approximately 62,000 cases to private laboratories at a cost of $6.6 million/year.[42]

Table 14 **Work Sent to Private Laboratories**

Service Category	Survey Reported Tests	
	Total	Private Labs
Toxicology	35,382	10,930
DNA[43]	3,626	419
DUI[44]	55,725	5,960
Controlled Substances	92,643	3,435
Latent Print Comparison	34,676	163
All Other	21,406	140
TOTAL	243,458	21,047

39 The questionnaire sent to law enforcement agencies was less extensive than that completed by laboratory directors.

40 Note that the raw numbers in the following sections are the summary of the 140 survey respondents. Therefore, they are not statewide totals.

41 21,047 / 243,458 = .0864 (see Table 14)

42 Agencies estimated each case cost $107 ($107 x 62,000 = $6.6 million)

43 These numbers do not include cases processed under the OCIP "COLD HIT" Grant Program for unsolved sexual assaults.

44 Blood and breath tests for alcohol in Driving Under the Influence (DUI) cases.

Law enforcement agencies have a variety of reasons for using private laboratories rather than the government laboratories that normally service their forensic needs. The reasons, in decreasing order of frequency, were:

1. Faster turnaround times
2. More control over priority cases
3. Primary service laboratory does not offer this test type
4. Better quality, equipment, or expertise at private laboratory
5. Private laboratory is less costly

Faster turnaround time was the primary reason for using private laboratories.

Law enforcement agencies (and district attorneys as will be seen later in this report) indicated that faster turnaround time was the primary reason for using private laboratories.

As noted elsewhere, about 2/3 of the turnaround time is due to waiting for laboratory resources. To address concerns of law enforcement about turnaround times, it is likely that the laboratories would need to essentially eliminate backlogs in most test categories. Faster turnaround of casework would probably eliminate most concerns about responsiveness. This would also be likely to cause agencies to bring a substantial portion of the work being sent to private laboratories back to the governmental laboratories.

Local control over priorities is a key determinant for local law enforcement.

However, simply adding capacity to existing city, county, and state laboratories would not necessarily stop law enforcement agencies from relying on private laboratories for certain services. While additional capacity could improve turnaround time – the primary reason law enforcement uses private laboratories – other factors also influence their decision, including additional control over priority cases. Local control over priorities is a key determinant for local law enforcement.[45]

45 Judging from comments made by laboratory directors and others, this is also a primary reason that local agencies do not generally support a single statewide laboratory structure.

Law enforcement agencies use private laboratories most commonly for toxicology services. Toxicology represented both the largest raw number of tests sent to private laboratories and the category with the highest percentage of tests sent to private laboratories. Nearly one third of all toxicology work for these agencies was sent to private laboratories. This toxicology work comprised more than half of all cases these agencies sent to private laboratories. We estimated that these agencies send about 12% of their DNA cases to private labs.

Toxicology work comprised more than half of all cases these agencies sent to private laboratories.

Table 15 indicates the approximate costs for the forensic services if public laboratories did the work now being done for law enforcement by private laboratories. It appears that cost of services at private laboratories is just slightly lower than comparable services at public laboratories. The average cost per test at government laboratories was $123 compared with $107 that agencies indicated they were paying for private testing. However, given the limitations of our data,[46] this does not appear to be a significant difference.

Table 15 **Cost of Private Lab Tests if Processed by Government**

Service Category	Private Lab[47] Tests in 2000	Approx. Cost/Test	Estimated Total Cost
Alcohol Breath	10,300	$ 93	$ 961,901
Controlled Substance	5,755	103	590,687
Latent Prints Comparison	115	634	72,856
Forensic Biology - DNA	563	3,567	2,008,109
Toxicology	45,202	85	3,822,070
Other	613	349	213,946
TOTAL	62,548	$123	$7,669,569

46 Data is based on law enforcement records of the costs for services at private laboratories. We did not compare this data with actual price schedules for private laboratories. Further, the private laboratory costs may or may not include testimony costs, which can be significant.

47 Extrapolated statewide total.

B. Law Enforcement Satisfaction with Public Laboratories

Law enforcement agencies were asked to rank their degree of satisfaction with several specific aspects of the service provided by their public laboratory, including:

- Preservation of the chain-of-evidence
- Scientific expertise level of laboratory personnel
- Presentation of evidence during testimony
- Evidence preservation and testing
- Specific testing methods
- Equipment availability for certain services
- Evidence collection at the scene
- Timeliness of results

Overall law enforcement gave public laboratories an average rating of 85% satisfaction.[48] Again, timeliness of results is by far the most frequent cause for lack of satisfaction by law enforcement agencies. Without timeliness issues (overall and crime scene response), the average rating was 91%.[49] Respondents could answer on a scale of 1 to 5 with 5 being the highest level of satisfaction and 1 the lowest.

Overall, law enforcement gave public laboratories an average rating of 85% satisfaction.

Timeliness of results is by far the most frequent cause for lack of satisfaction by law enforcement agencies.

Table 16 **Law Enforcement Satisfaction with Primary Laboratory** [50]

Issue	Cumulative Score[51]	Indicated[52] Problem	Satisfied as a % of total
Proper preservation of the chain-of-evidence	599	none	100%
Scientific expertise level of laboratory personnel	592	1%	99%
Presentation of evidence during testimony	558	7%	93%
Preservation of evidence & testing problems	533	11%	89%
Specific testing methods in certain test types	520	13%	87%
Equipment availability in certain types of tests	473	21%	79%
Evidence collection at the scene	436	27%	73%
Timeliness of results	382	36%	64%

48 4,083 out of 4,800 possible score.

49 3,275 out of 3,600 possible score.

50 Many agencies made specific comments. Since our survey was confidential, we have not tabulated these. However, they suggest a need for laboratories to establish mechanisms whereby they can receive input from their clients regarding priorities and other concerns.

51 In total, 51 of the noted dissatisfaction "points" were allocated to overall expertise of laboratory personnel, testimony of staff, and chain-of-evidence issues; 67 to preservation issues; 207 to limited expertise or equipment in certain areas; and 392 to timeliness issues (assuming that is also the problem with on-scene evidence collection). Overall, the users gave the collective laboratories serving them an average rating of 85% satisfied (4,083 out of 4,800 possible). Without the two timeliness issues, the average rating would be 91% (3,275 out of 3,600).

52 Actual Score divided by the total possible score subtracted from 100.

Policy makers might address this problem most effectively by augmenting training programs for law enforcement officers and para-professional crime scene investigators to be effective crime scene evidence collectors.

The second biggest concern was evidence collection at crime scenes. This concern appears[53] to stem primarily from a laboratory's inability to get a qualified forensic science evidence collection team to the scene in a timely manner, not from the adequacy of collection of evidence once at the scene.[54] Law enforcement officers are located throughout the state and on-duty at all times. Laboratory staff are in a small number of locations across the state and generally work regular business hours, with on call staff. Officers awaiting arrival of the laboratory evidence collection team will need to locate the on-call scientist, who then must prepare and drive to the scene.

As an illustration, north of Sacramento there are only three laboratories – Eureka, Redding and Chico – which service 16 counties. In these areas, driving times to crime scenes can routinely be 60-90 minutes or more. Even when a county has its own laboratory, long distances may be involved. San Bernardino County, for example, has its laboratories in the Southeastern portion of a county of 20,000 square miles – larger than nine eastern states, and it is a 4-hour drive from the laboratory in San Bernardino to Needles. While most crimes occur in the urban area close to laboratory sites, travel time to some communities can exceed two hours.

Given California's geography and widely varying population density, policy makers might address this problem most effectively by augmenting training programs for law enforcement officers and para-professional crime scene investigators to be effective crime scene evidence collectors. While this will not obviate the need for laboratory personnel's expertise in some cases, it could reduce the frequency with which officers are required to wait for their arrival.

53 This question was not directly asked. We assume the issue is primarily timeliness because the expressed level of satisfaction with the expertise of lab personnel and chain of evidence was high, and satisfaction with timeliness was low.

54 Non-laboratory law enforcement personnel perform most crime scene response. However, survey responses were directed specifically at satisfaction with laboratory crime scene work.

C. Unmet Needs: Services Not Requested

Task Force members indicated their belief that law enforcement agencies and district attorneys commonly do not submit "low priority" cases to the laboratory for analysis because they perceive the laboratory does not have resources to handle them. Based solely upon discussions and without any scientific sampling, we believe that the following summarizes the general hierarchy of law enforcement and laboratory priorities:

- Cases with court dates will be prioritized over cases that are not yet calendared.
- Cases with a suspect in custody will take precedence over cases with a suspect, but not in custody.
- Cases with a suspect will take precedence over cases with evidence but no suspect.
- Crimes against persons will take precedence over crimes involving only property loss.

Crimes against persons with trial dates or with known suspects have the highest priority. Cases with no suspects are the least likely to be sent to labs for analysis, particularly suspectless property crimes. Obviously, the unique circumstances of a particular case can affect its priority; high profile unsolved crimes will be prioritized. As a result, departments typically will not submit cases without suspects[55] unless the case has unique significance or they believe they can solve several crimes by solving this one.

Departments typically will not submit cases without suspects unless the case has unique significance or they believe they can solve several crimes by solving this one.

Table 17 indicates the number and type of additional cases responding agencies reported that they would like to submit. In total, this represents an unmet need of 3.53% or approximately 16,000 cases.[56] Property and narcotics crimes top this list, comprising about 55% of these cases. Another 16% were cases in which respondents indicated they would request laboratory person to the crime scene if it were available.

Table 17 **Additional Cases Agencies Would Like to Submit**

Case Type	Additional Requests
Crimes involving property	2,512
Narcotics violations	1,819
Assistance in crime scene evidence collection	1,296
Homicide & crimes against persons	874
Driving under the influence	816
Child abuse and sexual crimes	544
TOTAL	7,861

55 Notable exceptions are sexual assault DNA cases funded under the "Cold Hit" grant program, and, in some jurisdictions, AFIS latent print cases and NIBIN firearms work.

56 Cases submitted to public laboratories by responding agencies 222,401 / 7861 unsent cases yields 3.53%. Extrapolated to statewide number: Statewide cases submitted 456,000 x 3.53% =16,117. There are no relevant statistics kept by agencies, so it is unclear how accurate this estimate is – and based on the CACLD members' experience of turning away lower priority cases, it is a significant understatement.

We conducted a survey of the state's district attorney's offices. It was similar to the one we sent to law enforcement agencies, but we also asked the prosecutors about the impact of the delays in evidence analysis on the case outcome. We limited this question to whether delayed results cause a reduction of guilty pleas by defendants and if the "quality" and/or the number of plea bargains were affected. Nineteen district attorneys from counties representing approximately two thirds of client requests responded to the survey.

The usefulness of the numerical data collected from district attorney responses is extremely limited. First, prosecutors do not track forensic service requests in any central process.[57] Each prosecutor manages his or her own cases and interacts directly with the laboratory. As a result most numbers provided are estimates made by the person filling out the questionnaire, who may not have an accurate picture of requests made by the office as a whole. Furthermore, all the counties with district attorney-managed labs responded to the survey, and they may not be typical of all counties. Consequently, this data is likely to be less numerically accurate and far less significant than in other areas of this report. However, we believe the opinions and attitudes about the laboratories fairly reflect attitudes of the respondents.

A. Use of Public Sector and Private Forensic Labs

The responding district attorneys reported that they prosecuted 87,447 cases that relied on testing by a forensic lab. Public laboratories handled approximately 95% of the work in these cases and 5% was sent to private laboratories. Table 18 below reflects the breakdown of cases sent to public and private laboratories by test type.

Table 18 **Type of Cases Sent to Public and Private Laboratories**

Test Type	Total Requests	Private Lab	% Private
DNA[58]	1,004	275	27.4%
Gunshot residue	134	31	23.1%
Toxicology	25,433	2,256	8.9%
DUI	36,223	1,669	4.7%
All Other	24,653	110	0.4%
TOTAL	87,447	4,471	5.0%

57 While this was also true in some police departments, it was universally true in district attorney's offices that did not have their own forensic laboratory operation.

58 These numbers do not include cases processed under the OCJP "COLD HIT" Grant Program grant.

The average cost per test for all tests sent to private laboratories was $113. This is comparable to the average cost calculated from law enforcement agency responses. The extrapolated statewide cost for all DA requested tests was approximately $2 million. District attorneys utilize private laboratories primarily for toxicology and DUI tests. As a percentage of the work per particular type of test, however, DNA and gunshot residue were the most privatized tests, with private labs handling 27% and 23% respectively of those services.

