



REPORT ON SCIENTIFIC PERFORMANCE AUDIT OF DFSS HQ AND ITS CFSLs

With Recommendations on Reforms to meet the Mandate

Presented to
Directorate of Forensic Science Services
Ministry of Home Affairs
Government of India
New Delhi

October 2011

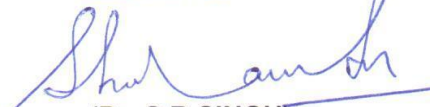
**REPORT ON
SCIENTIFIC PERFORMANCE AUDIT OF
DFSS HQ AND ITS CFSLs**

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October 2011

PREFACE

Scientific performance audit of any scientific organization is primarily an objective appraisal, to be provided for management, control, and governance, by evaluating their effectiveness in achieving the organization's mandate, compliance with the applicable laws and regulations, and stated as well as the implied expectations of the user agencies. With this in view, MHA constituted a Scientific Performance Audit Committee (SPAC) comprising retired forensic scientists, having rich experience in the field of forensic science services in the country.

The SPAC studied the functions and constituents of the forensic science activities being pursued at the three CFSLs of DFSS at Chandigarh (including Shimla), Hyderabad, and Kolkata, looked into their laboratories, documents, and case files, and assessed the adequacies of their capabilities relevant to all the dimensions of different forensic disciplines. Based on the gaps observed between the 'expected' and the 'actual', the reasons thereof were identified and remedial measures were included in the recommendations for restructuring the existing CFSLs and structuring the upcoming CFSLs. The new structure of the DFSS HQ and CFSLs has been proposed with an aim to make them world-class institutions, which can provide quality, timely, and credible forensic support to the homeland security during national exigencies and natural calamities.

The proposed steps are based on the premise that the forensic science service should not be taken as a typical run-of-the mill Government job; it should rather be handled as a "missionary zeal" and hence should be treated by the Government accordingly. Apart from restructuring the CFSLs, the Government must strive to achieve high employee satisfaction by encouraging emerging ideas and innovation so that they feel proud to be a part of the organization and willingly endeavour to fulfil their social responsibilities.

Members of the SPAC thank MHA and DFSS for giving them an opportunity to serve the Indian forensics again, and hope that the recommendations contained herein are accepted in totality and implemented expeditiously.

(Dr. R K Tewari)
Chairman SPAC

ACKNOWLEDGEMENTS

The SPA Committee is happy to thankfully acknowledge the cooperation and assistance from:

- ❖ *Ministry of Home Affairs, Government of India, New Delhi*
- ❖ *Dr. V.K. Kashyap (Director DFSS) and staff at the DFSS Headquarters*
- ❖ *Dr. S.K. Shukla (Director) and staff at CFSL Chandigarh/Shimla*
- ❖ *Directors and staff at CFSLs Hyderabad and Kolkata*
- ❖ *Sh. Manish Kumar, Research Associate at CFSL Chandigarh*

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LIST OF ABBREVIATIONS

CBI	:	Central Bureau of Investigation
CFSL	:	Central Forensic Science Laboratory
DFSS	:	Directorate of Forensic Science Services
FCS	:	Flexible Complementing Scheme
FIG	:	Forensic Improvement Grant
FRDA	:	Forensic Service Regulatory and Development Authority
FSAC	:	Forensic Science Advisory Council
FSL	:	Forensic Science Laboratory
GoI	:	Government of India
HRD	:	Human Resource Development
MHA	:	Ministry of Home Affairs
NABL	:	National Accreditation Board for Testing and Calibration Laboratories
NatGrid	:	National Intelligence Grid
NFA	:	National Forensic Academy
NIA	:	National Investigation Agency
NICFS	:	National Institute of Criminology and Forensic Science
PR	:	Public Relations
QMS	:	Quality Management System
RELIEF	:	Reserve List of Experienced Forensic Scientists
RO	:	Reporting Officer
RRFT	:	Rapid Response Forensic Team
RTI	:	Right to Information
SFSL	:	State Forensic Science Laboratories
SOC	:	Scene of Crime
SPAC	:	Scientific Performance Audit Committee
UT	:	Union Territory

EXECUTIVE SUMMARY

The Directorate of Forensic Science Services, Ministry of Home Affairs, Govt. of India, New Delhi vide their O. M. No. 18(5)/2011-CRC dated 19.05.2011 formed a Committee to conduct Scientific Performance Audit of the existing three CFSLs located at Chandigarh/Shimla, Hyderabad, Kolkata, and of the DFSS Headquarters, New Delhi. The Terms of Reference of the Committee were as follows:

1. The Terms of Reference

- i) To inspect and conduct Technical Performance Audit of issues based on evidence material received and examined on annual basis in each discipline of CFSLs.
- ii) To assess the capacity in providing Forensic Science Services in each discipline and its utilization.
- iii) To review existing technological capabilities, their relevance in forensic examination in different disciplines and its adequacy in examination of evidence material in the area of emerging various disciplines of Forensic Science.
- iv) To suggest work norms based upon single scientist unit in different disciplines of Forensic Science.
- v) To advise capacity and capability essential and expected from the Hi-tech Labs and the existing CFSLs and organizational structure.
- vi) To work out optimal number of Scientific, Technical and Ministerial manpower essential in CFSLs and Directorate of Forensic Science Services HQ to transform them as world class institutions.
- vii) To provide any other suggestion essential for re-engineering of the DFSS HQ and CFSLs as state-of-the-art Forensic Service Institutions.

2. The Scientific Performance Audit The Scientific Performance Audit Committee (SPAC) had several meetings and briefings by the Director DFSS on the MHA's expectations, followed by request on data proforma, two-level visits to the CFSLs, and interviews and interactions.

The SPAC studied the capacities and capabilities of the existing CFSLs of DFSS and the DFSS HQ, identified the gaps therein, and recommended appropriate measures for re-engineering them to fulfil the new DFSS vision, "**Render high quality, on time, and credible forensic services to justice delivery system**", to bring the forensic activities in the country at par with the world-class forensic laboratories, and provide infallible evidential support to the criminal justice system and homeland security of the country. The major recommendations contained in the SPAC Report are summed up as follows:

3. Meeting the New Mandate Observations

The SPAC observed that the existing mandates of the DFSS HQ/CFSLs are unable to cater for the newly emerging crime scenario of the country and there is an urgent need

of providing forensic support to the homeland security, national disasters/exigencies and the National Investigating Agency (NIA) at a very short notice.

Recommendations

Accordingly, the revised mandates of DFSS, the major R&D activities, and the jurisdiction of all the CFSLs (3 existing and 3 new being established have been proposed. The SPAC proposes that another CFSL be established in the national capital region of Delhi to provide all the forensic services to national exigencies and NIA. This CFSL will also serve as a on-the-job practical training laboratory to the scientists undergoing training at NFA, Delhi. Alternatively, the CFSL/CBI (MHA) be brought under the folds of DFSS and suitably expanded to meet the requirements of CBI, NIA, and practical training to forensic scientists. All the seven CFSLs (3 existing, 3 being established at Pune, Guwahati and Bhopal, and 1 SPAC-proposed at Delhi) are to be christened as CFSLs and hence they should have same role/mandate. Each CFSL would carry out R&D work in all the disciplines and each of these laboratories under their defined geographical jurisdiction would also act as lead laboratories for the respective States. However, the major Mission-Mode R&D projects in the specific thrust area would be undertaken only in a specified laboratory. Every CFSL should maintain a Rapid Response Forensic Team (RRFT) for quickly reacting to the MHA's requests for Scene of Crime visits.

4. Scientific Performance of CFSLs Observations

All the CFSLs fall short of credibility in their scientific performance, matching the world class forensic science laboratories, even though NABL-linked quality assurance programmes are in place. There is no uniformity in the maintenance of case records, chain of custody of the evidence materials, and documenting the Forensic Reports in CFSLs. The pendency of cases at CFSLs is rather high and many of the final reports/opinions were found to be inconclusive. The CFSL scientists are deputed for scene of crime (SOC) visits, for which ad-hoc arrangements are made by pooling scientists from different labs. Such arrangements are unable to meet the demands of "urgency" required during national disasters/exigencies. Database of forensic indices, essential for evidence material examination and evaluation of SOC, are not generated. When India is to have their role in world's peace and security scenario, its forensic support services need to be updated to meet the international standards.

Recommendations

Uniform pattern in the maintenance of evidence materials in respect of their purity, integrity, relevancy, and chain of custody and of case records be evolved and practised in all the seven CFSLs. Appropriate administrative and scientific measures, such as work-norms revision and increasing the manpower are essential to reduce the pendency, assure the timeliness (maximum of 4 weeks), credibility of case examination, and high level of the client's satisfaction. This requires changes in the work culture in the organization by creating positive attitude among the CFSL scientists and by disciplining the non-performers. Scientists up to the level next below the Director should examine evidence material themselves, rather than merely supervising it.

Inconclusiveness of Expert Opinion can be reduced by proper upkeep of evidence material, strictly adhering to the SOPs for all the laboratory tests, and thorough review

by seniors in different disciplines. Inconclusive opinions can also be reduced by augmenting the trained manpower resulting in reduction of waiting time before conducting the examination, thus avoiding the degeneration of exhibits.

The forensic report emanating from the CFSLs should be self-speaking, demonstrative and precise and should not only answer the questions asked by the forwarding agencies, but should also contain answers on the implied queries, which may provide leads to the IO for further investigation, or help the judiciary in justice delivery. Scientific reasons for arriving at the specific conclusions/opinions should also be given in the report. This requires formulation of detailed policy for recording observations, deductions, interpretations, and report framing.

The SPAC recommends formation of Rapid Response Forensic Teams (RRFT) in each CFSL and appropriate statutory legal measures for mandatory forensic presence at the Scene of Crime (SOC) in heinous crimes.

The newly recruited scientists need to be fully trained on rendering court testimony and every court experience should be shared with the colleagues in the Division.

R&D projects should be so chosen that their final outcome helps in either speeding up the laboratory examination or encompass exhibits on which conclusive opinion was hitherto not possible by employing the prevailing forensic techniques. More professionalism should be infused into the system of sanctioning the R&D projects, fund-release, mid-course corrections, oversight review and assured deliverables. There are ample models at national research funding agencies like DST, DBT, CSIR, ICMR, etc. DFSS HQ should constitute Project Advisory & Review Committees (PARC) for every project to periodically monitor and review their progress and suggest mid-term corrections, if any. The minutes of such bi-annual meetings should be critically reviewed at the DFSS HQ, and remedial actions, if suggested, be immediately taken.

CFSL Scientists should be motivated to publish their research papers in Peer-reviewed journals of international repute. A mechanism should be evolved to disseminate the findings of every research publication within the CFSL, and, also to other FSLs/CFSLs as well. DFSS should periodically make the CFSL scientists aware about IPR and Patents.

Every operational Division of CFSLs should create preventive and lead-giving forensic indices database and update them for sharing with agencies (like NIA) through homeland security linked networks (such as NATGRID).

Proficiency Certification of scientists (and three-yearly re-certification) should be made mandatory to ensure that they keep themselves abreast with the latest development in their respective fields. There should be a written/oral test at the end of each training course. A policy decision is to be taken on HRD Programmes for the University students while ensuring that the core-scientific performance of the CFSLs does not suffer.

Adequate space, infrastructure, and facilities, including e-accessibility to DFSS HQ/National Forensic Library/National Forensic Academy (NFA), should be made available for the technical libraries of CFSLs. Library should be manned by qualified Librarians and exclusive budget Head for "Technical Library" should be instituted. Priority should be for procuring scientific journals, books, monographs etc.

Although the NABL quality assurance program is in place in all the CFSLs, there is an urgent need for periodic review of quality system management, up gradation of SOPs, development and execution of proficiency testing (PT) programmes, and validation of developed methods/techniques before use.

Forensic Service Users' Feedback Form should accompany the laboratory report for obtaining feedback from service-seekers. CFSLs must try to get a copy of the judgment in every case wherein lab report has been taken on their file.

There should be a policy decision at DFSS HQ and action at CFSLs to withdraw all the obsolete equipment, irrespective of their cost and serviceability. Such equipment may officially be gifted or auctioned to save laboratory space. Similarly, the annual drill of physical verification of the Division's inventory and a 7-year-withdrawal-replacement cycle for equipment should be initiated, to ensure that the CFSLs are equipped with state-of-the-art facilities.

The Document Division of CFSL Chandigarh at Shimla should be immediately relocated to Chandigarh. The accommodation at Shimla may be retained and used as part of the training arm of DFSS. Designations such as GEQD, Dy. GEQD, AGEQD, and ACIO etc should be appropriately replaced to enable implementation of FCS in **their** career progression. DFSS may highlight to the Government, the importance of taking the experts/scientists of FSLs for core contribution and value addition to various Committees engaged in sensitive and hi-tech activities of national importance, such as security documents, travel documents, WMD, etc.

