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

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	Survey Reported Tests: 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**

Service Category	OTHER STATES			CALIFORNIA	
	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.