Table 19 indicates the most common reasons district attorneys sent cases to private laboratories for analysis. In the case of district attorneys, the most prevalent reason for sending a test to a private laboratory was that the service was not available from their local laboratory. Next most frequently cited reasons were slow turnaround times and a lack of control over priority cases with governmental laboratories. In some cases, DAs felt that the private laboratory had better equipment or was better staffed for the particular type of test being sent to it. One specific area is possibly based on scientific policy differences. Gunshot residue testing has proven effective in court and in obtaining confessions and plea bargains, despite significant scientific dispute over its probative value. Thus, prosecutors may want such tests, and laboratories may choose not to perform them.

Table 19 **Common Reasons Prosecutors Used Private Labs**

The service is not available in the primary service laboratory	13	68%
Private laboratory service is faster	6	32%
Private laboratory gives them a higher priority for the service	6	32%
Private laboratory is better equipped and/or staffed in this field	5	27%

B. District Attorney Satisfaction with Public Laboratories

We asked the district attorneys to indicate their level of satisfaction with their primary laboratory in several specific areas:

Table 20 **DAs Level of Satisfaction with Their Primary Labs**

Issue	Serious Problem	Some Problem	No Problem	Serious/some : No problem
Timeliness of results	9	8	2	8.5 : 1
Adequacy of equipment	3	7	8	1.25 : 1
Specific testing methods	3	6	9	1 : 1
Level of Laboratory Expertise	2	5	12	1 : 1.7
Evidence collection – crime scene	1	8	10	1 : 1
Compliance or discovery	1	7	11	1 : 1.4
Evidence preservation	0	10	9	1 : 1
Testimony	0	8	11	1 : 1.4
Chain of evidence	0	7	12	1 : 1.7
Access to expert witness	0	5	13	1 : 2.6
Objectivity of laboratory staff	0	3	16	1 : 5

Like law enforcement, timeliness of results was the most significant concern for prosecutors. Over 80% of district attorneys indicated that timeliness was a problem. Respondents indicated that 3.1% of their cases were impacted by laboratory delays.[59]

Over 80% of District attorneys indicated that timeliness was a problem.

2/3 of the DA respondents believed that the slow test results in DUI and narcotics cases reduced the number of successful plea bargains. About one in four felt that the "quality" of the plea bargains also suffered.

Prosecutors estimated that delayed results in DUI and controlled substances cases cost them 13 full time employees per year. Approximately 20 prosecutors could be freed for other duties, based on the responding DAs estimates multiplied out to the entire state, if responses to tests were received on a timely basis. Furthermore, 2/3 of respondents believed that the slow test results in DUI and narcotics cases reduced the number of successful plea bargains. About one in four felt that the "quality" of the plea bargains also suffered. As noted previously, about 2/3 of turnaround time "delay" occurs while the case waits to be assigned to a staff member for testing. Thus, to address this issue requires elimination or substantial reduction of laboratory backlogs, which can be accomplished only by adding staff or assigning overtime work to existing staff.

For every other issue, at least half of the respondents felt the issue was "no problem." In most categories, about 2/3 of the respondents felt that the laboratory serving them had no problems. Half of the district attorneys had concerns regarding the adequacy of equipment and specific testing methods. We believe this reflects the fact that laboratories do not offer all the services the prosecutors may want to use.

59 The respondents had 74,015 court cases, which required forensic laboratory test in their jurisdictions and estimated that 2,264 were delayed waiting for evidence analysis.

C. Expert Witness Testimony from Laboratory Personnel

District attorneys routinely have laboratory staff explain their tests and results to the jury. Prosecutors have the option of calling an expert witness from outside the laboratory that normally serves them. It would be expected that those services least frequently available from governmental laboratories would be those where outside expert witnesses are most often called. Given that so few laboratories have computer crime capabilities and that all have narcotics capability, it is not surprising to see these categories at the top and bottom of the list.

Table 21 **Frequency of "Outside Expert" Testimony**

Category	Public laboratories provide testimony	Often Outside Expert (total responses)	Sometimes Outside Expert (total responses)	Rarely Outside Expert (total responses)	Often & Sometimes : Rarely (Ratio)
Computer crimes	10%	8	4	5	2.4 : 1
Gunshot residue	35%	5	3	8	1 : 1
DNA	62%	4	5	8	1.1 : 1
Toxicology	41%	3	5	10	1 : 1.2
Arson-Fire	90%	2	9	7	1.4 : 1
Alcohol/DUI	90%	2	1	13	1 : 4.3
Other	Unclear	1	1	5	1 : 2.5
Narcotics	100%	0	4	13	1 : 3.2
TOTAL	N/A.	25	32	69	1 : 1.2

D. Unmet needs: Services not requested

Like law enforcement, district attorneys do not submit all the evidence they would like because they know that the laboratories do not have the resources to perform the analysis. The respondents indicated that they would have submitted 2,120 additional cases for testing if they believed there was any realistic chance that the laboratories could process them. This constituted 2.9% of the 74,015 cases they did submit to the laboratories. This is consistent with the 3.5% we found from law enforcement.

E. Prosecution vs. Investigation: Impact on Laboratories

Nearly 80% of the prosecutors' offices believed that emphasis on prosecution over investigation was a moderate or serious problem confronting the overall justice system.

As noted previously, given the saturated state of the laboratories around the state, priority is given to cases that are already in the "pipeline" and those with suspects, especially those in custody. This is based primarily on issues involving jail overcrowding, justice in general, and factors other than laboratory constraints. In fact, lawmakers have effectively prioritized DUI and controlled substance cases over other types of forensic tests by including set turnaround times for these cases in law.

The net result is that forensic laboratories in the state are seldom used for true investigative purposes – e.g. identifying a suspect when there is none. Even though databases developed for DNA, firearms, and latent prints have a significant chance of identifying a viable suspect, they are not used to anywhere near their full potential at present, and other types of evidence are almost never looked at when there is no known suspect. In addition to limited resources in the crime labs, there are also resource limitations in law enforcement that may cause cases without suspects to receive limited investigation.

We asked prosecutors if they perceived this focus on prosecution versus investigation to be a significant problem. While this is a group that one would expect to support prosecution, responses indicate that district attorneys are concerned that investigation is not sufficiently prioritized. Nearly 80% of the prosecutors' offices believed that emphasis on prosecution over investigation was a moderate or serious problem confronting the overall justice system.

Table 22 **DAs Concerns about Focus on Prosecution vs. Investigation**

Response	Number	Percent
This is an overwhelming problem	1	5%
This is a serious problem	9	47%
This is a moderate problem	6	32%
This is a small problem	2	11%
This is no problem	1	5%
TOTAL	19	100%

COMPARABLE STATE LABORATORY SYSTEMS

The Task Force sent brief questionnaires to state laboratory systems in other large states. The primary objective was to compare how California public laboratories handled their workload[60] to how other states handled similar case levels. It had become clear from other survey results that timeliness was the most significant issue with California laboratories. We thought that learning more about productivity in roughly comparable laboratories in other states might shed light on how best to address timeliness problems in California. If other States appeared to be more efficient than California (performed more work with fewer staff and/or had a faster turnaround time), then our solution might be to emphasize improving efficiency in California laboratories. If not, this would lead to the conclusion that in California efficiency is not the primary problem. In that case, it would be likely that timeliness in California laboratories could be significantly improved only by adding resources.[61]

A. Other States Surveyed

We sent surveys to the ten largest states and received usable results from five: Illinois, New York, North Carolina, Texas, and Virginia,[62] and a partial response from Georgia. These states represented a collection of 32 laboratories and process about 280,000 cases each year, utilizing 1,157 FTEs. This survey compared state-run operations in other states against both state and locally managed labs in California. The individual comparison laboratories were about three times as large, on average, as the California laboratories we are comparing them with (they averaged 45,000 tests/year per organization, while the California laboratories averaged less than 15,000 tests/year per organization).

B. Other States Structure, Practices and Policies

Illinois, North Carolina and Virginia have consolidated state systems. Texas and New York have state laboratories as well as a significant number of county and city managed laboratories. Only one responding state – New York – provides funding to local laboratories, and then only for training. No state has significant[63] fees for service although some have partial fees to discourage abuse of system resources.

In only one state were defense counsels able to utilize the laboratories to conduct analyses. Most of the responding states had state law that restricted forensic laboratory use to law enforcement agencies.

Four of the five states that responded had some type of performance standards associated with laboratory work. Primarily these dealt with the number of tests per year or month that a professional at various levels from junior to senior should be able to perform in various categories of casework. Only one responding state – New York – licenses local forensic laboratories.

60 As indicated elsewhere, workload comparisons are difficult because laboratories "count" their work differently; this is even more a problem comparing between states than it is within a state.

61 The wide disparity in resources required to perform different services and other variables make comparison between laboratories on a cost per case, or person-hours per case, less meaningful than in other businesses. Recognizing that we did not want to compound the variables with differences in cost-of-living, we restricted our comparison to cases per analyst or hours per case – not salary related factors. Of course, by eliminating salary costs, we necessarily lump together all levels of analyst; essentially assuming that all organizations will have roughly similar average levels of experience and expertise within their total laboratory staff.

62 Survey results were obtained from state laboratories only. The Texas and New York county and city managed laboratories were not surveyed, and the state laboratories did not track local laboratory workload. As a result, data for those states is not complete.

63 Significant is used to mean financially significant in generating revenue.

C. Turnaround Times: California vs. Other States

As a result of the survey, we were able to contrast the turnaround times of California[64] laboratories with those of responding laboratories in other states. The California laboratories compared very well, with faster average turnaround times in every category with the exception of DNA. On the whole, California laboratories averaged about 15 days while the average of all of the other states was more than twice that at 37 days.

Although slow turnaround time is the primary service complaint about laboratories within California, they are more than competitive with other states.

This comparison showed that, although slow turnaround time is the primary service complaint about laboratories within California, they are more than competitive with other states. In the area of controlled substances (which is 2/3 of the other states' workload), California's average turnaround time was about 1/5 of the other states' average (9.3 days vs. 45.9 days).

TABLE 23 **Turnaround Times – California vs. Other States**

	OTHER STATES			CALIFORNIA	
Service Category	Backlog	Requests Completed	Turnaround Days (Avg[65])	Turnaround Days (Avg[65])	Difference
Alcohol, blood	503	8,104	17.5	5.0	–12.5
Clandestine laboratories	106				
Computer crime	17				
Cont. Substances	12,348	192,199	45.9	9.3	–36.6
Crime Scene Investigation	6	5,389	87.0	25.8	–61.2
Explosives	8				
Fire Debris	45	736			
Firearms, Toolmarks	1,745	10,392	56.9	40.3	–16.6
GSR	30	482	55.3	26.4	–28.9
Impressions	12	32	174.0	38.0	–136.0
Latents-comparisons	4,191	21,429	96.2	34.1	–62.1
Latents-field response	15				
Questioned documents	388	1,779	63.0	51.9	–11.1
Forensic bio-conventional	723	5,713			
Forensic bio-DNA	2,727	5,852	114.2	182.0	+67.8
Toxicology	1,511	19,786	49.4	15.9	–33.5
Trace Analysis	1,037	7,745	63.5	62.7	–0.8
Others	272	277			
TOTAL	25,538	280,061	37.2[66]	14.8[66]	–22.4

64 As noted earlier for the California data, most other state labs provided only "best estimates." This limits the accuracy of the data, and any comparison between systems must be made with this limitation in mind.

65 Weighted average turnaround per case reported by all labs for that service.

66 Weighted average for each lab by type of service, multiplied by total number of requests completed for that service, summed over all services, and divided by total number of completed requests.

D. Workload and Staff per Case Ratio

The final comparison we attempted to make between other states and California laboratories was about the number of staff they required "per test." As noted throughout this report, it is difficult to compare "cases" because of the number of variables among cases (type of services being used, number of individual tests performed for each request). The high volume blood alcohol, toxicology and controlled substances tests comprised about 79% of the service requests completed in other states; in California, these three service categories comprised 71% of the tests completed.[67]

This "apples-and-oranges" problem that exists even within the state is likely to be a much greater factor as we compare between states. We had gathered data on the number of staff assigned to each test category. We took the number of requests of each type completed by the other states and divided that by the number of requests of that type completed by California laboratory workers per year. This allowed us to calculate the number of laboratory staff that would be required in California to complete the same number of requests. We estimated that 909.4 FTE professional staff would be needed to complete this work at the same level as California's composite productivity.