5. Technological Capacity/Capability of CFSLs

Observations

A large number of equipment procured by the CFSLs has remained grossly underutilized. All the three operational CFSLs are equipped with adequate tools and technologies. However, their Standard Operating Procedures (SOPs) prepared more than a decade ago have not been updated with standard validated techniques. The certified reference materials (CRMs) are available only in some of the Divisions of CFSLs. Quality assured critical chemicals are not available in most of the Divisions. In most of the cases, the reports on viscera samples analysis remain vague/ inconclusive. The standard international procedures of representative sampling in voluminous evidence materials are not followed in some of the Divisions. Calibrations of measuring tools are regularly carried out in most of the CFSLs through NPL or NABL accredited commercial institutions.

Recommendations

The existing methods for testing evidence materials need immediate review and uniform test methods (SOPs) should be adopted for in all FSLs. Limit of detection (LOD), limit of quantification (LOQ), and uncertainty of measurements (UOM) are to be reflected in all the SOPs, in which quantitative measurement of the evidence material becomes important. Every CFSL must, have a policy and action plan for procurement of CRMs and certified purity of critical chemicals. A mini set up [similar to NIST (USA)] should be created to ensure regular supply of all relevant standard materials required for the forensic analysis.

The exhibits received at CFSLs for toxicological analysis should be stored at 4°C temperature to avoid further decay; a facility is to be created in all the CFSLs. The lab examination of viscera samples should be taken up on priority to avoid degradation. The forensic report should contain the names or classes of poisons screened for in the analysis, rather than saying that no common poison has been detected, as is generally the case in most of the reports. This will make the forensic report more meaningful.

The internationally accepted standard statistical sampling methods need to be followed in crime cases comprising large number of samples and should be recorded in the file and mentioned in the opinion. Profiling of each sample with quantities more than “small quantity” (vide NDPS Act) is needed for source identification and intelligence throughput to understand the trafficking pattern, and also for creating data bank. This will also help in controlling drug abuse problems, and in planning health services for the treatment of drug addicts.

Effectiveness and validity of new technologies are to be studied in the Indian context before procurement. It is recommended that a “Need-identification Committee” be formed at DFSS HQ to scrutinise the procurement process rather than solely depending on the indenters. Adequate advanced planning by scientists to be done to identify their requirements of equipment, materials and manpower to ensure their proper utilization. All the CFSLs have to ensure that the equipment remain functional and are fully utilized in evidence material analysis work. The Log Book of each instrument must have case reference details for their utilization in evidence material examination.

SPAC has examined the capability and capacity of the existing technologies/methods to render forensic service as per the mandate of CFSLs of DFSS. Limitations have also been recognized. Alternative ways and means have been suggested to address such deficiencies. Security of the forensic data collected and stored on computers should be ensured to avoid manipulations by the unscrupulous elements. The validated software employed in forensic analysis should regularly be “re-validated” by periodically ascertaining their performance integrity through simulation studies.

Creation of video conferencing facility in consultation with judicial authority should be considered to save the valuable analytical time of the experts and the travel expenditure.

6. Standards on Work Norms for Evidence Material Analysis

Observations

The SPAC found that the existing system of “multiple-scientists-unit” based work norms has many limitations and cannot sustain in the changed scenario in view of fragmented unit and other lab deficiencies. This has resulted in lame excuses from the non-performers and increased unaccountability.

Recommendations

With the implementation of FCS for promotion, single-scientist-based-unit work-norms with full technical support and a provision of adequate supervision have been evolved. The proposed system of work-norms considers the time spent by individual scientist in scene of crime (SOC) visits, court testimony, R&D, database generation, supervision of

case analysis, etc. The services of technical personnel are proposed to be pooled together for optimum utilization of their technical skills. All the mundane activities need to be taken away from the scientists up to the Scientists-D level and be centrally handled by the Division in-charge.

The concept of “normalised case” has been introduced by the SPAC for qualitative and quantitative evaluation of scientific work performance of the individuals. The facility-wise work-norms for each of the forensic services to be carried out by single-scientist work-unit have been proposed and the scope of work has been identified. Timeliness and quality have been put as basic yardstick in the proposed work-norms with the assumption that the system functions with optimal efficiency and fosters appropriate scientific culture in the organization.

7. New Structure of CFSLs

Observations and Recommendations

The new mandate of CFSLs requires complete re-structuring of CFSLs to effectively meet the country’s forensic demands in the prevailing national as well as global scenario. The existing three CFSLs, the upcoming three and the herein-SPAC-proposed one for Delhi will all fall in the same line. To meet the enlarged and focussed mandate, the re-engineering of CFSLs have been proposed for modification of certain existing operational units of analytical techniques, de novo creation of high-tech analytical processes, and creation of data bases of forensic indices. The following broad categories of expertise for reactive and preventive forensics are to be created at each of the CFSLs.

- ***Terrorism and Counter-terrorism***
- ***Weapons of Mass Destruction***
- ***Smuggling/Contraband Products***
- ***Computer Crimes***
- ***Counterfeit, Explosion***
- ***Fire and Arson, Mass Disasters***
- ***Identification of Mutilated Dead Bodies and Missing Persons,***
- ***Restoration of Kinship***

Specially designed vehicle is to be stationed in the Business Area for Rapid response Forensic Team for crime scene management and collection of evidence materials in an efficient manner.

The SPAC recommends that Scientific Performance Audits should be conducted for all the CFSLs, once in every three years, in view of the ever-changing scenario of technological inputs in perpetrating crime and increased sophistication in the availability of global forensic science and technology for evidence analysis. This would ensure appropriate and timely remedial actions that may become imperative.

Similar exercise should also be conducted for all State FSLs who are beneficiaries of Central Funds through Police Modernization Grant of Union Home Ministry. Through

such audits, these laboratories will also get an opportunity for introspection of their work procedures and take appropriate remedial actions, wherever required.

Directors of CFSLs should be armed with financial powers at par with the Directors of other scientific laboratories of the Departments under Govt. of India.

8. Re-Engineering of DFSS Headquarters

Observations

Presently the DFSS HQ has no organizational structure whatsoever to handle all their activities nor has proper accommodation for their HQ. Most of the work is handled in an un-structured manner by the two scientists and a set of totally inadequate administrative staff. Apart from the grossly inadequate scientific manpower available (only two) at the DFSS HQ, it is suffering from inappropriate infrastructure, enablement, library facility, and other logistic supports required for efficient functioning of a headquarters of an important scientific organization, from where the national policies are evolved and monitored. Most of the time the two scientists of DFSS HQ remain busy only with the fire-fighting activities, which results in many routine, but important issues remain pending due to lack of manpower. Many a times such delays percolate to its outlying units, viz. the CFSLs and adversely affect their efficiency. The role of DFSS HQ would further enhance manifold after the “*Forensic Act (2011)*” is passed in the Parliament and implemented. This Act includes activities like Proficiency Testing and certification of Forensic Professionals, regulating the Private Forensic Labs, framing of National Standards, and Creation of Forensic Database, which have to be handled by DFSS HQ. The technology in perpetrating crimes is getting increasingly sophisticated, and hence DFSS HQ has to evolve comprehensive skill development policies and programmes for continuously updating the knowledge-base of the existing scientists, police investigators, and members of the judiciary.

Recommendations

The SPAC recommends that DFSS should function as the apex body for the development of forensic science in the country. The organizational structure of the DFSS HQ, in terms of scientific manpower, and the supporting infrastructure should be such that it can handle the desired mandate of evolving policies for forensic science at the national level, planning the *modus operandi* of their execution, coordination and supervision of the forensic science activities of the CFSLs, handholding of 28 State/UT FSLs, and liaison with the Planning Commission, MHA, Investigating Agencies (Central, UT, as well as State), Police, Judiciary, NABL, and other Scientific Institutions. DFSS HQ has also to provide scientific help to other countries (e.g. they have helped Bhutan, Maldives, Seychelles, and Vietnam in establishing their forensic science laboratories). The inadequacies cited in the report results in compromising the quality, quantity, as well as the timeliness of the scientific output and adversely affect the process of continuous improvements, an essential component of Total Quality Management (TQM). It should act as the central coordinating body for all the states in the areas of forensic science providing services to homeland security, and its contents and structure should be self-contained, involving multifarious skills, and wide range of specializations.

The Committee recommends that the Directorate of Forensic Science Services (DFSS) be upgraded to the level of a separate department under the MHA to evolve and implement proactive and reactive forensic policies for Homeland Security and National Calamities to provide high quality and timely services with international credibility.

This Department should be headed by a Secretary level Scientist (designated as Director General), as prevalent in the major scientific organisation like DRDO, ISRO, CSIR, DBT, ICMR etc.

The scientific posts of DFSS HQ would form a common cadre with those of the CFSL's scientific posts and would be eligible for promotion under the Flexible Complementing Scheme (FCS). The existing post of Senior Scientific Officer Grade I (Forensic Science) at the DFSS HQ is recommended to be upgraded.

The SPAC considers that a floor area of approximately 50,000 sq. feet should be adequate to meet their scientific, technical, and office accommodation requirements.

The new organizational structure of DFSS HQ has been proposed to effectively meet its mandate. The manpower of the DFSS HQ has been computed by the committee. DFSS HQ should be staffed by 150 personnel comprising 35 scientists and a supporting group consisting of 61 administrative staff, but excluding Data Entry Operators, Multi-task Staff, and Car Drivers which are to be outsourced.

9. Human Resource

Observations & Recommendations

Scientific Manpower Requirement in CFSLs

The Committee has computed the requirement of scientific and technical manpower on the basis of preparedness for handling 500/600 cases by each Group in each of the CFSLs with the new work norms. This would involve approximately 1000-1200 'normalized cases' to be annually examined. A total of 117 scientists and 58 technical personnel have been proposed for each of the CFSLs and thus a total of 819 scientists and 406 technical personnel are required for seven CFSLs.

Career Progression of Scientific Manpower

The Government of India has already sanctioned Flexible Complementing Scheme (FCS) of promotion to Group-A level of scientists in the DFSS HQ and its outlying units. As the FCS, in the present form, has been approved for promotions upto the Scientist-F level, the scheme would cover the existing levels of Senior Scientific Officer (to be re-christened as Scientist-B) to Director (to be re-christened as Scientist-E).

Career Progression of Technical Manpower

The FCS approved by the Govt. of India for Group-A level of scientists in the DFSS HQ and its outlying units, does not cover the existing technical personnel (Laboratory Assistants to JSOs) employed at the CFSLs. SPAC, therefore, recommends that the technical posts be brought under "Limited Flexible Complementing Scheme" of

promotion, on the pattern of DRDO Technical Cadre (DRTC), the rules for which should accordingly be framed expeditiously. To bring uniformity, the new nomenclature for the technical cadre of DFSS should also be changed.

The existing SSAs/JSOs, having Masters degree in any branch of science (i.e. fulfilling the essential qualification criterion for the direct recruitment for the post of Scientist-B), would be considered for selection to the post of Scientist-B without any age-bar. They should also be considered for upgradation to the post of Scientist-B through a *Limited Departmental Examination* followed by interviews, for which a policy is to be evolved on the pattern of DRDO.

Once the above schemes are in place, the technical cadre posts would be filled up only at the Technical Assistant-A level, for which the essential qualification would only be Bachelors Degree in Science with Diploma in Lab Technology or Diploma in Engineering. However, such freshly recruited Technical Assistants should compulsorily undergo 3-months induction training at NFA (LNJN NICFS) to make them suitable for the forensic laboratory work.

Administrative Manpower Requirements in Each CFSL

A total of 66 administrative personnel have been proposed for each of the CFSLs and thus a total of 462 administrative staff is required for seven CFSLs. The service of DEO, MTS, and Car Drivers should be outsourced to the extent possible.

Career Progression of Administrative Manpower

The administrative cadre of DFSS should be merged with that of the MHA to provide an equal opportunity to them in their career progression. Such a merger would increase the level of satisfaction among the administrative cadre of DFSS and increase their operational efficiency.

Total Manpower Requirement in the Organization

A total number of 854 scientific posts (from Secretary to Scientists- B) are required for manning the DFSS HQ and 7 CFSLs, and the total number of 409 supporting technical staff (spread over various ranks) is required in all the 7 CFSLs and DFSS HQ. Similarly, 317 administrative manpower and 327 outsourced personnel (DEO/MTS/Drivers) for the DFSS HQ and its outlying laboratories would be essential. Housekeeping, horticulture, security, and transport related jobs should preferably be outsourced. Fresh recruitment of MTS (Multi Task Staff) should be dispensed with in future.