Table 24 **Comparison of FTEs Required to Complete Workload**

Service Category	Requests Completed	CA Requests Completed per FTE	Other States FTEs earned by CA "Standards"
Alcohol, blood	8,104	1,424	5.69
Clandestine laboratories	106	58	1.81
Computer crime	17	127	0.13
Cont. Substances	192,199	1,296	148.32
Crime Scene Invest.	5,389	92	58.58
Explosives	8	10	0.82
Fire Debris	736	31	23.85
Firearms, Toolmarks	10,392	113	92.36
GSR	482	24	19.73
Impressions	32	15	2.13
Latent-comparisons	21,429	210	102.07
Latent - field response	15	275	0.05
Questioned documents	1,779	288	6.18
Forensic bio-conventional	5,713	52	109.79
Forensic biology-DNA	5,852	37	156.94
Toxicology	19,786	1,573	12.58
Trace Analysis	7,745	46	167.65
Others	277	381	0.73
TOTAL	280,061		909.43

67 California: 322,381 / 451,513 = .714
Other States: 221,314 / 280,061 = .79

California laboratories are performing well from a productivity and turnaround standpoint, and improvements will need to come from new resources or new ways of doing business overall.

The actual number of staff in other states reported was 1157 (vs. the 909 we estimated would be needed based on California's productivity). Assuming the staffing figures from the other states are professional staff only,[68] and to the extent that the measurement base is sufficiently comparable between states, California laboratories are producing more work per FTE than the other state labs.[69]

All in all, the results meant to us that the California laboratories are performing well from a productivity and turnaround standpoint in comparison with other states. It appears that improvements will need to come from new resources or new ways of doing business overall.

SHORTFALL IN DNA PROCESSING CAPABILITIES

California laboratories would have needed about 318 more scientific staff allocated to DNA testing to profile the same proportion of total cases as Virginia.

Bottlenecks in DNA analysis are clearly a significant problem in California. The average turnaround time on DNA cases was 182 days (26 weeks), significantly longer than other states. DNA/serology case backlogs are also high, and prosecutors reported that they sent over 27% of their cases to private labs for testing.

Some countries such as Great Britain have forged well ahead of the United States in the use of DNA testing, applying it to property crimes and other crimes that are well beyond the resources of almost any laboratory in the U.S. We did not attempt to contrast laboratories in California with capabilities of laboratories outside of the nation.

One of the national leaders in DNA testing within the United States has been the State of Virginia, which has by far the largest number of cold hits using DNA of any state in the nation (over 1,200 by June 2003). One study showed that 60% of the hits Virginia made on sexual assault cases would not have occurred if, as in California, its CODIS database had been restricted to only sex offenders and other violent felons. Virginia stores profiles of all convicted felons in its CODIS database, which currently contains about 190,000 profiles. Based on its population (about four times that of Virginia), California could potentially have a database of over 760,000 if all felons were included.

Virginia also analyzes DNA in a far greater proportion of its cases than California does.[70] Virginia processed one DNA case for every 83.5 Part I crimes that occurred in the state. California needed to process 15,326 DNA cases to achieve that same ratio, 4.4 times as many as the California laboratories were able to process. In the year of this survey, California had 93.3 FTEs in various laboratories throughout the State allocated to analysis of DNA cases. California laboratories would have needed about 318[71] more scientific staff allocated to DNA testing to profile the same proportion of total cases as Virginia.

68 It was not clear to us from the survey whether or not the other states figures included support staff. If they did not include support staff, and if the other states had the same proportion of support staff (32%) as California, then the other states would have needed 370 support staff and 905 professional staff (a total staff of 1275) to complete the work at California's composite productivity level. This might help explain why the other state laboratories, with only 1157 total staff, had so much longer turnaround times than the California labs.

69 If the figure from the other states reflects total staff, then they are completing 242 cases per FTE (280,061 / 1,157), vs. the 310 cases per total FTE (451,513 / 1,456) completed by the California laboratories.

70 Virginia had 214,348 Part I crimes for the year 2000; California had 1,279,758 the same year. Virginia processed 2,565 DNA cases that year; California did 3,476.

71 With the increasing use of robotics and other automation, productivity is rising in DNA units, and this estimate may need revision downward as time goes on.

We think it is important to recognize that expanding the capabilities of any single component of the overall justice system has implications for the remaining components. For example, the State decided to fund crime laboratories to analyze thousands of unsolved sexual assault cases through the OCJP COLD HIT Program. The goal was to maximize the use of the CODIS database and to minimize the number of cases that lapse due to the statute of limitations. Faced with the possibility of searching through several years of unsolved cases to find evidence, some law enforcement agencies did not have a way to allocate the needed resources to handle their end of the process. They also did not have the investigative staff to reopen large numbers of cases for follow-up investigation once a cold hit was made. Prosecutors, likewise, did not know how many of these cases they could add into their current caseload. This was indeed an unusual event in that the funding decision provided the opportunity for as much as a tenfold increase over a normal year's caseload in these case types. However, it pointed out the need to consider the broader impact of releasing the logjam in laboratories on the overall investigation and prosecution system.

It is generally believed within the forensic science community that years of "rationing" tests to the most serious crimes has led to police investigative staffing patterns based, in part, on the idea that it is fruitless to waste investigative efforts on a case that their laboratory will not accept for testing. As laboratory capabilities are enhanced to support more cases, and as the payoff for having the laboratory work done increases, investigators and prosecutors will both need to rethink these empirically based operational assumptions.

Furthermore, an investment in upgrading the forensic laboratories without attention to the delivery of other forensic services, such as evidence collection from sexual assault victims, crime scene processing and forensic pathology, will not have the full intended impact on the quality of forensic evidence.

It is clear from our study that California's crime laboratories have significant needs that must be met in order for forensic services to continue to improve and meet the demands of the criminal justice system. It is equally clear that all elements of the criminal justice system have a stake in the outcome and should be involved in shaping the future.

Although we have identified major trends and challenges in this report, at present, the forensic system in California needs to develop a unified strategy for future improvements. An ongoing planning process is needed to ensure that the most effective possible use is made of public resources, and a coherent voice is needed to advise public policy makers on forensic science issues.

It is our hope that the State will recognize the need to continue and build on the work of this Task Force by establishing an ongoing representative body that will develop and update priorities for California's forensic service delivery system.

V. Task Force Findings and Recommendations

This section of the report outlines the various significant findings from the study as well as our recommendations, based on the surveys and the comments of the Task Force and other parties. The findings included both broad function-wide trends and impacts, as well as specific areas for improvement.

BROAD TRENDS AND IMPACTS

The following are, in the opinion of the Task Force, the primary factors affecting the success of the California's forensic laboratory operations.

A. The pace of technological and scientific change is accelerating.

As exemplified by all of the developments in DNA analysis techniques, as well as the new statewide and national databases, the basic scientific approaches and technical tools underlying forensic sciences are changing at a much faster pace than was the case in the past. This has created an environment with the following new or recent characteristics:

1. Training is a higher cost of doing business than in the past.
2. Equipment becomes obsolete more quickly, resulting in higher equipment budgets.
3. Development and validation of new methods and technology requires an increasing investment of staff time.
4. The new environment calls for more highly educated professional staff and a greater level of continuing education.

B. Enhanced crime-solving capabilities create expanded workload per case request.

As the laboratories' ability to generate useful information from a wide variety of crime scene evidence has increased, investigators now request that many more items per case be tested. Additionally, the new capabilities to make nationwide database comparisons have increased the desirability of conducting certain types of tests. Thus, even though technological improvements often result in lowering the staff hours for a given test, depending on the specific area in question, the number of items examined per case has increased in many disciplines to more than offset these savings.

C. New tools to identify suspects are viewed as resource-constrained and thus unavailable.

Historically, forensic science was used to determine whether a person suspected by the police could have been or was the actual perpetrator of a crime. Investigators were used to thinking of crime labs as confirming or refuting the involvement of a suspect they had already developed. Over time, this came to mean that evidence was submitted to the laboratory only for cases where a suspect was already identified. With the advent of AFIS, CODIS, and NIBIN, the ability of the laboratory to link items of evidence to a previously unidentified suspect has grown tremendously. While these tools also support the historical need to confirm or exclude an existing suspect, they can now point out new suspects. Unfortunately, the rules by which investigators currently prioritize cases and evidence for examination by resource-constrained laboratories mitigate against the use of this capability for cases that are not the very most serious or highest profile.

D. Accreditation improves product acceptance/effectiveness, but reduces staff efficiency.

As California moves toward universal accreditation of labs, it has become clear that this is a two-edged sword. Clearly, accreditation and the quality assurance associated with it improve quality, which improves the effectiveness both of the laboratories and of the justice system overall. On the other hand, the increased documentation, proficiency testing and other quality control measures required by accreditation increase the time per test and reduce the number of case requests that a scientist can complete in a given timeframe.

E. Specialization impacts laboratory efficiency and organization.

The accelerated pace of change, increased requirements associated with accreditation and quality assurance, and other factors are leading to a much more specialized laboratory workforce than was previously typical. This can be a benefit in laboratories where workload is fairly constant and more than enough to support the use of an individual scientist in only one or two disciplines. Such a specialist will become proficient more quickly in his/her area of specialization and will likely be very efficient as well compared with a generalist. Unfortunately, laboratory workloads will not always dovetail with the full time specialist approach - even in fairly large labs. Therefore, the overall organization of laboratory functions may need to move toward consolidating those types of testing that cannot realistically fit within the specialist concept at the current level of decentralization. Alternatively, the justice system may need to accept lower levels of specialization and possibly lower quality goals for such test categories.

California's delivery system for forensic services appears to work efficiently by comparison with the five large state-managed laboratories we surveyed in other states. Although the California system is not integrated, there is little redundancy. California's forensic laboratories were able to provide a significantly faster turnaround for most test types than their peers in other states.

The forensic laboratory network within California is based on a set of historical actions rather than any policy pattern set by the governor and legislature. It essentially forces the continuation of the decision of each individual jurisdiction to create a local forensic laboratory – nearly all such decisions having been made at a point in time before the current regional or statewide options existed, and also well before current technology and quality assurance constraints came into existence.

The system relies on a choice made three decades ago by local jurisdictions to continue operating their own laboratories and by the State to fund forensic services for the balance of the counties. The local jurisdictions' decision to fund their own laboratories is strong evidence of the importance law enforcement attaches to local control of case priorities.

Recommendations:

✓ **The current organization of California's forensic system is complex, but appears to function effectively. There is little impetus for and probably little to be gained by fundamentally altering the configuration of the system.**

It is difficult for anyone to determine precisely where the technology, laboratory procedures, and laws governing forensic operations will go in the future, but the last 20 years of continuous development make it certain that dramatic changes can be expected.

The overall trends of the last several years have included:

- Incredible expansion of nationwide data bases that support potential solution of cases with no locally known suspect.
- A dramatic improvement in quality control, certification of staff, and accreditation of lab operations.
- Continuing implementation of better and better technology, with the accompanying need for funds for staff, equipment and training.
- Significant expansion in the number of requests for analysis of evidence in Part I crimes, both in California and nationally.
- An increased emphasis on quality of crime scene processing and demand for more and better-trained crime scene staff.
- An increased need for education and in-service forensic science training, coupled with a scarcity of education and training programs.

The forensic system in California needs to develop a unified strategy for future improvements. There is an ongoing need to forecast the most significant likely changes and determine the near-term steps the laboratory operations and related support systems will need to take to meet them.

Recommendations:

✓ **The State should create an ongoing representative body (analogous to the present Task Force) whose mission would be:**

- **To provide a forum for follow-up and to coordinate the implementation of these recommendations.**
- **To develop and continually update a shared vision and priorities for California's forensic services delivery system.**
- **To create a master plan for implementing that vision.**
- **To act in an advisory capacity to the DOJ, OCJP, and the Legislature.**

DEMAND FOR SERVICE AND IMPROVED TURNAROUND

Forensic laboratories are often perceived as a bottleneck in the state's criminal justice system. Timeliness of laboratory results is a significant source of dissatisfaction for the police and sheriff's departments and the district attorneys we surveyed. These agencies made it clear that they would use laboratories more if they felt that the laboratories had the capability to handle more cases. The DAs indicated that delayed results negatively affect their ability to obtain plea bargains as well as the "quality" of plea bargains. They also believe that the current emphasis on analysis of cases for prosecution over work needed at the investigative stage is a significant problem. There is a severe constraint on analyzing cases where a suspect does not already exist. AFIS, CODIS[72] and NIBIN have the ability to quickly solve a significant number of suspectless crimes, but only if the evidence can be timely collected and analyzed. Laboratory directors in California estimate that a 33% increase in professional staff is needed now to minimize denial of service to meet the existing demand for service in a timely fashion.

Demand for laboratory services will continue to rise even if crimes do not. Over the last five to ten years, the crime rate in California and the entire country has dropped. During that time, however, the number of cases submitted to forensic labs for testing has increased significantly. This trend is due in large part to the increased technological capability of the laboratories, the availability of forensic databases, and to the growing public expectation that forensic evidence will be introduced in court. The laboratories' overhead has also increased due to the stringent quality assurance requirements of accreditation and other national standards.

As new types of evidence (such as digital evidence or chemical and biological terror agents) become more prevalent, the workload in these cases will increase, as will the demand for more sophisticated laboratory examination. The State's current planning for addressing computer crime and terrorist incidents does not adequately address the potential contribution of forensic laboratories to the investigation of these types of crime.[73]

Recommendations:

- ✓ **To reduce backlogs and improve turnaround times, the State and local agencies should consider funding overtime or limited term staff increases in California's crime laboratories. Over the long term, improving turnaround time and minimizing denial of services will require a net increase in permanent staffing levels.**
- ✓ **State and local agencies should evaluate the role of forensic laboratories in the investigation of computer crime (digital evidence) and in the law enforcement response to terrorist incidents and should incorporate a forensic component into existing plans.**

72 As indicated earlier, the OCJP "Cold Hit" grant program has had a significant impact on the ability to investigate "suspectless" sexual assault cases.

73 PC11010 has begun to address part of this issue.

Accreditation by ASCLD-LAB has become an essential credential in the forensic community. Likewise, the quality assurance, training, and education standards being set by certifying bodies and scientific working groups have elevated the standards of practice in the profession. Quality assurance measures, such as proficiency testing, are increasingly used to demonstrate the reliability of the professional's work product.

Quality assurance programs greatly improve laboratory reliability, but they also represent a drain on laboratory resources needed for casework. The more accurate, but more time consuming, processes and documentation in an accredited laboratory have created a need for additional resources that most laboratories have not been able to quantify well or explain to those who would have to authorize additional staff.

Although federal and state funding is increasingly tied to accreditation, and most California crime laboratories are accredited, there are seven public laboratories in California that have not yet achieved accredited status. In addition, there is concern for the quality of crime scene, digital evidence, and latent print units that may be operated by police agencies outside the control and quality assurance umbrella of a forensic laboratory.

Recommendations:

- ✓ **The State should require all public forensic laboratories to be accredited by ASCLD/LAB. To the extent that accreditation is mandated, the State should identify costs related to accreditation (e.g. inspection fees, proficiency testing, QA manager) and assist laboratories with those costs.**
- ✓ **Agencies that manage crime laboratories must recognize and support the costs (both staff time and operating expenses) of accreditation and other quality assurance measures.**
- ✓ **State (for example, POST and CCI) and local agencies should explore ways to ensure that crime scene, digital evidence, and latent print units not controlled by forensic laboratories follow appropriate quality assurance guidelines and meet appropriate training standards.**

Clearly, CODIS, AFIS and NIBIN have the capability to identify suspects in a wide variety of crimes if the State and local agencies provide sufficient resources in the field to collect the evidence and in crime laboratories to allow these new techniques to be applied. However, the current resource limitations in most agencies prevent their full use , and large backlogs of DNA, latent print, and firearms cases exist. For California to match Virginia in the proportion of cases analyzed for DNA, an increase of over 40% in the total laboratory professional staff would be needed. If such resources were available, and if the State authorized DOJ to place all felons in the DNA database (as 29 other states do), we would expect that a) there would be a much higher number of "cold hits," and therefore convictions, b) the possibility of convicting the wrong person would be decreased, and c) there would be a significant impact on California's rate of Part I crimes.

The laboratories throughout the State are moving rapidly into DNA technology and increasing their capabilities as best as they can. However, many crimes that could be solved via DNA are not being investigated. It is clear from the comments we have received that most agencies expect their laboratories to process DNA tests essentially only on murders and rapes. In contrast, England and Virginia, for example, use DNA on a wide variety of property related cases - in California almost no crimes of that type receive DNA testing. Furthermore, 60% of the DNA cold hits on rape cases in Virginia, which has an all felon database, could not have been made if Virginia's database were limited to the offenses authorized in California's.

Recommendations:

- ✓ **The State should enact legislation to include all felons in the Cal-DNA databank.**
- ✓ **The State should extend funding for the "Cold Hit" program and expand the program to cover all DNA cases, with and without suspects.**
- ✓ **Agencies should identify and attempt to fund the increased laboratory, investigative, and prosecutorial resources needed for full use of CODIS, AFIS and NIBIN.**
- ✓ **The State should seek earmarked federal funding for all California public laboratories to increase laboratory capacity and reduce turnaround time on DNA cases.**
- ✓ **Law enforcement and prosecuting agencies should re-evaluate their investigative approaches and modify them where appropriate to make the most effective use of forensic laboratory automated database information.**

California is especially fortunate to have CCI, which is one of the most highly regarded forensic science training organizations in the country. The Directors of all of California's crime laboratories consider support for CCI to be one of their highest priorities. Support is also needed for augmented crime scene and latent print training for police agencies, which handle a large proportion of this workload. In this context, there is concern both for quality control as well as for a clear definition of the respective roles of the forensic scientists and the paraprofessional crime scene investigator.

Although education and in-service training programs for forensic scientists are limited at the national level, there is a trend toward developing partnerships between working crime laboratories, training institutes and academic institutions. California law requires the California State University and University of California to work with the Department of Justice's CCI, in cooperation with forensic DNA laboratories, to establish an internship program for DNA analysts that will prepare graduate students to meet national standards and pass certification examinations. The proposed internships have not yet been funded. Forensic disciplines other than DNA are equally in need of highly trained and educated analysts, and, in time, this program should be expanded to include all disciplines.

The recently defined standards for graduate education in forensic science recognize the importance of a research experience in preparing for a career in the field. Research plays a vital role in education by giving the student experience in problem-solving and critical thinking, both central elements of forensic practice.

Recommendations:

- ✓ **The State should continue to support CCI training, including funding travel for forensic scientists employed by both state and local laboratories to attend CCI courses**
- ✓ **The State should implement and fund the DNA internship program and, ultimately, expand it to other disciplines.**
- ✓ **The State and local agencies should augment in-service training and educational programs for crime scene investigators and latent print analysts and ensure that they meet appropriate professional standards.**
- ✓ **The State should encourage public universities to support research and professional education in all facets of forensic science.**

EQUIPMENT AND FACILITIES FUNDS

One of the things that became clear in our surveys and discussions with local laboratory directors was that equipment is the least reliably funded aspect of their operations. For most laboratories the "current budget" personnel and operating expense levels are almost automatically carried from year-to-year, while capital equipment is considered something that must be specifically justified annually. As forensic testing has become more comprehensive, the cost for a single item of equipment could well exceed the average annual equipment budget of a forensic laboratory. The general impact of this type of budgeting approach is to force extended life on existing equipment and generally retard the movement to newer more reliable or efficient instrumentation.

Grant funding has been a significant source for equipment purchases for many of the laboratories. However, grants are typically "one-time" and are not a consistently reliable source. Another option is the creation of a self-amortizing or "sinking" fund, with depreciation charges. This would be used to fund replacements on a routine schedule, effectively removing these from the annual "service betterment" discussion and leaving those discussions to focus on new equipment that actually provides some new and improved capabilities not available through the normal routine replacement process.

Needs assessments and audit inspections conducted over the years have identified serious problems in many of the forensic laboratory facilities across the state. Many were found to be outmoded, severely overcrowded and to have safety issues. Although several laboratories have been replaced during this period, significant facilities needs remain to be addressed.

Recommendations:

- ✓ **Agencies should develop replacement plans for laboratory equipment and establish revolving funds for this purpose.**
- ✓ **Agencies that manage crime laboratories should make every effort to upgrade, expand, or replace existing laboratory facilities where the need has been identified.**
- ✓ **The State should continue grant funding for equipment and should explore other mechanisms for statewide funding of forensic equipment.**

Valid workload and other performance data are extremely useful to policy makers at all levels faced with funding decisions. Analysis and comparison of the forensic laboratory operations in California and across the country are hampered by lack of comparable information on backlog and performance. There is no consistent mechanism within the state to collect and exchange information on the workload or productivity aspects of California's forensic laboratories. Additionally, there is no requirement on any laboratory to report its workload and turnaround information to any State agency or professional organization.

Periodic surveys such as we conducted are the only source for statewide information on the performance of California's forensic laboratories. The same is true on the national level, although the periodic surveys by the national association of crime laboratory directors (ASCLD) provide some comparative information. Further, as long as individual Laboratory Information Management Systems (LIMS) count cases and tests in different ways, it will be difficult to have valid "apples-to-apples" statewide totals and thus to have the most meaningful information for decision-making.

Recommendations:

- ✓ **The CACLD should establish a consensus on workload reporting and should conduct a workload survey annually.**
- ✓ **The State should fund development, licensing and installation of LIMS that provide data conforming to the CACLD workload reporting standards.**

It is not clear that increased centralization would improve service levels. The information provided by the other states' laboratory directors and by California's various laboratories demonstrates both beneficial and disadvantageous aspects of centralization of laboratory resources. Crime scene evidence gathering as well as expert witness testimony would be highly inefficient if done through a few centralized laboratories, and law enforcement's use of the crime laboratory tends to fall exponentially as their distance from the laboratory increases.

However, some costly or infrequent laboratory services might be regionalized. There are a comparatively small set of test types for which the equipment is expensive and the expertise rarely used. Most laboratory directors believed that some types of analysis (soil, explosives, GSR, glass and paint) might be more efficient if regionalized.

The primary case against increased centralization is the apparent slower response times of large laboratories and the importance law enforcement attaches to local control of laboratory case priorities. Agencies that now fund their own laboratories would not generally support consolidation of their operations with other laboratories into regional labs, although the regionalization of the specific services suggested above would probably be a cost effective option they would find acceptable.

Recommendations:

- ✓ **The State and local agencies should consider working toward regionalizing some services where appropriate.**
- ✓ **Laboratories, especially those that serve multiple client agencies, should set up mechanisms that give their agencies input on casework priorities.**

VI. Selected References and Websites

Readers who wish to know more about forensic science and crime laboratory management may find the following references and websites of value:

REFERENCES

Jan Bashinski and Joseph Peterson (2003) "Forensic Sciences" in **Municipal Police Management**, 4th edition, International City Managers Association, Washington D.C.

Barry A.J. Fisher (2000) **Techniques of Crime Scene Investigation**, 6th Edition, CDC Press, Boca Raton FL (7th edition in press 2003)

John Houde (1999) **Crime Lab: A Guide for Non-Scientists**, Calico Press LLC Ventura CA

Jami J. St.Clair (2003) **Crime Laboratory Management**, Academic Press, San Diego CA

WEBSITES

American Academy of Forensic Sciences ..... www.aafs.org

American Society of Crime Laboratory Directors ..... www.ascld.org

American Society of Crime Laboratory Directors/Laboratory Accreditation Board ..... www.ascld-lab.org

California Association of Criminalists ..... www.cacnews.org

California Criminalistics Institute ..... www.cci.ca.gov

National Forensic Science Technology Center ..... www.nfstc.org

Scientific Working Groups sponsored by FBI ..... www.fbiva.fbiacademy.edu

Technical Working Groups sponsored by NIJ ..... www.ojp.usdoj.gov

VII. Appendix: Surveys and Questionnaires

(Appendix A) FORENSIC LABORATORY SURVEY

The California State Attorney General's Task Force on Forensic Sciences is conducting a statewide survey for the purposes of informing state lawmakers of the needs of State and local law enforcement crime laboratories for technology-related support, including funding for personnel, laboratory space, technology acquisition, technology assistance and services, and technology training. In order to allow us to forecast future needs, we have asked you to provide both current information and data reflecting the status of your laboratory in 1985/86. The 15-year-old data is required to make the forecasts both plausible and defensible. Your participation in this survey will ensure that State support is responsive to the needs of your agency.