The present sanctioned strength of scientific and ministerial posts of various categories in CFSL and DFSS HQ is 422. This comprises 104 scientific posts of group 'A' category (from Sr. Scientific Officer Grade II to the rank of Chief Forensic Scientist), 106 technical staff (from the rank of Gazetted Gr. 'B' (33 JSOs), and 73 non-Gazetted Group - B, -C & -D), and 212 administrative manpower (comprising 8 Gazetted and 204 ministerial staff) staff. SPAC recommends that additional posts for different categories of staff may accordingly be created. This would involve an annual expenditure of Rs. 125 Crores (approx.).

Formation of Central Forensic Science Service

The SPAC recommends that a cadre of organized service called 'Central Forensic Science Service' be created for all forensic scientists working in the CFSLs, including CFSL (CBI), forensic wing of NPA, and the proposed NFA (LNJP NICFS). The SPAC is fully convinced that constitution of this service will create synergy, preserve and strengthen the scientific culture in these institutions.

Utilization of Seasoned Forensic Scientists Resource

The SPAC recommends that the services of retired forensic scientists of proven professional credibility could be harnessed in the case examination work to reduce pendency, for participation in major R&D projects, in imparting skill development programmes, and for SOC visits during forensic exigencies. This is in conformity with the recommendations contained in the Perspective Plan for Indian Forensics (2010), wherein the concept of Reserve List of Experienced Forensic Scientists (RELIEF) has been suggested.

1.1 The Directorate of Forensic Science Services, Ministry of Home Affairs, Govt. of India, New Delhi vide their O. M. No. 18(5)/2011-CRC dated 19.05.2011 formed a Committee to conduct Scientific Performance Audit (SPA) of the existing three CFSLs located at Chandigarh/Shimla, Hyderabad, Kolkata, and of the DFSS Headquarters, New Delhi in pursuance of the Recommendations Nos. 3(ii) & 4 (i) to (ix) of the **Perspective Plan for Indian Forensics (2010)**, as given at Appendix-A. The SPA Committee comprised the following:

1. Dr. R. K. Tewari - Chairman
Former Chief Forensic Scientist
BPR&D, New Delhi
2. Dr. C. Damodaran - Member
Former Director
FSD, Chennai, Tamil Nadu
3. Dr. R.S. Verma - Member
Former Director
CFSL, Chandigarh
4. Sh. A.K. Gupta - Member
Former Director
FSL, Delhi.
5. Dr. S.R. Singh - Member
Former Director
CFSL, CBI, New Delhi

1.2 The Terms of Reference of the Committee were as follows:

- viii) To inspect and conduct Technical Performance Audit of issues based on evidence material received and examined on annual basis in each discipline of CFSLs.
- ix) To assess the capacity in providing Forensic Science Services in each discipline and its utilization.
- x) To review existing technological capabilities, their relevance in forensic examination in different disciplines and its adequacy in examination of evidence material in the area of emerging various disciplines of Forensic Science.
- xi) To suggest work norms based upon single scientist unit in different disciplines of Forensic Science.
- xii) To advise capacity and capability essential and expected from the Hi-tech Labs and the existing CFSLs and organizational structure.
- xiii) To work out optimal number of Scientific, Technical and Ministerial manpower essential in CFSLs and Directorate of Forensic Science Services HQ to transform them as world class institutions.

- xiv) To provide any other suggestion essential for re-engineering of the DFSS and CFSLs as state-of-the-art Forensic Service Institutions.

The Committee had its first meeting at DFSS HQ New Delhi on June 1, 2011 and followed it up by data proforma, request communications, two-level visits to the CFSLs, and interviews and interactions. The Committee was also briefed by the Director DFSS on the MHA's expectations from this report. The consolidated findings and recommendations of the SPA Committee are presented in the subsequent Chapters. Based on the changed mandate of the DFSS HQ and CFSLs, the SPAC evolved new Vision and Mission Statements as given further.

1.3 VISION STATEMENT OF DFSS

Render high quality, on time, and credible forensic services to justice delivery system

1.4 MISSION STATEMENT OF DFSS

Missions are time bound priority activities to be undertaken by the department. Mission will be adopted by the organization from time to time as per the prevailing situation

1.5 MANDATE OF DFSS

The Article 246 read with the entry 65(c) of the Union List in the Seventh Schedule of the Indian Constitution vests the Parliament with the exclusive powers to make laws with respect to Union agencies and institutions for scientific or technical assistance in the investigation or detection of crime. As the power of the Union Government is co-extensive with the power of Parliament, appropriate action should be taken to improve the effectiveness of forensic science in the country. Therefore, the role to be played by the DFSS, as the apex body in the field of forensic science in the country, would be to evolve appropriate policies for forensic science for effective homeland security and national exigencies, plan the *modus operandi* of their execution, coordinate and supervise the forensic science activities of the Central/ State/UT FSLs as well as to liaise with various quarters including MHA, Investigating Agencies (Central, UT, as well as State), Police, Judiciary etc. With this in view, the mandate of DFSS HQ must be as follows:

- i) To formulate plans, policies, and legislations to promote and regulate quality, capacity, and capability building for forensic services in the country.
- ii) To facilitate high quality, on time and credible forensic services to the Homeland Security and Justice Delivery System.
- iii) To encourage Research & Development activities for innovation of technologies to strengthen forensic services by instituting financial assistance and fellowship schemes for intra-mural and extra-mural R&D and other incentive programmes.
- iv) To establish linkages with the national and international scientific and forensic institutions and universities for cooperation, transfer of

technical know-how and technology, skill development, exchange of scientific personnel, and sharing of information.

- v) To disseminate knowledge on forensic services to the stake-holders by supporting/organizing training, awareness programmes, symposia, seminars, hands-on workshops and national/international conferences.
- vi) To promote concept of Quality Assurance and Quality Control in forensic services.
- vii) To advise Central and State Governments in forensic matters and extend forensic assistance to manage national disasters/calamities.
- viii) To develop National Forensic Information Grid (NAT-FORENS-GRID) including databases on various forensic indices to control recidivism and strengthening Homeland Security.
- ix) To promote the concept of Quality Assurance and Quality Control in forensic services.

1.6 ERSTWHILE MANDATE FOR THE CFSLs

MHA vide their OM No. CFIs/S&T/CFSL/4/86/Vol-II/GPA-II dated April 16, 1998 (copy at Appendix-B) re-defined the role of all the three CFSLs under BPR&D to enable each laboratory to mainly focus on R&D activities and specialized training in one of the broad areas of forensic science viz. Forensic Biological Sciences, Forensic Physical Sciences, and Forensic Chemical Sciences to be handled by CFSL Kolkata, CFSL Chandigarh and CFSL Hyderabad respectively. It was decided that each CFSL would be developed as the 'Center of Excellence' in the designated field. Besides focusing on their core activities, it was also decided that each laboratory will continue to carry out the routine forensic analysis of crime cases in all the disciplines of Forensic Science received from Central Govt., State Governments and the Union Territories, and act as referral centers for handling special cases.

Based on the above OM from MHA, the DG BPR&D issued Office Order No. CFIs/S&T/CFSL/4/86/Vol. II dated December 29, 1998 (copy at Appendix-C) stating that the predominant role of the CFSLs would be to undertake R&D activities to develop new forensic techniques, adopt the latest development in basis sciences for forensic analysis, and disseminate this information to the other Central/State FSLs. In addition, the CFSLs would also carry out the forensic analysis of crime cases restricted to the following cases:

- 1) All the Central Government cases
- 2) Cases from the States, which do not have any forensic setup
- 3) Cases referred by the Courts of Law
- 4) Highly sophisticated cases referred by the State FSLs for which no expertise exists with them. However, the routine cases of SFSLs would not be entertained by the CFSLs
- 5) Cases referred by the neighbouring countries

The above mandate to the CFSLs has been continuing till now. In the meantime, the MHA appointed two Consultants to evolve '*Perspective Plan*

for Indian Forensics (2010) to be implemented in the forensic science set up of the country. As per this report, the role of CFSLs was defined as follows:

- i) To provide Forensic Science Services in the emerging areas (not available in the FSLs of their jurisdiction) to Central, UT & State investigating agencies.
- ii) To innovate technologies and create new scientific knowledge for betterment of S&T application in justice delivery system.
- iii) To develop databases of various forensic indices.
- iv) Validation of new technologies and their sharing with colleagues and transfer to other Forensic Science Laboratories of the country.
- v) To organize in-house Skill Development Programmes including Weekly Group Discussions, Monthly Journal Club Meetings.
- vi) To develop linkages with related important scientific institutions and State FSLs of their jurisdiction.
- vii) To assist DFSS in regulation of Quality Management System (QMS) and development of Forensic Science Agencies in the jurisdictional States.
- viii) To provide necessary rapid assistance in management of disaster and crime scene.
- ix) To act as a referral CFSL for evidence material already analyzed in other FSLs and State FSLs.

Subsequently, as per a Plan Project, in addition to the three existing CFSLs under the fold of DFSS, creation of three more Hi-tech CFSLs have been sanctioned by the Government and are in the process of being established at Bhopal, Guwahati, and Pune. *The SPA Committee is fully convinced that either the CFSL (CBI) is brought under the folds of DFSS, or another CFSL at Delhi be established to exclusively handle the forensic cases emanating from the National Investigation Agency.* Presence of a DFSS CFSL at Delhi would help in formation of Rapid Response Forensic Team (RRFT) and its quick deployment at very short notice. This would also serve as a laboratory for on-the-job practical training to the scientists undergoing training courses at National Forensic Academy (NICFS) Delhi. *The SPA Committee recommends that all these seven laboratories be christened as CFSLs only, as all of them have to be hi-tech laboratories, providing state-of-the-art forensic service facilities to the users. It is, therefore, recommended that their role as well as their new mandate should also be the same, as detailed below.*

1.7 THE PROPOSED MANDATE FOR THE CFSLs

With an aim to provide forensic science support to the Homeland Security during national exigencies, including natural calamities, the proposed mandate for the seven CFSLs is detailed below:

- i) To provide forensic science services to Homeland Security, to Justice Delivery System and, to the States in emerging areas, on mutual agreeable condition.

- ii) To carry out R&D for innovation of technologies and create new scientific knowledge for achieving excellence of S&T applications in Justice Delivery System.
- iii) To develop databases of various forensic indices.
- iv) To validate new technologies and their transfer to the State/UT/Central Forensic Science Laboratories.
- v) To organize skill development programmes.
- vi) To develop linkages with related important scientific institutions and State/UT FSLs under their jurisdiction.
- vii) To assist DFSS in implementation of QMS and development of forensic science laboratories in the States of their jurisdiction.
- viii) To provide necessary assistance in management of disaster and crime scenes.
- ix) To act as referral FSS Institutions for evidence material examination.

This new mandate requires re-engineering of the CFSLs to effectively meet the country's forensic requirements in the prevailing national as well as global scenario. The proposed re-engineering is detailed in subsequent chapters.

1.8 MAJOR R&D ACTIVITIES AT THE CFSLs

The SPA Committee strongly feels that, in addition to the above roles, each CFSL should be equipped in all respects to handle mission-mode major R&D projects in one specific discipline of forensic science as follows:

→	CFSL Bhopal	-	Forensic Psychology
→	CFSL Chandigarh	-	Physical Sciences
→	CFSL Delhi	-	Forensic Informatics
→	CFSL Guwahati	-	Questioned Documents
→	CFSL Hyderabad	-	Chemical Sciences
→	CFSL Kolkata	-	Biological Sciences
→	CFSL Pune	-	Digital Forensics

For this purpose, DFSS should evolve a mechanism to periodically identify specific missions focusing on discernible deliverables; each mission should then be objectively fragmented into major R&D projects and carried out in one or more CFSLs, as needed.