GENERAL INFORMATION

1. Type of agency: ☐ Municipal Police Crime Lab ☐ County Sheriff's Crime Lab
   ☐ County District Attorney's Crime Lab ☐ State Crime Lab
   ☐ Other (specify) _____
2. Size of the jurisdiction (square miles) _____
3. Size of the population served: _____
4. Number of law enforcement agencies served by your laboratory? _____
5. Last calendar year's total part I crimes (FBI statistics) for the jurisdictions you serve? (estimate) _____
6. Number of law enforcement officers served by your laboratory? _____
7. Point of contact for matters related to this survey:_____
8. What type of management information system does your laboratory use?
   ☐ Fully computerized, networked system Vendor _____
   ☐ Fully computerized, non-networked system Vendor _____
   ☐ Partially computerized system, some manual record-keeping Vendor _____
   ☐ Manual record-keeping system
   ☐ Other _____

   Does your information management system track personnel time usage? _____
9. Is your laboratory accredited?
   ☐ Yes, by the ASCLD/LAB. Year of first accreditation? _____
   ☐ Yes, by (specify) _____
   ☐ No
10. If the laboratory is not accredited, are you planning for accreditation? ☐ YES ☐ NO
    When do you expect to apply for accreditation by ASCLD/LAB? _____
    Or other accrediting body? (specify other agency and when)_____
11. Does your laboratory support individual certification? (mark all that apply)
    ☐ Yes, by paying for examination sitting fees.
    ☐ Yes, by paying recertification fees.
    ☐ Yes, by providing on-duty study time.
    ☐ Yes, by offering pay or promotional credits for becoming certified.
    ☐ Yes, by (specify) _____
    List acceptable certifying organizations: _____
    ☐ No

FACILITIES

12. Current crime lab space (square feet):_____ Sq. Ft. in '85/86? _____
    Are your current physical facilities adequate? ☐ YES ☐ NO
    Has your agency conducted a facility needs assessment? ☐ YES ☐ NO
    If yes, what is the recommendation of square footage for your facility? _____
    What is your estimate of the cost to replace or remodel? $_____
    (if you do not know, use $300/sq. ft. for new space)

BUDGET

13. What is the FY 2000/01 annual budget of your laboratory? _____
    Specifically, what does this figure include?_____

    If possible, please provide the following budget details (excluding equipment and training costs):

FY 1999/00	FY 2000/01	FY 1985/86
Personnel costs $_____	Personnel costs $_____	Personnel costs $_____
Operating costs $_____	Operating costs $_____	Operating costs $_____
Facilities costs $_____	Facilities costs $_____	Facilities costs $_____

14. Do you have an annual equipment budget for your laboratory? ☐ YES ☐ NO

15. Do you have an annual training budget for your laboratory? ☐ YES ☐NO
    What was your budget for each fiscal year listed below?

	EQUIPMENT	TRAINING
FY 1985/86	_____	_____
FY 1999/00	_____	_____
FY 2000/01	_____	_____

    What is the estimated annual cost of your equipment needs? _____
    What is the estimated annual cost of appropriate training? _____

STAFFING

16. Total number of full-time, testifying technical staff members (do not include supervisors unless they perform casework): _____. Number of testifying technical staff by discipline:
    (Provide partial staff numbers where appropriate. Total must equal number above)

    ___ Alcohol, blood/breath
    ___ Clandestine Labs (scenes and/or analysis)
    ___ Computer Crime
    ___ Controlled Substances
    ___ Crime Scene Investigations
    ___ Explosives
    ___ Fire Debris
    ___ Firearms, Toolmarks
    ___ GSR

17. Based on current backlog and requests for analysis:
    How many additional full-time technical staff do you need to meet service goals? _____
    Estimated annual cost (salary and benefits) for such additional technical staff? $_____
    How would you divide these additional full-time technical staff by discipline?

    ___ Alcohol, blood/breath
    ___ Clandestine Labs (scenes and/or analysis)
    ___ Computer Crime
    ___ Controlled Substances
    ___ Crime Scene Investigations
    ___ Explosives
    ___ Fire Debris
    ___ Firearms, Toolmarks
    ___ GSR

18. Provide a breakdown, by job title, of all personnel within the laboratory.

Job Title	Current Approx. FTE	Did position exist in 1985? Yes/No	# of FTE
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

19. Indicate total span of control for each manager and supervisor listed.
    For managers, specify the number of direct reports (e.g. supervisors) and total indirect reports.

Position	Span of Control
_____	_____
_____	_____
_____	_____

20. How many additional full-time support staff do you need? .
    Clerical _____ Evidence custodian_____ Other (specify) _____
    What is the annual cost (salary and benefits) for additional support staff? $_____

21. Does your laboratory have a Quality Manager? ☐ YES ☐ NO
    If yes, what is the ratio of full-time technical staff to quality assurance staff? _____

CURRENT QA STAFF		NEED[1]	
Less than _ - time QM	☐	Less than _ - time QM	☐
_ - time QM	☐	_ - time QM	☐
Full-time QM	☐	Full-time QM	☐
Full-time QM + clerk	☐	Full-time QM + clerk	☐
Full-time QM + clerk + Laboratory Technician	☐	Full-time QM + clerk + Laboratory Technician	☐

    If possible, estimate the amount of time (in hours) annually your staff spends away from the laboratory in court trials: _____ .

    Your best estimate of the similar number of hours required in 1985-86 _____

    No basis for estimate _____.

SERVICES PROVIDED

22. Check the areas of examination offered by your laboratory: If the service is not now offered, put "N." If offered now and was also provided in 1985-6, put "Y." If this is a service you have added between 1985/86 and this year, indicate the year added (such as "90" or "1990")

____ Alcohol – breath
____ Alcohol - blood
____ Arson, explosives
____ CALID
____ Clandestine Labs (scene/analysis)
____ CODIS
____ Computer crime/digital evidence
____ Controlled substances
____ Crime Scene Processing
____ DNA - D1S80
____ DNA - DQA1 + PM
____ DNA - Mitochondrial
____ DNA -RFLP
____ DNA - STR
____ Fibers
____ Firearms
____ Gunshot Residue – AA
____ Gunshot Residue – SEM
____ Hairs
____ Impression (footwear/tire)
____ Latent prints
____ Misc. trace - glass, soil, paint, etc.
____ NIBIN (IBIS/DRUGFIRE)
____ Questioned documents
____ Forensic Biology – conventional
____ Toolmarks
____ Toxicology
____ Other (specify)_____
____ Other (specify)_____
____ Other (specify)_____
____ Other (specify)_____
____ Other (specify)_____

23. Which of the above services, if any, were offered by your laboratory but discontinued? Include the reason for discontinuing service and the approximate date.

_____
_____
_____

24. What types of services not performed by your laboratory are commonly requested?

_____
_____
_____

25. What services does your laboratory provide that are contracted out to another entity?

_____
_____
_____

26. Does your laboratory allocate resources specifically to the examination of old cases? _____

27. Does your laboratory have the ability to conduct DNA analyses?
☐ YES → GO TO QUESTION 28
☐ NO → SKIP TO QUESTION 30

28. Does your laboratory have the ability to analyze DNA in ways that are compatible and integrated with the FBI's Combined DNA Index System (CODIS)? ☐ YES ☐ NO

29. For each DNA analysis method listed below, indicate its current use and any factors limiting its future acquisition or use by your laboratory.

CURRENT USE:

Method	Not in Use	Limited Use	General Use
RFLP	☐	☐	☐
DQA1 + PM	☐	☐	☐
D1S80	☐	☐	☐
STR	☐	☐	☐
Mitochondrial	☐	☐	☐

FACTORS LIMITING FUTURE ACQUISITION OR USE (Mark all that apply.)

Method	No Expected Requirement	Too expensive for anticipated volume	Effectiveness or Reliability	Training Requirements	Lack of Trained Personnel	Lack of Equipment and/or Lab Space
RFLP	☐	☐	☐	☐	☐	☐
DQA1 + PM	☐	☐	☐	☐	☐	☐
D1S80	☐	☐	☐	☐	☐	☐
STR	☐	☐	☐	☐	☐	☐
Mitochondrial	☐	☐	☐	☐	☐	☐

30. For the most recent year for which data has been compiled, enter the number of requests received and analyzed, the average processing times, and the end of period backlog for calendar year or fiscal year:_____

AREAS OF ANALYSIS	REQUESTS RECEIVED	REQUESTS COMPLETED	AVE. TURN-AROUND TIME	# OF CASES BACKLOGGED
Alcohol, blood				
Clandestine Laboratories				
(scenes and/or analysis)				
Computer Crime				
Controlled Substances				
Crime Scene Investigations				
Explosives				
Fire Debris				
Firearms, Toolmarks				
GSR				
Impression (footwear/tire)				
Latent Print Comparisons				
Latent Print Field response				
Questioned Documents				
Forensic Biology – Conventional				
Forensic Biology – DNA				
Toxicology				
Trace Analysis				
All Others				

FOR PURPOSES OF THIS SURVEY, USE THE FOLLOWING DEFINITIONS:
TURNAROUND TIME is the averaged elapsed time (calendar days) from the submission of a request for analysis to the release of a completed laboratory report.
BACKLOG is defined as the number of submitted requests for analysis for which a completed laboratory report has not been released.
NOTE: If you are unable to report on turnaround time and backlog based on the definitions provided in this survey, please define the terms as used in your laboratory and record the numbers in the table above based on your definition.

What is your laboratory's definition of turnaround time? _____

_____

If you do not keep turnaround information, would it be possible for the Task Force to assign someone to review last 100 results and identify time sample arrived and time completed? _____

What is your laboratory's definition of backlog? _____

_____

31. Does your laboratory have casework performance standards for technical staff?

☐ YES *(We accept even informal supervisory estimates of direct labor minutes per test type as a "standard" for this purpose, even if it is not scientific and not measured. However, please clearly identify how you derived the standards you are providing and what they mean in terms of direct time vs. total effort, etc.)*

Describe the criteria used to determine the standards:_____

_____

☐ NO

If YES, provide the following information for the most recent year for which data has been compiled for calendar year: _____ or fiscal year:_____.

AREA OF ANALYSIS	PERFORMANCE STANDARD
Alcohol, blood	_____
Clandestine Laboratories (scenes and/or analysis)	_____
Computer Crime	_____
Controlled Substances	_____
Crime Scene Investigations	_____
Explosives	_____
Fire Debris	_____
Firearms, Toolmarks	_____
GSR	_____
Impression (footwear/tire)	_____
Latent Print Comparisons	_____
Latent Print Field response	_____
Questioned Documents	_____
Forensic Biology – Conventional	_____
Forensic Biology – DNA	_____
Toxicology	_____
Trace Analysis	_____
All Others	_____

32. If your laboratory processes crime scenes, briefly describe who responds and performs what tasks, and the estimated hours per year required to provide this service.

_____

_____

_____

LABORATORY NEEDS

33. How would you prioritize the following needs for your lab? (If you acquired a one-shot windfall in your budget, how would it be used?) Rank these from 8 (high) to 1 (low). There should be only one "8" one "7" etc.

CURRENT NEEDS	PRIORITIZE (1 – 8)
System for overall laboratory information management	_____
Computerized system for tracking evidence	_____
Additional staff (professional)	_____
Training on available technology or technology being acquired	_____
Additional laboratory space	_____
Continuing education and/or in-service training on new technologies or new developments in the field	_____
Equipment (specify below)	_____
Other (specify below)	_____

34. Equipment needs

_____

_____

35. Other needs

_____

_____

36. What are the laboratory's major training needs, if any?

_____

_____

37. Within your laboratory how would you generally rate the quality of the following technologies presently in use? Mark the number of units per category, e.g. "3" GC/MS are old but serviceable and "5" are state-of-the art.

Technology	Not Applicable	Obsolete	Old but Serviceable	Modern/Little Room for Improvement	State of the Art
GC/MS	_____	_____	_____	_____	_____
FTIR	_____	_____	_____	_____	_____
GC	_____	_____	_____	_____	_____
UV	_____	_____	_____	_____	_____
SEM	_____	_____	_____	_____	_____
Microscopes, Compound	_____	_____	_____	_____	_____
Microscopes, Polarizing	_____	_____	_____	_____	_____
Microscopes, Comparison	_____	_____	_____	_____	_____
Computers	_____	_____	_____	_____	_____
Case management system	_____	_____	_____	_____	_____
Evidence tracking	_____	_____	_____	_____	_____
Evidence security and preservation equipment, e.g., freezers	_____	_____	_____	_____	_____
Testimony preparation/ presentation	_____	_____	_____	_____	_____
Toxicology extraction	_____	_____	_____	_____	_____
DNA equipment	_____	_____	_____	_____	_____
Crime scene response/ evidence collection	_____	_____	_____	_____	_____
Other (specify)_____	_____	_____	_____	_____	_____

38. With respect to the following types of analyses, if backlogs were eliminated, please indicate what is/are the key limiting factor(s) in your laboratory's ability to analyze all of the evidence submitted to it.
(Mark all that apply for each row.)