1.9 JURISDICTION OF THE CFSLs

Since the Mandate of the seven CFSLs (three old, three upcoming, and one herein-proposed), as mentioned above, now primarily includes service to homeland security as well as handling the case work of different States in the areas in which the facilities do not exist, the following State/UT-wise jurisdictions of the respective CFSLs are recommended:

CFSL CHANDIGARH

- i) Jammu & Kashmir
- ii) Punjab
- iii) Himachal Pradesh
- iv) Chandigarh (UT)
- v) Uttarakhand

CFSL BHOPAL

- i) Madhya Pradesh
- ii) Uttar Pradesh
- iii) Rajasthan
- iv) Chhattisgarh

CFSL HYDERABAD

- i) Andhra Pradesh
- ii) Tamil Nadu
- iii) Kerala
- iv) Lakshadweep
- v) Karnataka
- vi) Puducherry

CFSL GUWAHATI

- i) Assam
- ii) Manipur
- iii) Mizoram
- iv) Meghalaya
- v) Sikkim
- vi) Nagaland
- vii) Arunachal Pradesh
- viii) Tripura

CFSL KOLKATA

- i) Orissa
- ii) Bihar
- iii) Jharkhand
- iv) West Bengal
- v) Andaman & Nicobar Islands

CFSL PUNE

- i) Maharashtra
- ii) Gujarat
- iii) Goa
- iv) Daman, & Diu
- v) Dadra & Nagar Haveli

CFSL DELHI

- i) Delhi
- ii) National Capital Region
- iii) Haryana

In view of the above concepts, the expected load of case work from the agencies specified earlier and the geographical jurisdiction of the above CFSLs, the manpower (scientific, technical, and administrative) requirement has been evaluated in the Chapters that follow. During this exercise of evaluating the manpower requirement, SPAC also took cognizance of the fact that DFSS had recently re-distributed the existing manpower to meet the necessity of the three nascent CFSLs (vide OM No. DFSS/15(16)2011/MHA/PM-11/705 dated June 2, 2011 (copy at Appendix- D), which caused further depletion of scientific manpower at the on-going CFSLs. However, the past performance of the CFSLs has been evaluated on the basis of the charter defined in the MHA OM No. CFIs/S&T/CFSL/4/86/Vol.-II/GPA-II dated April 16, 1998 (copy at Appendix- B)

2

EVALUATION OF SCIENTIFIC PERFORMANCE OF CFSLs

During this performance evaluation, a bottoms-up approach has been adopted, beginning with the grass-root CFSLs (Chandigarh, Hyderabad and Kolkata) leading to the Headquarters of the DFSS at New Delhi. Scientific performance audit is also being conducted at CFSL (CBI) and LNJN NICFS (NFA), New Delhi as per subsequent Govt. (MHA) Order No. 18(5)/2011 - SPAC/ PM-II dated 15-07-2011. Twenty four specially designed Forms for data input (Form SPAC-1 to Form SPAC-24), telephone and e-mail requests, visit-cum-interaction associated with spot questionnaires and analysis of case files and records helped the Committee with the relevant details. Thrust was given to incisive examination of randomly chosen case files of 2010/2011.

2.1 FACILITIES AT CFSLs

Each CFSL has seven operational Divisions (Ballistics, Biology, Chemistry, Documents, Explosives, Physics, and Toxicology); inclusive activities are Serology, Skull Photo Superimposition and DNA Fingerprinting (within Biology); Computer Forensics (within Documents/Physics/Ballistics); and Audio-Video Authentication (within Physics). Besides, the CFSL Chandigarh has a second Documents Division at Shimla, which has no scientific/administrative rationale to continue there, thereby warranting its total relocation at Chandigarh. Till recently CFSL, Hyderabad had a Neutron Activation Analysis (NAA) Unit-appendage of the Bhabha Atomic Research Centre (BARC), Mumbai, which has now been pooled into the upcoming CFSL at Pune. Furthermore, CFSLs at Chandigarh and Kolkata have, for several years, full-fledged facility for Forensic Psychology {Polygraph and Brain Electrical Oscillation Signature (BEOS) at the former, and Polygraph at the latter}, which are yet to see any operation whatsoever. This warrants a very serious view of this ill-planning of capacity vis-à-vis capability vis-à-vis necessity.

The scientific manpower (Director to Laboratory Assistant) and ministerial personnel are in place as per the recent re-distribution (vide MHA's OM No. DFSS/15(16)2011/MHA/PM-II-705 dated June 02, 2011 (copy at Appendix-D). The conspicuous drudgery of depleted manpower is due to austerity measures of the Government, non-filling up of vacancies by the UPSC and SSC, deputation - mode of appointments, relocation of manpower to the three newly created CFSLs, and inappropriate (non-scientific) recruitment rules. Absence of Flexible Complementing Scheme (FCS) of promotion in Forensic Science set up at the Central Government level resulted in inbreeding. In most of the recruitments at the lateral entry, a new person is not recruited, people get promoted and the vacancy is shifted downwards in the hierarchy, and couple of years are lost in the recruitment process at the entry level. This problem can adequately be solved after the FCS is implemented in the Forensic Science set up. Nevertheless, it is

obvious that for long there had been only fragmented Work Units as prescribed for Work Norms by the BPR&D vide their No: CFIs/12(1)/2001 dated November 12, 2002 (copy at **Appendix-E**), which defines each Unit to consist of one SSO/SO/JSO, two SSA/SA, one Lab Asst., and one Attendant. As a stop-gap arrangement, participation of contractual Research Analyst/Associate in the case work has understandably been in practice. In absence of the complete Work Unit in place, comparison of the turnover with the prevailing Work Norms (2002) does not seem to be possible.

The operational Divisions of the CFSLs are equipped with the requisite technology and expertise to undertake scientific examination and offer forensic services pertaining to the broad areas/ evidence materials as shown in Table 2.1.

Table 2.1: *Forensic Science Services Rendered by CFSLs*

S. No.	Facility/ Division	Crime/ Evidence Exhibit Impacted
1	Audio/ Video Authentication	Speaker identification/ verification, image/ portrait verification, audio/video recording & storage devices authentication, etc.
2	Ballistics	Firearms, ammunition and target materials; modern firearms (Indian/ foreign origin), improvised/ modified/ country made weapons, firearms, propellant powders, shot shells, etc...
3	Biology (including DNA)	Biology, serology, skull superimposition – identification, portrait building, facial reconstruction, blood, semen, other body fluids/ stains, tissue, tooth, bone, hair, plant, diatom, fibre, cord, cloth, DNA profiling, rape, paternity, maternity, etc.
4	Chemistry	Narcotics, drugs, acids throwing, trap (detective dye) cases, arson, liquor, restoration of erased numbers, gold/ jewellery, fire accelerants, etc.
5	Computer Forensics	Electronic documents, hardware & software, compact disc, DVD, image, mobile phone, computer, laptop, hard disk, digital storage media, etc.
6	Document	Variety of questioned documents, handwriting, signature, scanning, typewriting, impact/ non-impact printing, computer printout, watermark, hologram, photo - print, currency, plastic currency, seal & stamp impression, writing media, judicial paper, stamp, travel documents, postal money order, etc.

7	Explosives	Pyrotechnic, unexploded formulation, post - blast recovery, initiation device, etc.
8	Physics	Paint, glass, tyre, soil, fabric, fibre, metal, thread, rope, tool mark, struggle mark, knot, metal/ postal seal, decipherment of erased chassis & engine number, source correspondence, etc.
9	Toxicology	Poison examination in viscera, stomach wash, body fluids, hair, nail, volatile/ non-volatile organic poisons, inorganic poisons, organochlorine & organophosphorous insecticides, carbamates, pyrethroids, plant poisons, animal poisons, chemical weapons, drugs, etc.

The role of these Divisions and the concomitant distribution of the scientists' performance time encompass:

- i) Examination of Evidence Material (incorporating Cases Examined, Average Turnaround Time, Scene of Crime Visit, and Court Attendance)
- ii) Research and Development (R&D) (incorporating Validation of Technologies Used, New Technologies Adopted/Innovated, Transfer of Technology to other FSLs and Projects, Publications, Patents, Awards, and Presentations)
- iii) Human Resource Development (HRD) (incorporating programmes conducted/attended by CFSL scientists and training conducted for scientists of other FSLs, forensic end-users & others, and Library)
- iv) Implementation of Quality Management System (QMS); and
- v) Feedback on Customer Satisfaction.

Now and then mid-career and senior scientists spend some percentage of their time in administration, Right to Information (RTI) Act – compliance, etc. Also, instances of scientists/employees studying and/or researching for PG/Ph. D. Degree, apparently without detrimental of their core duties, are in place; this, however, warrants closer scrutiny.

2.2 EXAMINATION OF EVIDENCE MATERIAL

Forensic science service jumpstarts mostly in the laboratory through the scientific examination of evidence materials (physical/electronic), originating from various sources including scene of occurrence, depending on the nature and intensity of disobedience to and violation of law. Many events precede and follow such examination; the scientific performance of the three CFSLs in these avenues has been evaluated by the SPA Committee and briefed hereunder.

2.2.1 The Process of Case Receipt and the Chain of Custody: The case receipt (evidence material or exhibit) by the laboratory from service-requestor (popularly known in forensic parlance as “Forwarding Authority”) is invariably the first interface for the laboratory with its “customer”. Right at that point begins the legally traceable/sustainable exercise of safeguarding the exhibits and case files, commonly called as “Chain of Custody”, which pauses at the post-examination opinion reporting and returning of unspent exhibits, and concludes only when the case is finally disposed off through trials, appeals, reviews, and revisions. After pre-acceptance check of details, cases are either accepted or conditionally accepted or not accepted (*Alongside, SPAC found that there is no practice of date-rubber-stamping of CFSL concerned on any of the incoming service-requesting letters*). The three CFSLs follow documented procedures under NABL accreditation, and each of them has a Central Case Reception Counter. However, among themselves, they differ as described below:

Observations at CFSL Chandigarh: The Central Case Reception Counter (CCR Counter) of the CFSL Chandigarh has, among others: Case (Pre) Acceptance Form; Partial computerization; Case Receipt Register; Case Receipt – Acknowledgement Procedure; Opinion Register; Record Room; Case File Movement Register for Court Evidence etc. This Counter does not have a Central Exhibit Storage Area. The exhibits storage facilities with full safety measures at CCR Counter is essentially needed for inward and outward safe keeping of evidence materials. The concerned Divisions enter details in their respective Case Registers and maintain the exhibits and case files; after the Division completes the examination and is ready with the report, the CCR Counter intimates the same to the original service-seeker and subsequently hands over the report and exhibit remnant(s) to the authorized messenger. The case files are then maintained in Record Room by the CCR Counter. Chain of Custody is, therefore, ensured with high fidelity and hence meeting the requisite compliance.

Observations at CFSL Hyderabad: CFSL Hyderabad has almost similar arrangement except for certain changes in different types of Forms and Registers. Also, post-dispatch case files remain with the Reporting Officer/Division. An observation of serious concern to the SPAC was that “Chain of Custody” Forms in most of the case files remain incomplete. Dereliction of duty was also obvious in that the Reporting Officers/ Divisions do not seem to be enthusiastic about intimating report readiness for several months and await the appearance of some messenger from the service-seeker with a general request/authorization. This may be construed as deliberate delay in the legal parlance and hence requires immediate remedial action. [*Ref. case Nos. 13/EE/CFSL (H)/10/15456, 13/EE/CFSL (H)/10/15629 and 13/EE/CFSL (H)/10/15522*].

Observations at CFSL Kolkata: The CCR Counter of CFSL Kolkata steered by an administrative Assistant, caters the major part of chain of custody by up-keeping Central Exhibit Storage (with non-functional cold room facility) and Case File Maintenance; there are many labour intensive crises – cross Registers exhibiting avoidable redundancy, and causing months long delay to

intimate (and follow up with) the original service-seeker, during which duration the reporting Officers/Divisions are in the dark. Post-examination exhibit-remnants are being kept for more than a decade. SPAC recommends that the Central Exhibit Storage area needs to be immediately addressed for proper return/disposal of case exhibits. Such administration delay requires immediate remedial action.

2.2.2 Recommendations: The SPAC recommends uniformity in all the three CFSLs through adoption of:

- (i) *Case (Pre-) Acceptance Check Form as used in the Chandigarh Laboratory*
- (ii) *Putting date and stamp of the recipient on all the letters received from the service-seekers.*
- (iii) *All the CCR Counters must use single Central Case Reception Register of the type currently being used by CFSL Hyderabad.*
- (iv) *Each Division of the CFSLs must use uniform Case Registers of the type currently being used in the Document Division of CFSL Hyderabad*
- (v) *The practice of storing of evidence materials for long durations at Central Exhibit store, as adopted in CFSL Kolkata, is to be dispensed with. All the CFSLs should ensure that exhibit remnants should immediately be returned to the forwarding authorities along with the reports.*
- (vi) *The case files and exhibits, and follow up actions should be handled by the Division/Reporting Officers and returned to the CCR Counter after completing the Report.*
- (vii) *Realistic application of mind and vetting of cases (right from the reception stage) by the Technical Manger, Head of Division, and Director at appropriate stages.*

Specimens of the Form and Registers cited in (i), (iii), and (iv) above, pertaining to comprehensively maintain the chain of custody, are provided in **Appendices F, G and H** respectively.

2.3 CASES EXAMINED

Examination of evidence material is the central theme of scientific performance of every CFSL. The cases received, examined, and pendency for the period January 2007-May 2011 was studied by SPAC and the Observations for each CFSL are given as hereunder:

2.3.1 Observations at CFSL Chandigarh: The statistical detail on examination of cases/evidence materials, pendency's and guesstimate of cases not accepted in each division during January 2007-May 2011 have been given below in Table 2.2 and also in the bar diagram (Figure 2.1, 2.2, 2.3 & 2.4).

Table 2.2 Statistical Details of Cases and Evidence Materials at CFSL,
Chandigarh (During January 2007 – May 2011)

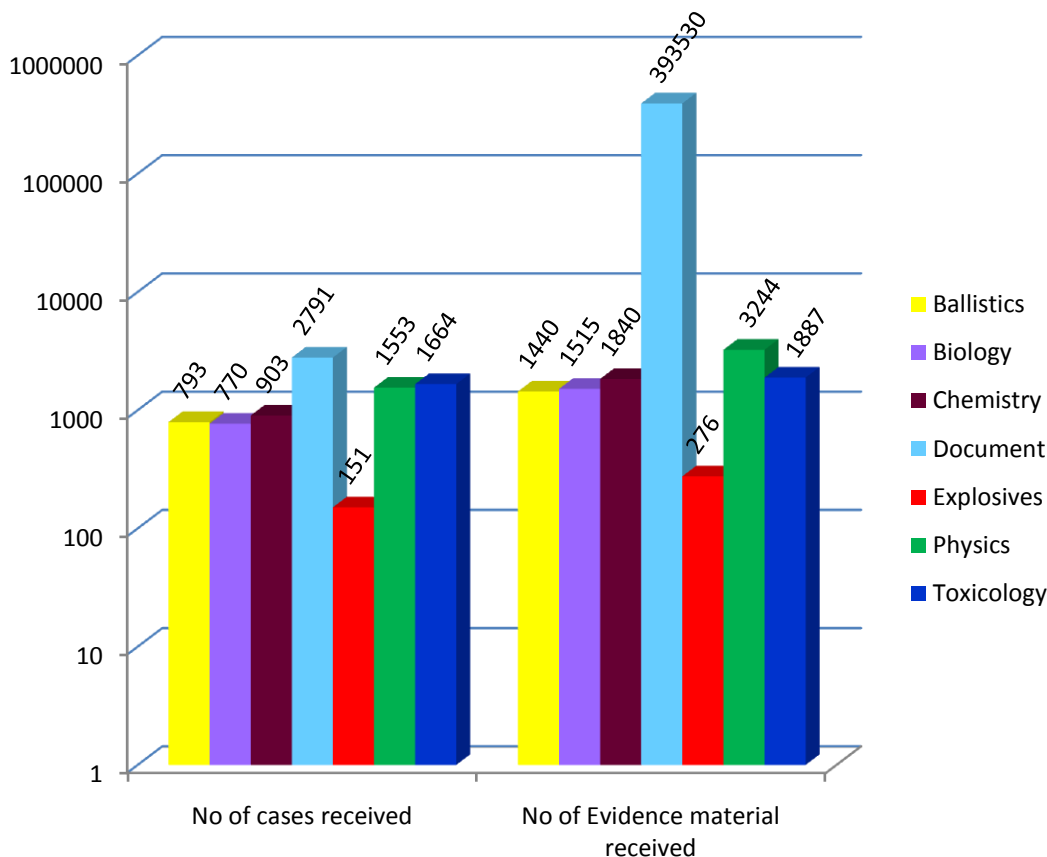
S. No	Operational Facility/ Division	Quantum of Cases/Evidence Materials						
		Received		Examined		Pending		Cases Not accepted for examination (Guess timate)
		No of cases	No of exhibits	No of cases	No of exhibits	No of cases	No of exhibits	
1.	Ballistics	793	1440	685	4037	05	20	700
2.	Biology (including DNA)	770	1515	545	2963	50	120	890
3.	Chemistry	903	1840	708	8607	80	120	1450
4.	Document (includes Chandigarh and Shimla)	2791	393530	2462	366596	181	9481	592
5.	Explosives	151	276	79	14079	02	04	00
6.	Physics (includes Audio – Video Authentication and Computer Forensics (Chandigarh and Shimla)]	1553	3244	994	14901	203	366	1090
7.	Toxicology	1664	1887	1113	15466	127	154	1320
Total		8625	403732	6586	426649	648	10265	6042

Out of the total receipt of 8625 cases (4,03,732 parcels) at CFSL Chandigarh, about 77% had been examined in the laboratory (Figure 2.2) by scientists employing relevant documented methods, techniques, and equipment and reports thereon were communicated to the concerned forwarding agencies. During a course of discussions by the SPAC team, it transpired that a large number of cases, sometimes double the number of cases examined, were not accepted in the CFSL. The reasons given to SPAC, for such a situation, were inadequacy of service-requestors' administrative procedure-compliance/exhibit integrity, and, shortage of laboratory's scientific manpower, consumables, equipment maintenance, and support structure etc. No record seems to be available at CFSL Chandigarh for the exact quantum of non-acceptance of cases from the forwarding authorities, and hence only estimated figures, as guessed by them are given in the last column of the above Table.

SPAC is not satisfied with the prevailing situation.

2.3.2 Recommendations

All the appropriate measures (administrative as well as scientific) should be adopted to ensure that the level of the client's satisfaction remains high.



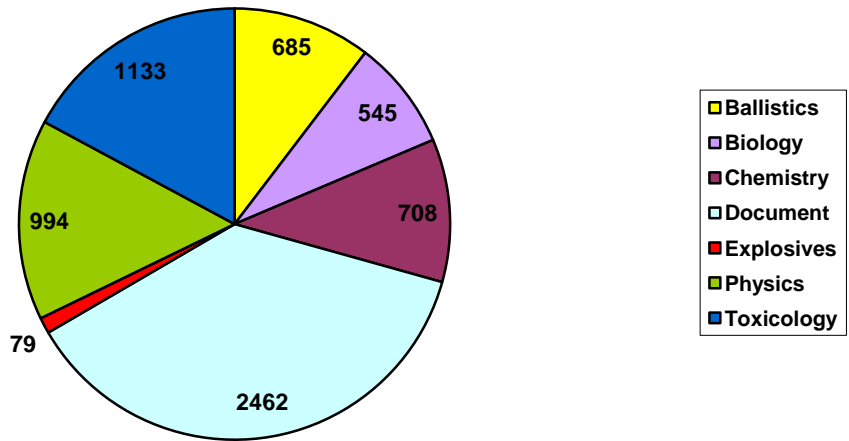
Biology includes DNA Profiling.

Document includes Chandigarh and Shimla.

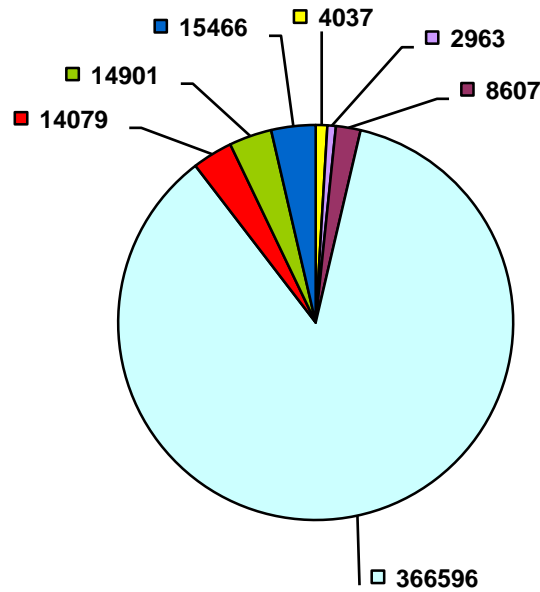
Physics includes Audio – Video Authentication and Computer Forensics (Chandigarh and Shimla).

Figure 2.1: Cases and Exhibits Received by CFSL, Chandigarh (During January 2007 – May 2011)

Number of Cases Examined



Number of Exhibits Examined

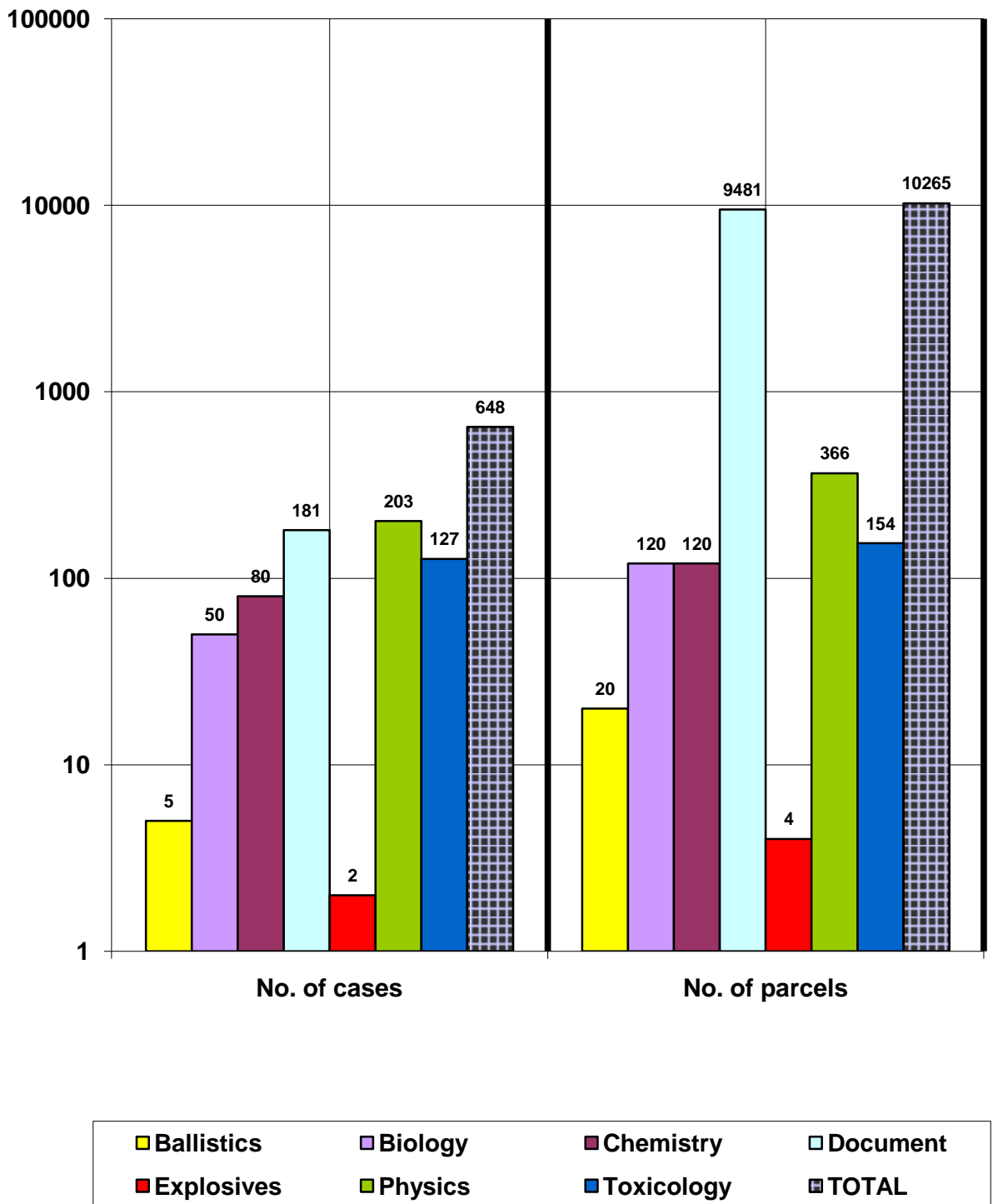


Biology includes DNA Profiling.

Document includes Chandigarh and Shimla.