Type of Analysis	PERSONNEL			More cost-effective to contract out	Lack of Technology/ Equipment	Other (specify)
	Insufficient resources to hire	Inability to retain	Lack of training			
Alcohol, blood	☐	☐	☐	☐	☐	☐
Clandestine Laboratories (scenes and/or analysis)	☐	☐	☐	☐	☐	☐
Computer Crime	☐	☐	☐	☐	☐	☐
Controlled Substances	☐	☐	☐	☐	☐	☐
Crime Scene Investigations	☐	☐	☐	☐	☐	☐
Explosives	☐	☐	☐	☐	☐	☐
Fire Debris	☐	☐	☐	☐	☐	☐
Firearms, Toolmarks	☐	☐	☐	☐	☐	☐
GSR	☐	☐	☐	☐	☐	☐
Impression (footwear/tire)	☐	☐	☐	☐	☐	☐
Latent Print Comparisons	☐	☐	☐	☐	☐	☐
Latent Print Field response	☐	☐	☐	☐	☐	☐
Questioned Documents	☐	☐	☐	☐	☐	☐
Forensic Biology – Conventional	☐	☐	☐	☐	☐	☐
Forensic Biology – DNA	☐	☐	☐	☐	☐	☐
Toxicology	☐	☐	☐	☐	☐	☐
Trace Analysis	☐	☐	☐	☐	☐	☐
All Others	☐	☐	☐	☐	☐	☐

39. Describe limitations, if any, imposed by your laboratory on the type of crimes from which evidence can be submitted.

_____

_____

_____

40. What operational changes, if any have you implemented to meet increasing demands/reduced resources?

_____

_____

_____

41. If you have any outstanding anecdotes as to the impact of not being able to provide complete lab services in a timely manner, please provide them. Be as specific as possible. Use this space for additional comments or information you feel would be important for the Task Force to include in the survey. For example, the Task Force may want to address the need for forensic teleconferencing or other interlinked communications capability for California laboratories.

_____

_____

_____

– END –

(Appendix B) FORENSIC LABS IN CALIFORNIA – SUPPLEMENTAL QUESTIONNAIRE

GENERAL INFORMATION

1. Name of Agency (Lab):_____

2. Overtime and/or comp. Time off paid in last calendar or fiscal year (approx.):
   Overtime-Field $_____ Overtime-Lab $_____
   Comp time off-Field $_____ Comp time off-Lab $_____

3. Specific Equipment Needs Next 3 Years: Please list specific types of equipment you believe you need to meet service goals over the next three years. This includes both replacement and new equipment. If more than one item of the same type is needed in the same year, please indicate the number of items following the item name [e.g. computers (3)]. (Prioritize from top of list to bottom)

	2001-2002	2002-2003	2003-2004
P1.	_____	_____	_____
P2.	_____	_____	_____
P3.	_____	_____	_____
P4.	_____	_____	_____
P5.	_____	_____	_____
P6.	_____	_____	_____

4. We are trying to determine, among other things, a reasonable turn-around target for various types of tests. We recognize that this will depend in some circumstances on how urgently the client needs the results. Please indicate below what you believe to be the appropriate turnaround times (time received by Lab until sent to customer).

	Working Days for a routine request	Approx. % of all requests deemed routine	Working Days for an urgent request deemed urgent	Approx. % of requests
Alcohol, blood	_____	_____	_____	_____
Clandestine Labs	_____	_____	_____	_____
(scenes and/or analysis)	_____	_____	_____	_____
Computer Crime	_____	_____	_____	_____
Controlled Substances	_____	_____	_____	_____
Explosives	_____	_____	_____	_____
Fire Debris	_____	_____	_____	_____
Firearms, Toolmarks	_____	_____	_____	_____
GSR	_____	_____	_____	_____
Impression (footwear/tire)	_____	_____	_____	_____
Latent Print Comparisons	_____	_____	_____	_____
Questioned Documents	_____	_____	_____	_____
Biology – Conventional	_____	_____	_____	_____
Biology – DNA	_____	_____	_____	_____
Toxicology	_____	_____	_____	_____
Trace Analysis	_____	_____	_____	_____
All Others	_____	_____	_____	_____

Describe the basis for the above turnaround targets:

_____

_____

_____

_____

5. If there were funding to support some test types being done on a regional basis (such as in analytical areas where the volume of work is low or the cost of equipment is too high to be economical on an individual lab basis), what analysis types would you recommend be so funded, if any:

	Possible Candidate	Outstanding Candidate	Describe Why
Arson	_____	_____	_____
Explosives	_____	_____	_____
Clandestine Lab	_____	_____	_____
Controlled Substances			
(define):_____	_____	_____	_____
(define):_____	_____	_____	_____
Conventional Forensic Biology	_____	_____	_____
DNA: - D1S80	_____	_____	_____
- DQA1+PM	_____	_____	_____
- Mitocondral	_____	_____	_____
- RFLP	_____	_____	_____
- STR	_____	_____	_____
Firearms	_____	_____	_____
GSR: - AA	_____	_____	_____
- SEM	_____	_____	_____
Impressions	_____	_____	_____
Questioned documents	_____	_____	_____
Trace: - soil	_____	_____	_____
- paint	_____	_____	_____
- glass	_____	_____	_____
- hair	_____	_____	_____
- fiber	_____	_____	_____
Toxicology	_____	_____	_____
Toolmarks	_____	_____	_____
Other (define):_____	_____	_____	_____

6. Would your lab likely be willing to send the cases of the type you identified above as "outstanding candidate" to a regional specialty lab? Yes_____ No _____

7. Labs have expressed concern about the ongoing impact of quality improvement and accreditation-driven processes on staff productivity, quality management overhead, and turn-around times. We are interested in any quantitative analysis you may have previously performed (or can obtain as a by-product of your MIS) on any of these issues. Additionally, estimate as best as you can, the impact by area of lab operations of such quality and accreditation improvements:

	Turnaround time Impact (delays)	Analyst Productivity Impact*	Additional Operational Costs**
DNA & biology	_____	_____	_____
Controlled Substance	_____	_____	_____
Toxicology	_____	_____	_____
Latents	_____	_____	_____
All Other	_____	_____	_____

* Estimate the number of cases per analyst/per year that cannot be completed because of the diversion of resources to proficiency and accreditation requirements.
** Includes proficiency testing, materials costs for extra samples, additional standards and controls, duplicate testing, etc.

– END –

I. CONTACT INFORMATION

_____

_____

_____

_____

II. HOW YOU HANDLE YOUR FORENSIC LAB NEEDS

1. Where do you have your forensic testing done?_____

   Number of cases last year:_____

	Controlled Substances	DUI	DNA	Toxicology	Latents	All Other*
a. Private labs	_____	_____	_____	_____	_____	_____
b. DOJ (state) lab	_____	_____	_____	_____	_____	_____
c. City or County	_____	_____	_____	_____	_____	_____
d. Other government lab	_____	_____	_____	_____	_____	_____
e. In-house staff** (non-lab)	_____	_____	_____	_____	_____	_____
f. Other	_____	_____	_____	_____	_____	_____

   Budget for the use of private lab testing, if known $_____

2. Estimate the number of cases your investigators should have sent to labs last year, but did not given lab priorities or your own priorities?

Crime scene evidence collection	_____	DUI	_____
Homicide & crimes against persons	_____	Narcotics	_____
Child abuse and sexual assualt	_____	Property	_____

3. Estimate the number of cases sent to forensic labs in 1985-86: _____

4. Is your use of private labs primarily to achieve: (If several, prioritize using 1 = high; 5 = low)
   a. Faster turn-around times than at government labs _____
   b. Better quality/expertise _____
   c. More control over priority cases _____
   d. Less costly results _____
   e. Government lab does not offer this service _____
   f. Other (define)_____ _____

* All other includes firearms, biological evidence, trace evidence, computer crime, GSR, impressions, documents and miscellaneous other.

** If your agency operates a forensic lab, only report cases assigned to non-lab staff that are not part of the agency-owned lab.

III. OPPORTUNITIES FOR IMPROVING YOUR PRIMARY LAB

5. Using the ratings below, please indicate your level of satisfaction with the degree of control you have over the prioritization and/or timing of individual cases you submit to your primary lab (including crime scene assistance if appropriate):

a.	Evidence collection at the crime-scene	_____
b.	Chain of evidence	_____
c.	Evidence testing/preservation problems	_____
d.	Specific testing methods in certain areas	_____
e.	Scientific expertise in lab personnel	_____
f.	Required equipment in certain areas	_____
g.	Timeliness of results	_____
h.	Presentation of results during testimony	_____
i.	Other: _____	_____

5 = Extremely Satisfied
4 = Well Satisfied
3 = Satisfied
2 = Somewhat Satisfied
1 = Dissatisfied

6. Please list the specific case types that generally need additional priority at the lab that serves you: (e.g. important to you, but do not seem to get processed at all or in a timely manner. Please indicate delay time if timeliness is the issue.)
   a._____
   b._____
   c._____
   d._____
   e._____

7. Does your department handle crime scene evidence collection, or does the primary lab that services your sample processing handle crime scene collection?
   We do _____ They do ____ Shared____ (describe who does what:)
   _____
   _____

8. Approximate number of times you called a forensic lab technician to a crime scene in the last 12 months: _____ Approximate number of times your requests were fulfilled: _____ (%)

9. What additional forensic capabilities and/or capacity would you most like to see provided?
   _____
   _____

10. Due to limited lab capacity and court dictated prosecutor needs, testing to support investigative needs is sometimes limited. Please indicate below the impact this has on your department's investigative success:
    a. Overwhelming _____
    b. Serious _____
    c. Some constraint_____
    d. Small problem _____
    e. No problem _____

– END –

(Appendix D) SURVEY FOR CALIFORNIA DISTRICT ATTORNEYS

I. CONTACT INFORMATION:

II. YOUR FORENSICS LAB NEEDS

1. What are your current forensics labs needs annually:
   a. No. of cases w/ forensic lab tests last fiscal year? _____ Number of cases where you had to request additional testing beyond what Police department requested? _____
   b. Estimated (guesstimated) # of cases w/tests in 1989-90? _____
   (We know this is difficult, but we need to have a base for forecasting future workload.)

2. Approx. number of cases/year by type and lab types:

	DNA	Toxicology	Gunshot residue	All Other
a. Private labs	_____	_____	_____	_____
b. CA State (DOJ) lab	_____	_____	_____	_____
c. This Office runs a lab	_____	_____	_____	_____
d. Sheriff run lab	_____	_____	_____	_____
e. Police Run Lab	_____	_____	_____	_____
f. Other	_____	_____	_____	_____

   (define) _____

   Cost of Testing $ _____

3. Is your use of private labs, if any, primarily designed to:
   a. Obtain quicker turn-around times than at Govt. labs _____
   b. To obtain better equip./skill in specific areas _____
   c. Lack of capability of lab to process my tests _____
   d. Lab could do it, but too low a priority _____
   e. Other (define) _____

4. Test types (if any) with frequent tardiness problems _____

5. Number of prosecutions/year you handle (all cases, not only those w/testing) _____
   Number going to trial _____

III. ASSESSING YOUR CURRENT FORENSICS LAB SUPPORT

(You may skip this section if your office runs the lab)

As an agency that has to either accept or reject the results of forensics tests in your cases, and one that must expend resources to support those tests that are perceived to be inaccurate or misleading, your office has a strong interest in having the most reliable, accurate, and timely tests to serve both your own needs and those of the justice system as a whole. We presume that your office has some concerns about lab procedures and/or field (crime scene) collection procedures. We are asking the following in the hopes of determining where the various labs around the state most need to improve.

6. If you were to summarize the primary problem/shortcoming of the current lab system, excluding current limits on DNA capabilities (which we are addressing), how would you rate these areas:

		Serious	Some Problem	No Problem
a.	Evidence collection at the crime-scene	_____	_____	_____
b.	Chain of evidence	_____	_____	_____
c.	Evidence testing/preservation problems	_____	_____	_____
d.	Specific testing methods in certain areas	_____	_____	_____
e.	Lack of scientific expertise in lab personnel	_____	_____	_____
f.	Lack of required equipment in certain areas	_____	_____	_____
g.	Slow/tardy results	_____	_____	_____
h.	Presentation of results during testimony	_____	_____	_____
i.	Lack of objectivity of lab staff	_____	_____	_____
j.	Problems w/compliance or discovery	_____	_____	_____
k.	Problems w/access to expert witnesses	_____	_____	_____
l.	Other (define): _____	_____	_____	_____

7. In California, prosecuting attorneys and/or the labs have limited fiscal resources for testing or use of forensics experts. As best as you can estimate, tell us how this might be quantified in your case as follows:

		DNA	Narcotics	DUI	Latents	All Other
a.	Current % of cases w/tests	____%	____%	____%	____%	____%
b.	% of cases where tests would be beneficial	____%	____%	____%	____%	____%
c.	Current % of cases w/forensics consultation	____%	____%	____%	____%	____%
d.	Cases that would benefit from consultation	____%	____%	____%	____%	____%

e. Probable cost to meet the desired level of consultation and testing $_____

8. What change(s) would you suggest that you believe would most improve the forensic evidence throughout the State?_____

9. As regards admissibility and/or credibility and eventual acceptance of the results, identify the types of cases/ tests that seem to most often present a problem or most negatively impact on your case success:

		biggest problem	2nd biggest	3rd biggest	4th worst	5th worst
a.	Bloodstain pattern interpretation	_____	_____	_____	_____	_____
	Other case or test types:					
b.	_____	_____	_____	_____	_____	_____
c.	_____	_____	_____	_____	_____	_____
d.	_____	_____	_____	_____	_____	_____
e.	_____	_____	_____	_____	_____	_____

10. The high demand for prosecutorially driven testing coupled with limited lab resources can negatively impact investigatively driven testing. How big a problem do you perceive this to be for the investigators in the police departments you work with:
a) Overwhelming___ b) Serious___ c) Some constraint___ d) Small problem___ e) No problem___

11. How many court proceedings, if any, were delayed in the last fiscal year (or calendar year) due to delays in forensic test results? _____

12. Do the limitations on quantity and quality of forensic resources impact the level of plea bargaining in serious cases? Yes _____ No _____If so, please describe how: _____
Would current levels of plea bargaining occur if adequate lab resources were available? _____

13. Any other comments you would like to make about the forensics laboratory system in the State and how it might better serve your office_____

– END –

(Appendix E) SURVEY OF [OTHER] STATE FORENSIC LABS

I. GOVERNANCE LEVELS/FUNDING LEVELS

1. Total number of forensic labs and approximate cases completed or percent of all test workload statewide at all lab levels last available fiscal or annual year at:

	# OF LABS	# OF CASES	OR % OF WORKLOAD
State managed labs	_____	_____	_____
Other (regional) managed labs	_____	_____	_____
County managed labs	_____	_____	_____
Municipal managed labs	_____	_____	_____
Private labs (if available)	NA	_____	_____

2. Discuss how lab functions not managed directly by the State are funded by the State (if at all) and the percentage of income provided by state budget, local agency budgets, fees charged to users, and any other major revenue providers.

_____

_____

3. What is the approximate budget and total full-time employees (FTE) for each level of governance:

LEVEL	ANNUAL BUDGET	FTES	STATE FUNDING (ANNUAL)
State	$ _____	_____	$ not applicable
County	$ _____	_____	$ _____
Municipal	$ _____	_____	$ _____
Other	$ _____	_____	$ _____

(Use the best information readily available to you, if any, for labs you do not manage directly)

4. If the State provides a subsidy to local forensics labs to cover part of their costs, please describe the basis (per capita, per Part I crime, per case or per test, x% of total cost, etc.)

5. Does the State license or accredit locally managed forensics labs? Yes ____ No ____
   If so, is it enforced by a) mandatory legislation Yes ____ No ____

6. Is some type of accreditation needed to be eligible for State funding? Yes ____ No ____

II. COSTS OR HOURS ASSOCIATED WITH TEST TYPES

7. Does the State have any type of cost standards, performance standards, or other way of associating required resource levels with the number of various types of tests requested? Yes___ No___
   If so, please attach or describe:

   _____

   _____

8. To your knowledge, do any labs within the State, not managed directly by the State have any such standards? _____

   If so, please provide contact information and the type of standard you understand they utilize.

   Entity:_____

   Contact name/title:_____ Phone:_____

   Type of standard used: _____

III. SERVICE TIMES ASSOCIATED WITH VARIOUS TEST TYPES

9. If you maintain data on the average time it takes your labs to process various types of tests, please indicate it below. We have also provided a space to indicate whether the numbers you are providing are based on an ongoing tracking system using actual received/delivered dates, a prior statistical analysis, or your best judgment.

Areas of Analysis (recent 12 month period)	Received Requests	Requests Completed	Avg. Turn-Around time	# of Cases Backlogged
Alcohol, blood				
Clandestine Laboratories (scenes and/or analysis)				
Computer Crime				
Controlled Substances				
Crime Scene Investigations				
Explosives				
Fire Debris				
Firearms, Toolmarks				
GSR				
Impression (footwear/tire)				
Latent Print Comparisons				
Latent Print Field response				
Questioned Documents				
Forensic biology - Conventional				
Forensic biology – DNA				
Toxicology				
Trace Analysis				
All Others				

Basis for numbers: _____ _____ _____ _____

IV. FEES CHARGED

10. Most labs do not charge for most of their services. Some have legislatively mandated charges for certain types of tests or for certain sets of circumstances. Please provide information describing the types of fees for service you have, the reason for each such fee (legislative, equity reasons, or simply revenue generation), the amount of the fee, and the method you use to calculate a fee (displaceable cost, market cost, full cost, etc.).

_____

_____

_____

V. OTHER

11. Do defense attorneys make any use of state/local labs? _____ Yes ____ No
12. Is there any perceived reason that they do not, if they do not?

_____

_____

_____

– END –

VIII. Glossary

AAFS The American Academy of Forensic Sciences. The Sections of the AAFS are Criminalistics (most forensic scientists are in this category), Pathology/Biology, Engineering, Psychiatry and Behavioral Sciences, Physical Anthropology, Odontology, Toxicology, Questioned Documents, General, and Jurisprudence.

ABC The American Board of Criminalistics, the certifying body for criminalists.

ABFDE The American Board of Forensic Document Examiners, the certifying body for questioned documents examiners.

ABFT The American Board of Forensic Toxicology.

Accreditation A voluntary program whereby an organization is inspected by an external body to determine that its policies, procedures, staff, physical plant and work product meet published peer-based standards.

AFTE The Association of Firearms and Toolmark Examiners.

Arson Analysis The analysis of evidence from fire scenes (fire debris) to detect, identify and classify any flammable substances (arson accelerants) present, which may indicate the crime of arson.

ASCLD/LAB The American Society of Crime Laboratory Directors-Laboratory Accreditation Board, the accrediting body for crime laboratories.

AFIS Automated Fingerprint Identification System (See Cal-ID).

ALPS Automated Latent Print System, the part of the Cal-ID database in which evidence latent prints are compared to the automated file of inked prints of arrestees.

ALS (Alternate light source) Equipment that produces light of controlled and variable wavelengths that aids in the visualization of latent prints, body fluid stains, fibers, obliterated writing, and other evidence at crime scenes and in the laboratory.

Arson Accelerants Flammable substances (such as gasoline or lighter fluid) used to add fuel to an arson fire.

Backlog Requests for service received by the laboratory that remain in the queue pending testing and completion of a report.

BATF Bureau of Alcohol, Tobacco, and Firearms, a federal regulatory agency.

BFS The Bureau of Forensic Services, the State crime laboratory system operated by the California Department of Justice, Division of Law Enforcement.

Blood Alcohol Analysis The detection and quantitation of ethyl alcohol in the human body by the analysis of blood, breath or urine and the interpretation of its effects. This analysis is critical in driving under the influence (DUI) cases.

Body Fluids Biological evidence (blood, semen, saliva, sweat, vaginal fluid, etc.) from the human body.

BrassCatcher An early version of the IBIS system that stored and compared digitized files of the markings on fired cartridge casings; this system was offered by BATF.

Cal-DNA California's state level CODIS (Combined DNA Index System) file of convicted offender DNA profiles, maintained by the BFS DNA Laboratory in Richmond.

Cal-ID California's state level automated fingerprint identification system, which provides booking identifications of arrestees as well as latent print comparisons of evidence against the digitized files of known fingerprints, maintained by the DOJ Division of Criminal Justice Information and Statistics (DCJIS).

CAC The California Association of Criminalists.

Case Generally, a single criminal event, e.g. a homicide. Laboratories sometimes use "case" to refer to a request for service, e.g. a DNA case. However, a single criminal case may involve multiple requests for laboratory work; for example, a homicide may require fingerprint DNA, firearms, and trace evidence analysis, each of which would usually be counted as a separate case or request for service.

Case System (See LIMS)

CCI The California Criminalistics Institute, the training arm of the DOJ BFS that provides forensic training to scientists and examiners from all public crime laboratories in the state.

Certification A voluntary, formal process to establish that individual professionals meet peer-based education, experience, and knowledge standards. Recognized certification programs in forensic science include written examinations, ongoing proficiency testing, and continuing education requirements for re-certification.

Chain of Evidence The documentation that ensures the identity and integrity of an item of evidence from its collection through its introduction in court. The chain must identify the location(s) of the evidence and the person(s) who had custody of it from the time it is collected to the time it is destroyed or returned to the owner.

Clandestine Laboratories (clan labs) Laboratories set up to illegally synthesize controlled substances and their immediate precursors. The most common clan labs are those that synthesize methamphetamine, and by far the greatest number of clan labs in the nation are located in California.

CODIS Combined DNA Index System, an automated federal- and state-level database of DNA profiles from convicted offenders, forensic profiles from unsolved cases, and DNA profiles from missing persons.

Cold Hit A match between evidence information and information in a forensic database in a case where the perpetrator is unknown (suspectless case). In CODIS, a match between an evidence profile and the known profile of a convicted offender (case-to-offender hit) or a match between the DNA profiles of evidence in two different cases (case-to-case hit). In AFIS, a match between latent prints from a case and inked prints of a known person. In NIBIN, a match between an evidence bullet or cartridge casing and the digitized image of a bullet or casing test fired from a known weapon or a match between evidence bullets or casings from different cases (case-to-case hit).

"COLD HIT" Grant Program A grant program, administered by OCJP, that funds crime laboratories to profile DNA evidence in unsolved sexual assaults and homicides with a sexual component. The "COLD HIT" Grant Program began in October 2000 and will end in January 2005. Eligible cases must be within the statute of limitations and have occurred before July 2003.

Competency test A test, or series of tests, to demonstrate that an individual has the necessary knowledge and skills to perform casework in a specific discipline. ASCLD/LAB requires that competency tests (which may be practical, written and/or oral) be conducted and documented prior to assigning an individual to casework.

Computer Crime (see digital evidence)

Controlled Substance A drug, substance or immediate precursor listed in Schedules I through V of the California Health and Safety Code. Controlled substance analysts are primarily concerned with the analysis of drugs in their solid dosage forms, such as powders, tablets, and capsules.

Convicted Offender An individual convicted of one of the crimes eligible for inclusion in a DNA offender identification database. Various crimes are eligible, depending on the state; the national CODIS defers to the standards of each state in determining which offenders from that state are to be included.

Corrective Action Follow up measures taken by the laboratory whenever it has an indication of a problem that may affect the reliability of its casework. Corrective action may include additional training and proficiency testing of analysts, as well as review of additional casework that might have been affected by the problem. ASCLD/LAB accredited laboratories must document and report corrective actions they have taken to the accreditation board.

Crime Laboratory A laboratory that employs at least one full-time forensic scientist and that does work for law enforcement.

Crime Scene The location(s) where a crime has occurred and other location(s) related to the crime. Crime scenes may include homes, vehicles, or outdoor locations. In the case of a sexual assault or other violent crime, the victim's body is also processed for evidence that may lead to the perpetrator.

Crime Scene Investigation The process of examining the crime scene to locate, preserve and collect physical evidence that may provide a link between the offender and the crime or may help to reconstruct the sequence of events that occurred. Crime scenes are routinely photographed, diagrammed, and processed for latent prints and other physical evidence.

Crime Scene Investigator Crime scenes may be processed/investigated by police department technicians (sworn or non-sworn crime scene investigators) or by forensic scientists associated with a crime laboratory. Often, crime laboratory staff are called to the scene as an adjunct to the crime scene technician, especially when specialized evidence interpretation problems (e.g. blood stain patterns, bullet trajectories) are involved.

Crime Scene Vehicle Crime scene vehicles are typically vans, SUVs or modified trucks that contain portable evidence detection and collection equipment, cameras, materials for packaging evidence, and safety equipment such as self-contained breathing apparatus (SCBA), portable eye wash/showers, first aid supplies, and supplies for prevention of biological contamination. The vehicles typically have tools and equipment such as ladders, floodlights, measuring devices and alternate light sources that aid in crime scene processing.

Databank Profiling DNA profiling of samples collected from convicted offenders for inclusion in the CODIS databank. Because these known reference samples are not degraded, mixed or limited in amount (as evidence samples often are), they can be analyzed in a routine high-throughput manner, using robotics and other highly efficient procedures.