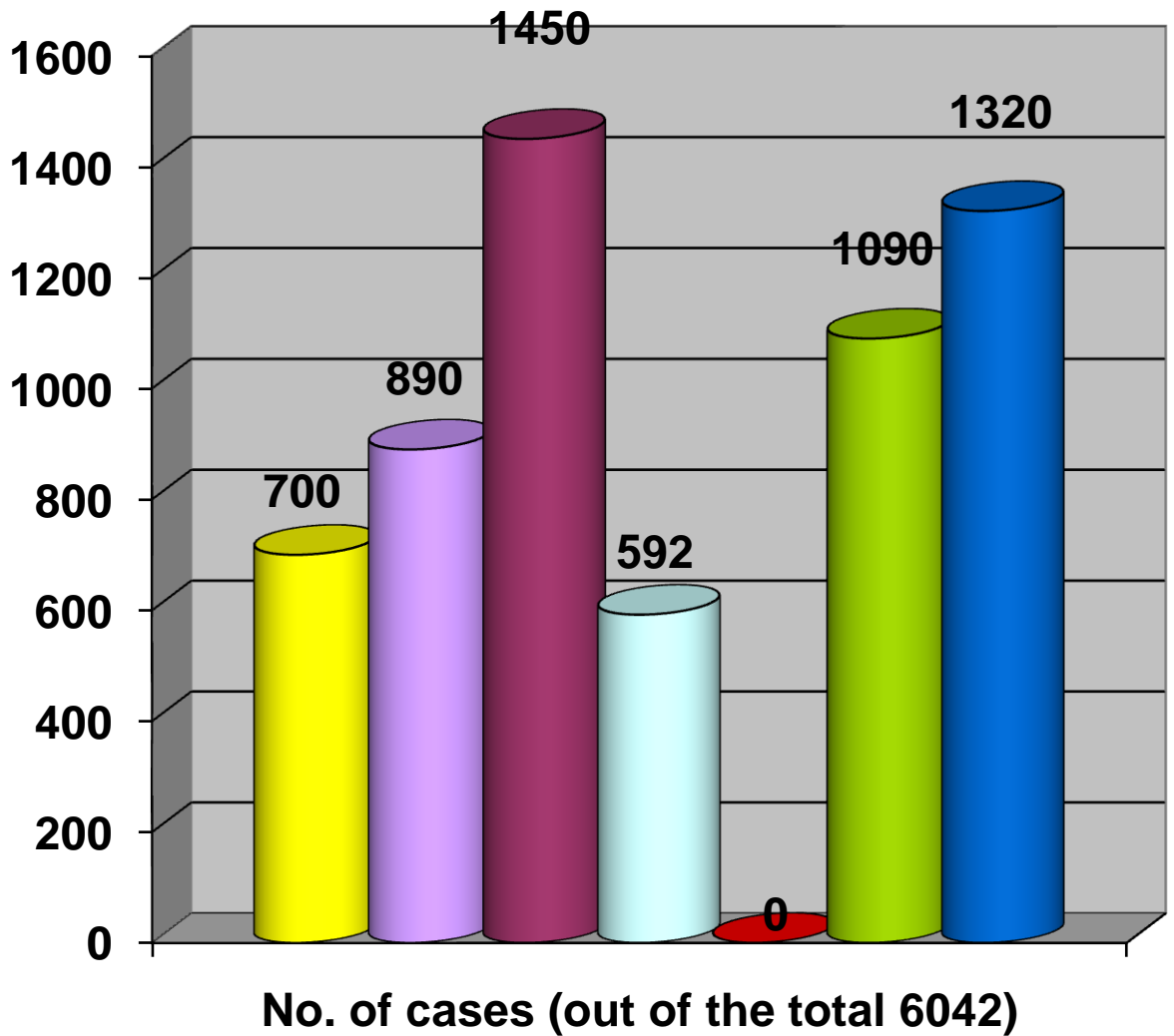
Physics includes Audio – Video Authentication and Computer Forensics (Chandigarh and Shimla).

Figure 2.2: Cases and Exhibits Examined by CFSL, Chandigarh (During January 2007 – May 2011)



Biology includes DNA Profiling.
 Document includes Chandigarh and Shimla.
 Physics includes Audio – Video Authentication and Computer Forensics (Chandigarh and Shimla).

Figure 2.3: Cases and Evidence Material Pending Examinations at CFSL, Chandigarh (As on May 31, 2011)



■ Ballistics
 ■ Biology
 ■ Chemistry
 ■ Document
 ■ Explosives
 ■ Physics
 ■ Toxicology

Biology includes DNA Profiling.
 Document includes Chandigarh and Shimla.
 Physics includes Audio – Video Authentication and Computer Forensics (Chandigarh and Shimla).

Inadequacy of service requestor's administrative procedure – compliance/ exhibit integrity, and shortage of lab's manpower/ consumables/ equipment maintenance/ infrastructure etc. had prompted CFSLs not to accept many cases.

Figure 2.4: *Guesstimate of Forensic Service - Requests not accepted by CFSL, Chandigarh (During January 2007 – May 2011)*

2.3.3 Observations at CFSL Hyderabad: The statistical detail on examination of cases/evidence materials, pendency's and guesstimate of cases not accepted in each Division during January 2007-May 2011 have been given below in Table 2.3 and also in the bar diagram (Figure 2.5, 2.6 2.7 & 2.8).

Table 2.3: *Statistical Details of Cases and Evidence Materials at CFSL, Hyderabad (During January 2007 – May 2011)*

S. No	Operational Facility/ Division	Quantum of Cases/Evidence Materials						Cases not accepted for Examination (Guesstimate)
		Received		Examined		Pending		
		No of cases	No of exhibits	No of cases	No of exhibits	No of cases	No of exhibits	
1.	Ballistics	109	2499	127	1443	05	21	01
2.	Biology <i>(including DNA)</i>	1811	10344	771	5306	370	1743	00
3.	Chemistry	501	1778	454	3220	76	421	00
4.	Document <i>(includes its work on Computer Forensics (CF) as well as the CF work done by scientists of Ballistics/ Physics)</i>	5247	497196	4029	437588	254	17142	102
5.	Explosives	290	1085	180	654	11	70	03
6.	Physics	176	756	146	596	04	40	00
7.	Toxicology	5068	20272	2078	8312	247	988	00
Total		13202	533930	7785	457119	967	20425	106

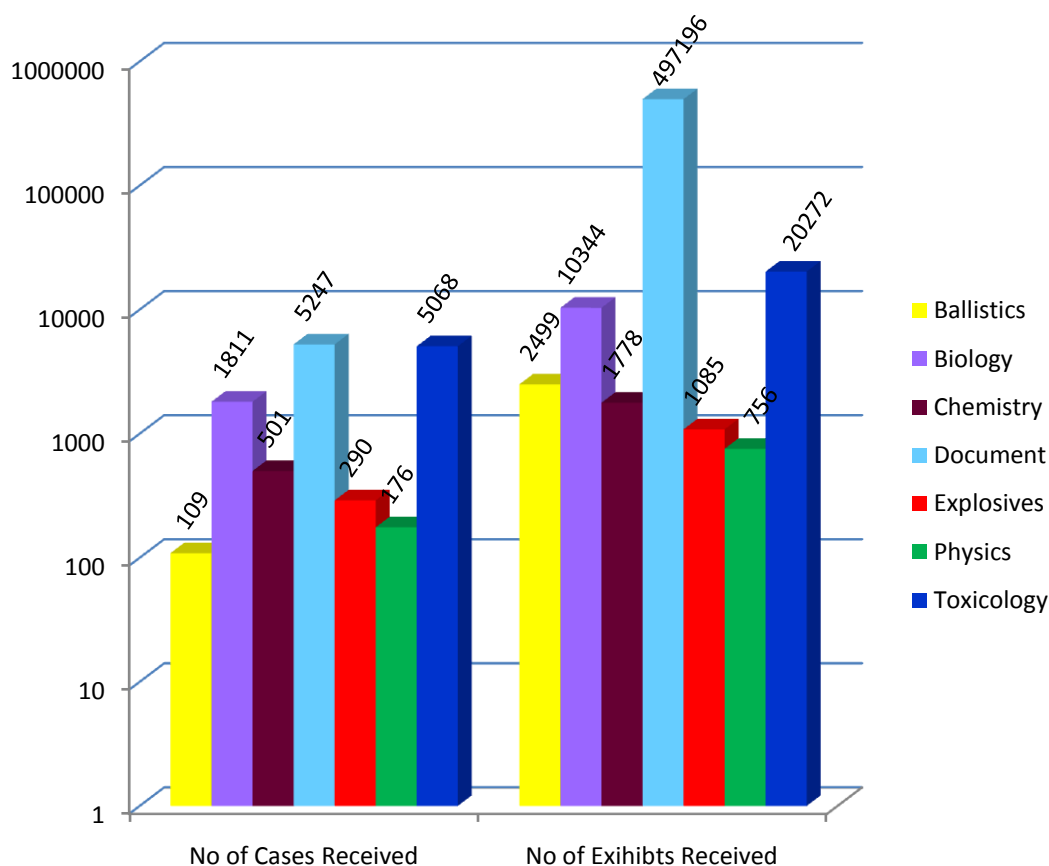
Out of the total receipt of 13,202 cases (5,33,930 parcels) at CFSL Hyderabad, about 59% had been examined in the laboratory (Figure 2.6) by scientists employing relevant documented methods, techniques, and equipment and the reports thereon were communicated to the concern Forwarding Agencies. During a course of discussions by the SPAC team, it transpired that the non-acceptance of cases is rather small. No record seems to be available at CFSL Hyderabad for the exact quantum of non-acceptance of cases from the

forwarding authorities, and hence only figures, as guessed by them are given in the last column of the above Table. The reasons given to SPAC, for such a situation, were inadequacy of service-requestors' administrative procedure-compliance/exhibit integrity, and, shortage of laboratory's scientific manpower, consumables, equipment maintenance, and support structure etc.

SPAC is not satisfied with the large pendency prevailing in some of the Divisions of CFSL Hyderabad. Keeping the evidence material for long periods without examinations would attribute to compromising with its integrity.

2.3.4 Recommendations

All the appropriate measures (administrative as well as scientific) should be adopted to ensure that the timeliness and credibility of case examination and thus the level of the client's satisfaction remains high.

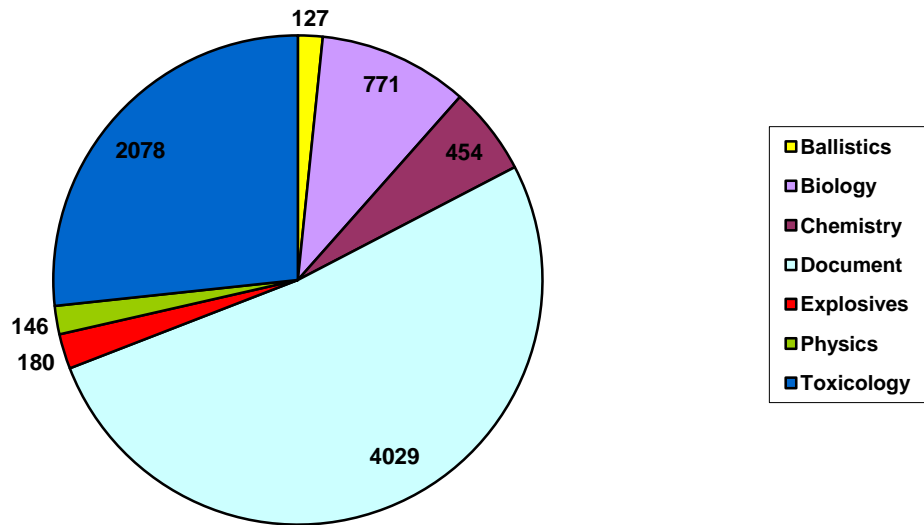


Biology includes DNA Profiling.

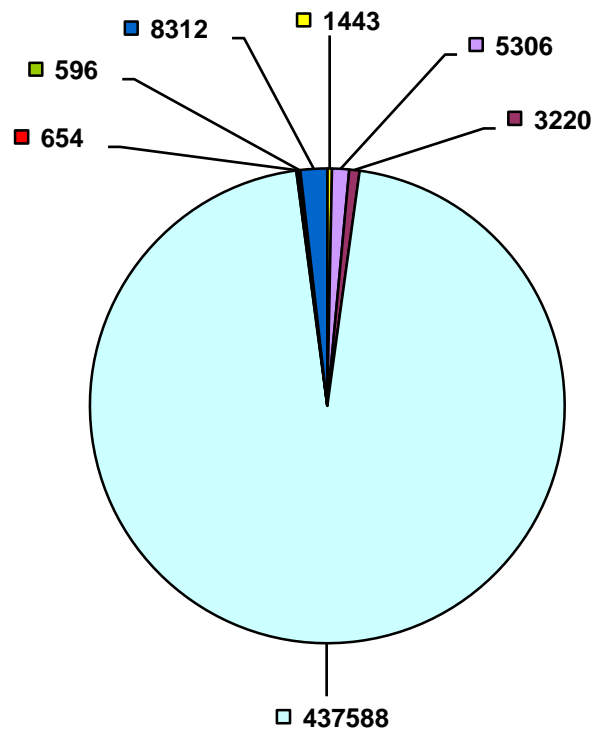
Document includes its work on Computer Forensics (CF) as well as the CF work done by scientists of Ballistics/Physics