DEA Drug Enforcement Administration, a federal agency.

Digital Evidence Analysis The detection, recovery and preservation of digital information stored in various electronic media and devices such as personal computers, cell phones, pagers, personal digital assistants, and fax machines.

Discipline A specialty area within forensic science, such as forensic biology/DNA, latent fingerprints, controlled substances, firearms, trace evidence, etc.

DNA Equipment The instrumental analysis most commonly used for DNA profiling is called capillary electrophoresis. Other DNA equipment includes thermal cyclers (for conducting PCR) and computer equipment used for accessing the CODIS databank.

DNA-DQA1+PM DQ Alpha 1 plus Polymarker, a PCR-based DNA analysis system that preceded STR typing.

DNA-D1S80 A PCR-based DNA analysis system at the locus D1S80 that preceded STR typing.

DNA Mitochondrial (mt) Analysis of DNA taken from the mitochondria of the cell structure. This analysis is useful for highly degraded samples and is generally used when other methods are not available. Unlike the nuclear DNA used for STR typing, the mt DNA reflects only the type of the maternal lineage.

DNA Profile The combined results obtained from typing the DNA of a particular individual at a number of locations (loci). The DNA profile of an evidence item can be searched against the DNA profiles of convicted offender samples stored in CODIS to link evidence from a crime scene to a known person.

DNA-RFLP Restriction Fragment Length Polymorphism, the DNA analysis system that was the early standard in CODIS. RFLP has been replaced by PCR-based DNA typing methods.

DNA-STR Short Tandem Repeats, the PCR-based DNA analysis system that is the current standard for DNA profiles in the CODIS databank. The standard core CODIS DNA profile contains STR typing information from 13 different locations (loci) in the DNA and, on average, has a discrimination capability of one in one trillion.

Drug Analogue A substance that is closely related to a controlled substance in its molecular structure or pharmacological effect.

Drug Metabolite A substance that is produced when the body metabolizes (breaks down) a drug and that can be detected in tissues, blood or urine as evidence of ingestion of the parent drug.

DrugFire An automated database of images from fired cartridge casings; this system was originally developed by the FBI.

DUI Driving under the influence (of alcohol).

EPAS Evidential Portable Analysis System, a portable breath testing device that meets the standards of Title 17 of the California codes, in that the results are admissable as evidence in DUI cases.

Evidence Security Equipment/facilities (typically refrigerators, freezers, high density filing systems, alarm and surveillance systems) designed to protect and maintain the chain of custody and integrity of evidence within the laboratory.

Evidence Tracking A system, often using barcodes, for tracking evidence in casework from the time it is submitted to the laboratory to the time it leaves the laboratory. (Also see LIMS)

Explosives Evidence Explosive substances detected and identified from the chemical examination of both pre and post blast samples.

FBI Federal Bureau of Investigation

Fingerprints (See Inked Prints; Latent Prints)

Fire Debris Evidence collected from the scene of a suspected arson fire to be analyzed for the presence of arson accelerants.

Firearms Examination The examination of firearms and fired ammunition components (bullets and cartridge casings) to determine if the fired components were discharged in a particular firearm.

Forensic Biology – Conventional (Also called serology) The characterization and typing of biological samples through analysis of antigens, antibodies, enzymes and proteins. Biological evidence (blood, semen, etc.) is often screened by conventional testing prior to DNA typing. Conventional testing is much less discriminating than DNA.

Forensic Biology – DNA The typing of DNA in a sample at various locations (loci) to obtain a DNA profile. Evidence samples, for example from sexual assault cases, may contain a mixture of DNA from more than one individual and may be very small in quantity or badly degraded. DNA, as compared to forensic serology, is very specific to an individual.

FTIR (Fourier Transform Infrared Spectrophotometer) An analytical instrument that measures the interaction of a sample with infrared light and determines its chemical makeup for identification or comparison purposes. This instrument is often used for identification of controlled substances, as well as for examination of paints and fibers.

FTE (Full Time Equivalent) A measurement of staffing levels. If a laboratory has two halftime individuals working in an area, this is equivalent to one FTE.

GC (Gas Chromatograph) An analytical instrument that separates complex mixtures into their individual components. It is often used for blood alcohol analysis and can also be used for determining concentrations of controlled substances (quantitation or purity).

GC/MS (Gas Chromatograph/Mass Spectrometer) An analytical instrument that separates complex mixtures and determines the chemical makeup of a substance, allowing for the identification of controlled substances, accelerants used in arson cases, trace components in clandestinely manufactured drugs, and polymers in paint and fibers. GC/MS is often used to confirm the results of toxicology analyses.

Generalist A forensic scientist who practices in multiple forensic disciplines.

GSR/AA Gunshot residue analysis using atomic absorption (AA) to detect certain elements.

GSR/SEM Gunshot residue determination through the detection of characteristic discharge particles using a Scanning Electron Microscope (SEM).

Hit Rate The percentage of searches of evidence information that result in a match (hit) to information in an automated database. For DNA, the "hit rate" is the sum of instances where an evidence profile matches that of a convicted offender (case-to-offender hit) and instances where an evidence profile in one case matches that from another (case-to-case hit) divided by the total number of evidence profiles searched against the database.

IAI The International Association for Identification. The IAI certifies forensic professionals in the disciplines of fingerprints, crime scene processing, bloodstain pattern analysis, footwear examinations, forensic art, and forensic photography.

IBIS Integrated Ballistics Imaging System, an automated ballistics imaging data storage and retrieval system for both bullets and cartridge casings, which has now been absorbed by NIBIN.

Impression Evidence Shoe or tire impressions left at crime scenes. Impressions can be tied to the objects that made them, usually by examination of both tread design and wear characteristics.

Inked Prints Fingerprints collected from individuals upon arrest by inking the tips of the fingers (or palms) and depositing an impression of the fingers on a fingerprint card. This method of collecting known fingerprints is being replaced by live-scan technology.

Latent Prints Latent or hidden friction ridge impressions, usually of thumb or finger but also including palm and foot impressions.

Latent Prints – Comparisons The comparison of developed friction ridge evidence impressions to inked impressions of known individuals. If the latent prints are of sufficient quality, they can be conclusively identified as having been made by a particular individual.

Latent Print Development (Processing) The process of rendering a latent print visible or enhancing a partial latent print so that it is capable of being compared to inked prints. Latent print processing employs various powders, chemical treatments, digital imaging, laser examination, and other processes, often in a sequential fashion.

Latent Print Examiner A forensic professional who specializes in the processing and comparison of latent fingerprints. Some examiners are involved in the collection of latent prints from crime scenes; others focus on the in-laboratory development and comparison of latent prints.

Latent Prints – Field The processing and collection of latent prints at crime scenes.

LEAA Law Enforcement Assistance Agency, a federal agency that existed in the 1970s and that provided significant grant assistance to local law enforcement and crime laboratories.

LIMS Laboratory Information Management System. An automated system used to track cases, analytical results, and evidence as they flow through the laboratory. LIMS systems assist with the assignment of cases, case flow, and backlog control. LIMS can also generate and maintain the case reports and allow for statistical analysis of the types of cases, number of cases, turnaround times and other management data.

Live Scan A process for digitizing friction ridge pattern images directly from the hand and transmitting the digitized images to AFIS. Live scan eliminates the need for collecting inked prints.

Microscopes, Comparison A specialized microscope constructed of two microscopes bridged together to view two specimens or samples at the same time. Firearms comparison microscopes are used to compare evidence bullets or cartridge casings to determine if they were fired from the same weapon. Trace evidence comparison microscopes are used for the intercomparison of fibers, hairs, paint and other types of trace evidence.

Microscope, Compound The compound microscope is used to magnify samples up to 400X. This microscope is typically used for the examination of sexual assault evidence, glass particles, soil, hair, explosives and fibers.

Microscope, Polarizing The polarizing microscope is used for the examination and analysis of controlled substances, glass, soil, hairs, fibers, paint, and other trace evidence materials.

NCFS The National Center for Forensic Science

NFSTC National Forensic Science and Technology Center

NIBIN National Integrated Ballistics Information Network, an automated ballistics imaging data storage and retrieval system administered by BATF.

OCJP The Governor's Office of Criminal Justice Planning

Old and Obsolete Equipment Old equipment is defined as equipment that is much older than the state of the art but is still useable and serviceable, although its capabilities may be inferior to current equipment. Obsolete equipment may still be useable, but is not serviceable, is no longer supported by the manufacturer, and is significantly inferior to current equipment.

Part I Crime Part I crimes reported to the FBI Uniform Crime Report (UCR) are murder, forcible rape, robbery, aggravated assault, burglary, larceny, auto theft, and arson. The UCR Part I Crime Index is frequently used as a measure of the crime rate in a jurisdiction.

Paternity Determination The analysis of inherited characteristics (conventional genetic markers or DNA types) to determine parentage. Half of an individual's characteristics are inherited from each parent; if a child possesses a characteristic that could not be contributed by a putative parent, that person is excluded from parentage (in practice, to account for possible mutations, more than one exclusion is required).

PCR The polymerase chain reaction, a process for amplifying (making more copies of) specific segments (loci) of DNA. The advent of PCR has made it possible to type much smaller, older and more badly degraded DNA samples than could be typed by older methods such as RFLP.

POST The Commission on Peace Officers Standards and Training. POST sets training standards and certifies courses.

Professional Staff Forensic scientists and examiners who examine and analyze evidence, write reports, and testify as expert witnesses, including supervisors if they do casework.

QA (Quality Assurance) The activities an organization undertakes to ensure that users of its services can have confidence in the reliability of its work product.

QA Audit A periodic inspection of all aspects of the laboratory's quality assurance program. ASCLD-LAB requires that accredited laboratories conduct annual QA audits.

QA Manager The individual who oversees the laboratory quality assurance program and has the authority to take laboratory operations off-line whenever there is an indication of a problem affecting the reliability of the lab results. ASCLD-LAB requires that every accredited laboratory have a designated quality assurance manager.

Quality control Those processes the laboratory has in place to monitor its quality assurance procedures- for example, instrument maintenance and calibration logs, records of reagent quality checks, and use of positive and negative controls during analysis.

Questioned Document Examination The analysis of handwriting and printing, machine writing, papers and inks to determine the authenticity and authorship of documents.

Request The specific work a client agency asks to be done in a case. Requests are typically broken down by type of service involved- for example, a single homicide case may involve requests for forensic biology/DNA, firearms, and latent print work. Most laboratories count their workload by tallying the numbers of requests they receive for each type of service.

RFLP (See DNA–RFLP)

Services The various types of analysis (disciplines) offered by a laboratory.

SEM (Scanning Electron Microscope) A microscope that uses electron particles to view very small samples or areas of samples (at a magnification of up to 250,000X). This instrument is often equipped with an analyzer for determining the elemental composition of the sample or area on the sample.

Serology (See Forensic Biology – Conventional)

Specialist A forensic scientist who specializes in one forensic discipline.

STR (See DNA-STR)

SWG Scientific Working Group, responsible for developing national guidelines for quality assurance, training and education, and analysis procedures in a particular forensic discipline.

Substrate The background material on/in which an evidence sample has been deposited. For example, the carpet fibers are the substrate of a bloody footprint on the carpet.

Support Staff All individuals in the laboratory that are not directly involved in casework (examination and analysis of evidence, report writing and testimony). This includes technicians who clean glassware and prepare solutions, property controllers who manage evidence, clerical and administrative staff.

Testimony Equipment Graphic and plotting devices, projectors and other audio visual equipment used by forensic scientists to assist them in conveying their findings to the jury.

Toolmark Analysis The examination of evidence marks made by tools (such as pry bars, screwdrivers, pliers, etc.) to establish, through microscopic comparison with test marks made by tools of a known source, that the evidence marks were made by a particular tool. This work is often done by persons who are also firearms examiners.

Toxicology The detection and study of effects of drugs and poisons on the human body. Toxicologists analyze blood and urine samples and/or postmortem tissues to determine the presence and concentration of drugs and their metabolites.

Trace Evidence The analysis and comparison of trace quantities of evidence such as hairs, fibers, paint, glass, soil, building materials and flammable substances.

Turnaround Time The time, in calendar days, between when a request is received in the laboratory and the report has been completed.

TWG Technical Working Group (See SWG)

UV (Ultraviolet Light Spectrophotometer) An analytical instrument that utilizes the UV spectrum of light to classify and quantitate unknown substances, most commonly used for controlled substance and toxicology analysis.

Workload A measure of the work performed by a laboratory, most commonly tracked by the number of requests completed in each service category.