**Figure 2.5: Cases and Exhibits Received by CFSL, Hyderabad
(During January 2007 – May 2011)**

Number of Cases Examined



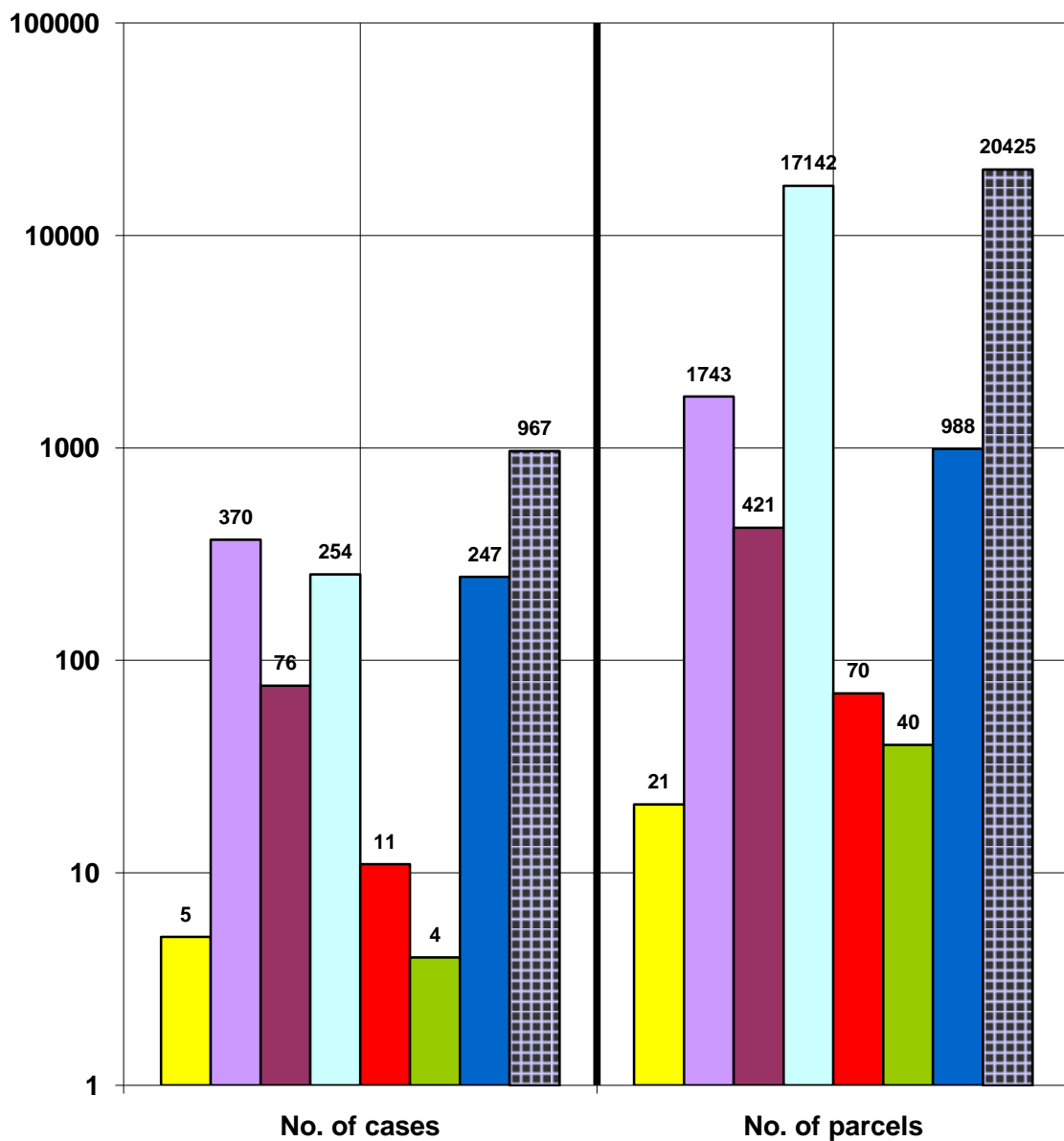
Number of Exhibits Examined



Biology includes DNA Profiling.

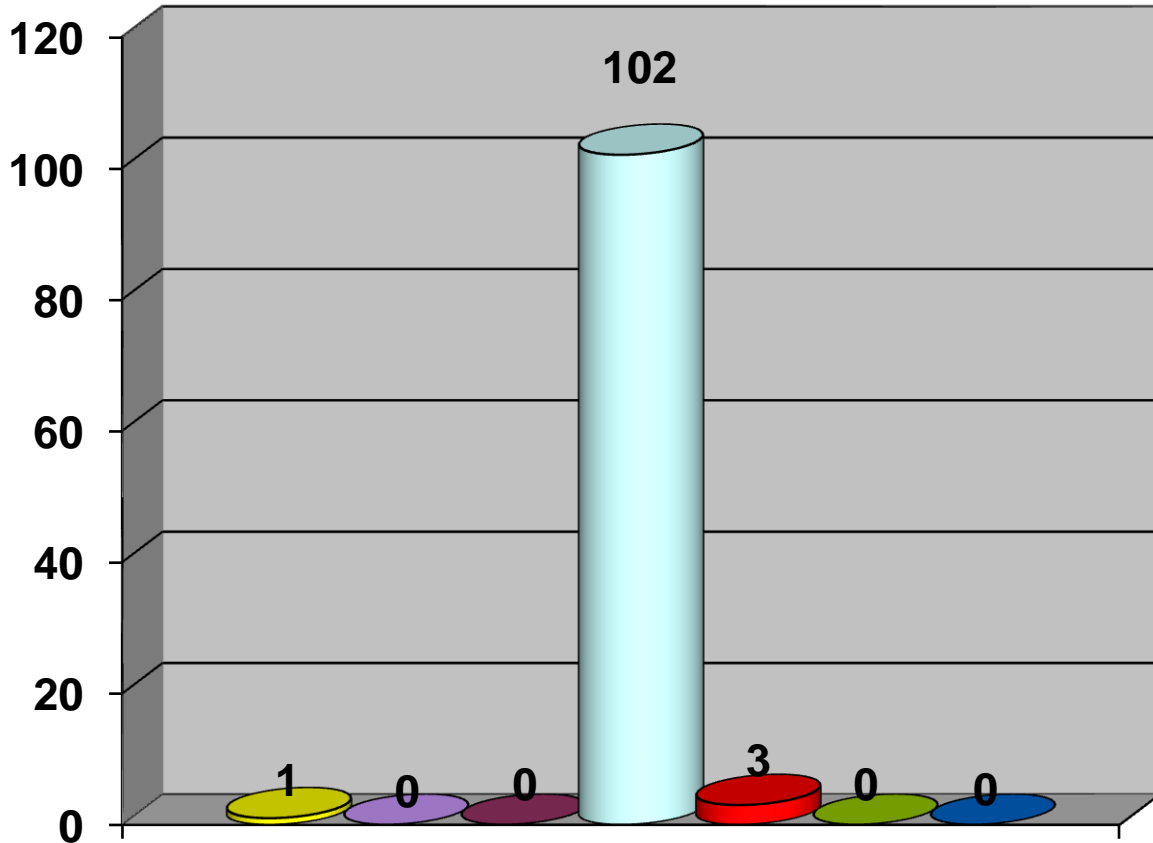
Document includes its work on Computer Forensics (CF) as well as the CF work done by scientists of Ballistics/Physics.

Figure 2.6: *Cases and Evidence Materials Examined by CFSL, Hyderabad (During January 2007 – May 2011)*

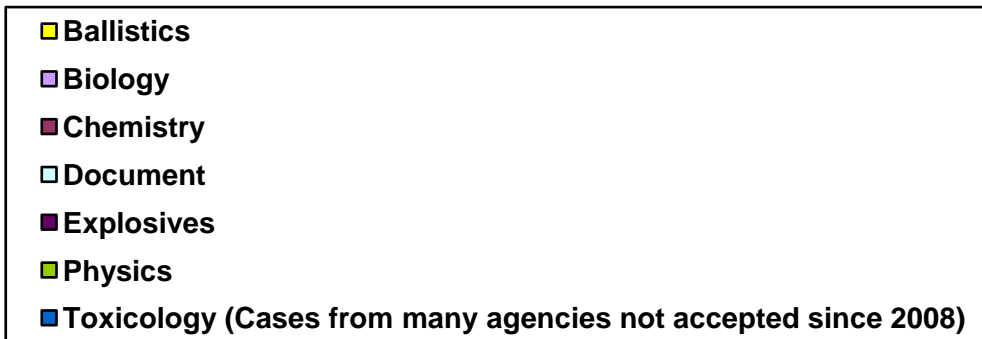


Biology includes DNA Profiling.
 Document includes its work on Computer Forensics (CF) as well as the CF work done by scientists of Ballistics/ Physics.

Figure 2.7: *Cases and Evidence Materials Pending Examination at CFSL, Hyderabad (as on May 31, 2011)*



No. of cases (out of the total 106+)



Biology includes DNA Profiling.

Document includes its work on Computer Forensics (CF) as well as the CF work done by scientists of Ballistics/ Physics.

Inadequacy of service requestor's administrative procedure – compliance/ exhibit integrity, and shortage of lab's manpower/ consumables/ equipment maintenance/ infrastructure etc. had prompted CFSLs not to accept many cases.

Figure 2.8: *Guesstimate of Forensic Service - Requests Not Accepted by CFSL, Hyderabad (During January 2007 – May 2011)*

2.3.5 Observations at CFSL Kolkata: The statistical details on examination of cases/evidence materials, pendency's and guesstimate of cases not accepted in each Division of CFSL Kolkata during January 2007-May 2011 have been given below in Table 2.4 and also in the bar diagrams (Figures 2.9, 2.10, 2.11 & 2.12).

Table 2.4: *Statistical Details of Cases and Evidence Materials at CFSL, Kolkata (During January 2007 – May 2011)*

S. No.	Operational Facility/ Division	Quantum of Cases/Evidence Materials						
		Received		Examined		Pending		Cases not accepted for Examination (Guesstimate)
		No of cases	No of exhibits	No of cases	No of exhibits	No of cases	No of exhibits	
1.	Ballistics	123	2797	84	990	19	647	00
2.	Biology (including DNA)	1783	10763	1241	6564	56	362	00
3.	Chemistry	1830	123430	603	19371	388	31461	58
4.	Document (includes its work on Computer Forensics (CF) as well as the CF work done by scientists of Ballistics/ Physics)	3163	919978	2305	652916	286	61198	192
5.	Explosives	1607	7614	628	2274	321	2895	60
6.	Physics	1019	19922	356	6767	74	934	03
7.	Toxicology	4068	15205	518	1875	794	2863	100
Total		13593	1099709	5735	690757	1938	100360	413

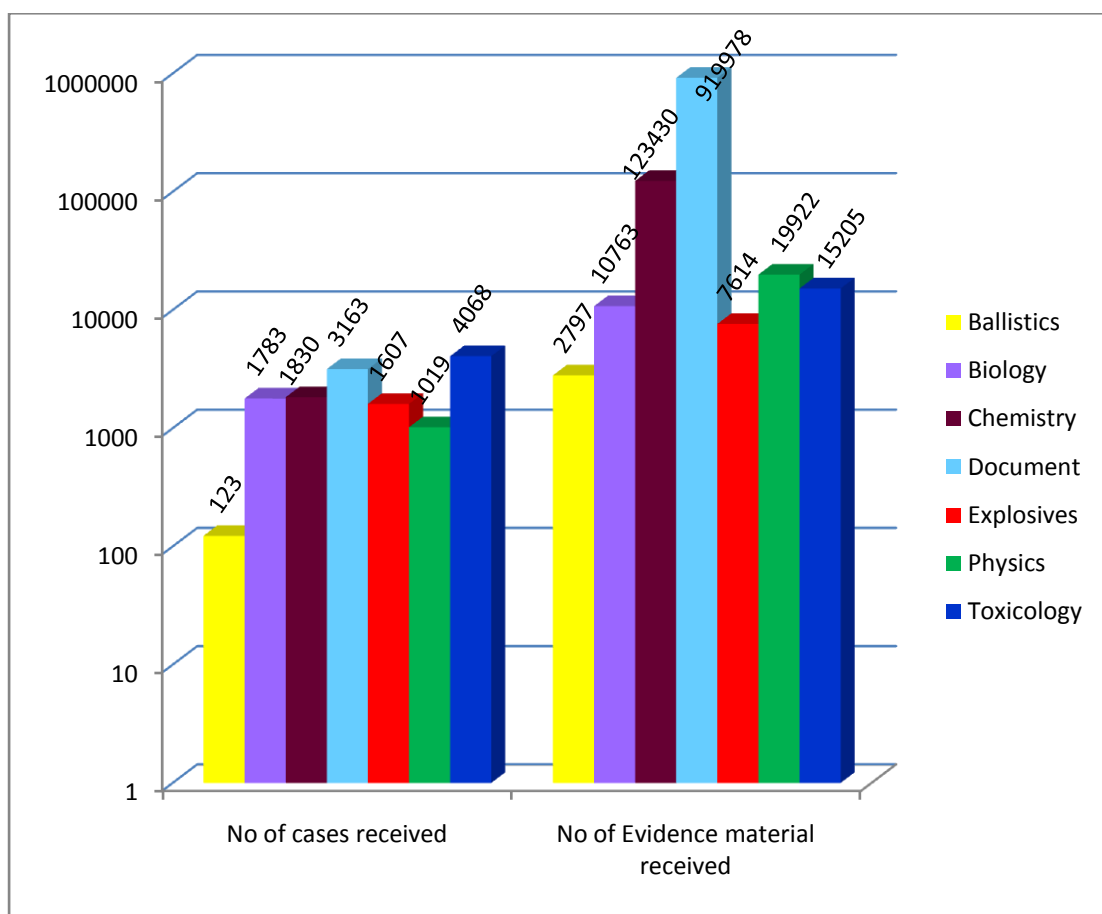
Out of the total receipt of 13,593 cases (10, 99,709 parcels) at CFSL Kolkata, about 42% had been examined in the laboratory (Figure 2.10) by scientist employing relevant documented methods, techniques, and equipment and reports thus prepared. A very large pendency in some of the Divisions of CFSL Kolkata was found. Instances have also come to the notice that some of the

reports were not even communicated to the concerned forwarding agencies for long, even after the examination was completed. The reasons given to SPAC, for such a situation, were inadequacy of service-requestors' administrative procedure-compliance/exhibit integrity, and, shortage of laboratory's scientific manpower, consumables, equipment maintenance, and support structure etc. During a course of discussions by the SPAC team, it transpired that the non-acceptance of cases is rather small. No record seems to be available at CFSL Kolkata for the exact quantum of non-acceptance of cases from the forwarding authorities, and hence only figures guessed by them are included in the last column of the above Table.

SPAC is not satisfied with the large pendency prevailing in some of the Divisions of CFSL Kolkata. Keeping the evidence material for long periods without examinations would result in compromising with its integrity.

2.3.6 Recommendations

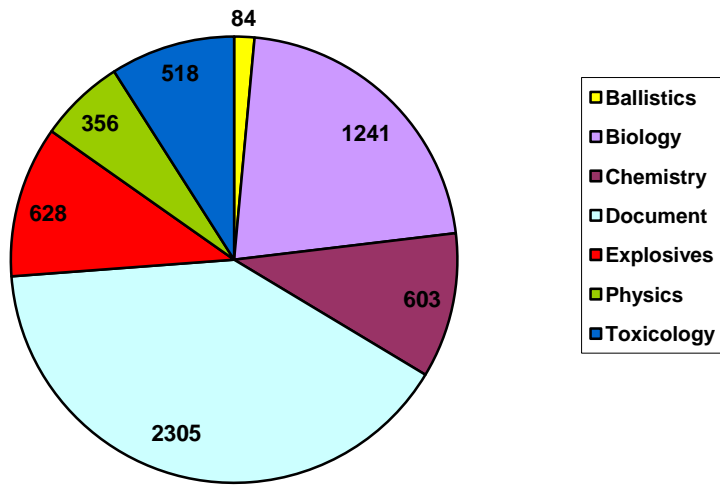
All the appropriate measures (administrative as well as scientific) should be adopted to ensure that the timeliness and credibility of case examination and thus the level of the client's satisfaction remains high.



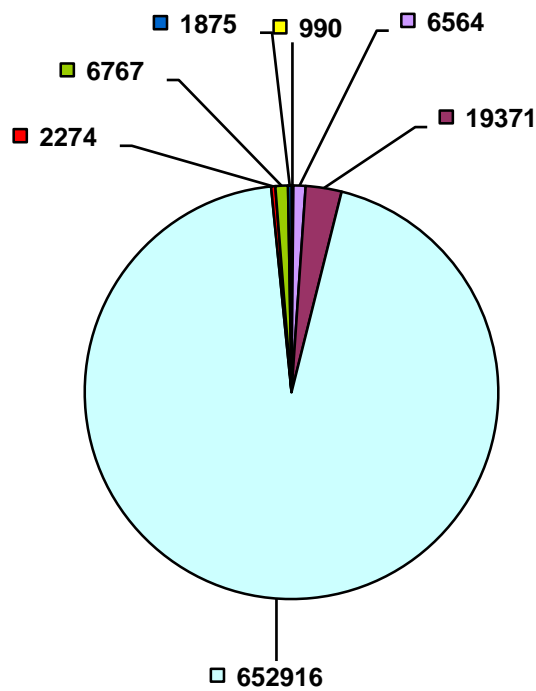
*Biology includes DNA Profiling.
Document includes its work on Computer Forensics (CF) as well as the CF work done by scientists of Ballistics/ Physics*

Figure 2.9: Cases and Evidence Materials Received by CFSL, Kolkata (During January 2007 – May 2011)

Number of Cases Examined



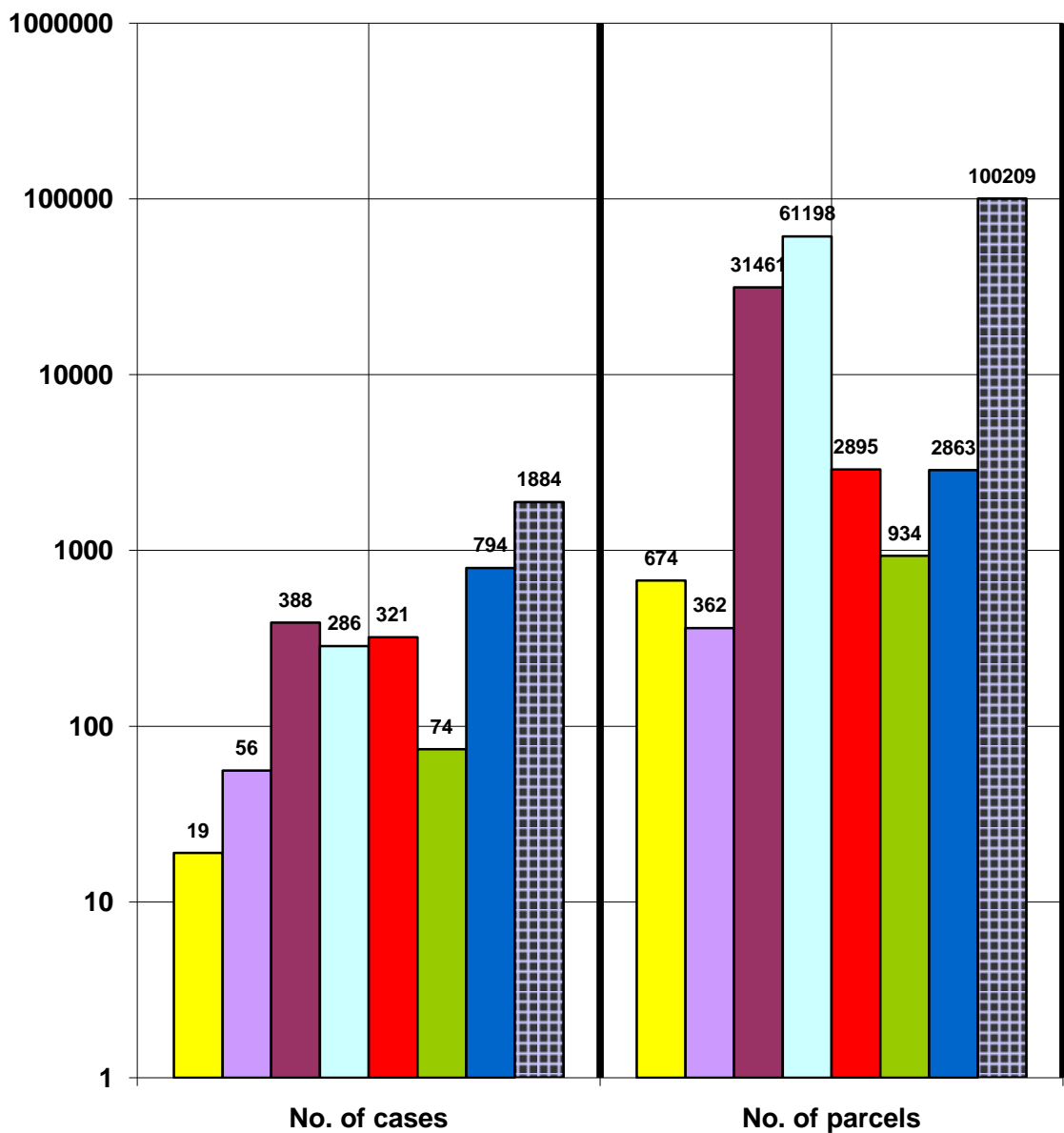
Number of Evidence Materials Examined



Biology includes DNA Profiling.

Document includes its work on Computer Forensics (CF) as well as the CF work done by scientists of Ballistics.

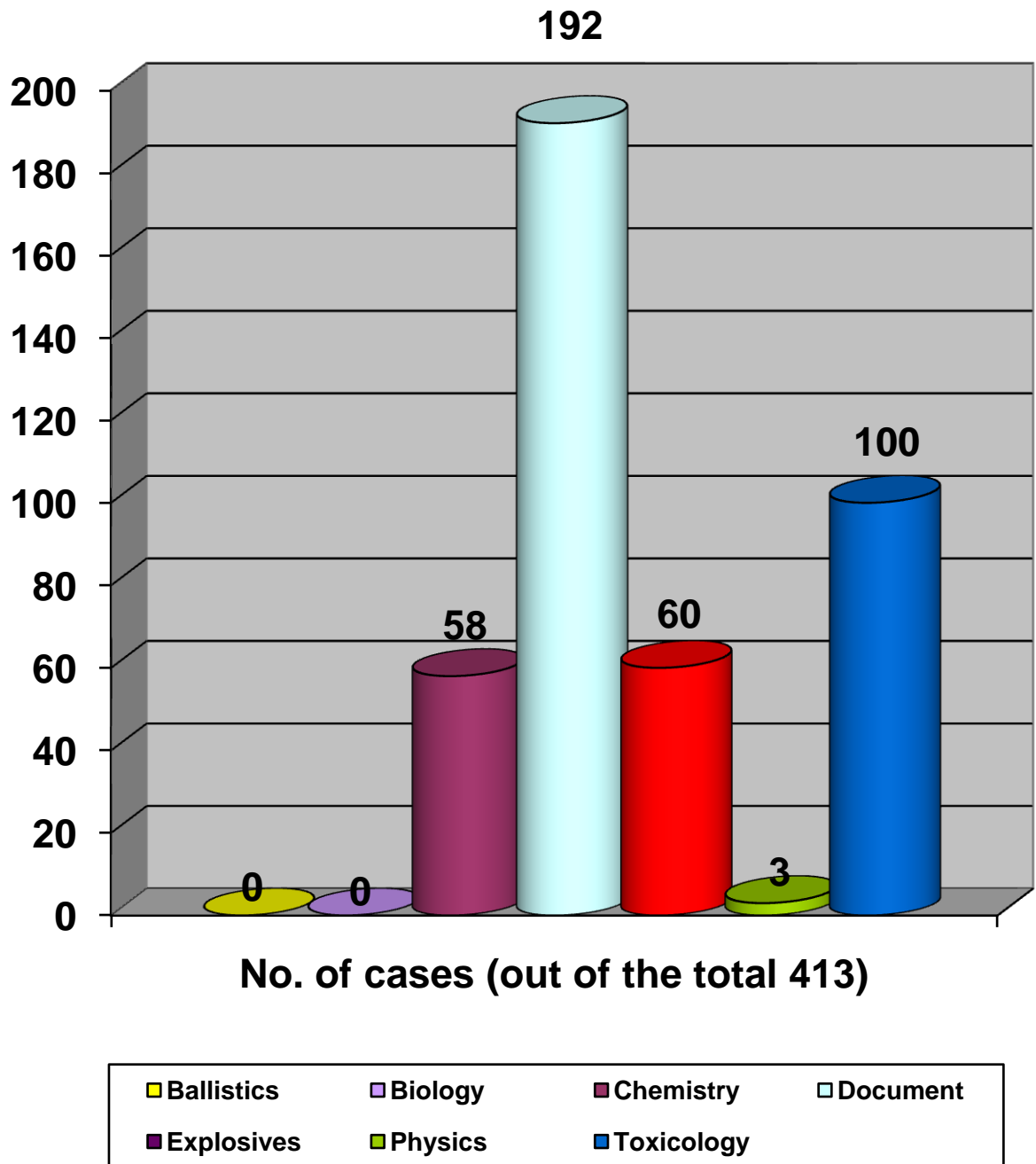
Figure 2.10: *Cases and Evidence Materials Examined by CFSL, Kolkata (During January 2007 – May 2011)*



Biology includes DNA Profiling.

Document includes its work on Computer Forensics (CF) as well as the CF work done by scientists of Ballistics.

Figure 2.11: *Cases and Evidence Materials Pending Examinations at CFSL, Kolkata (As on May 31, 2011)*



Biology includes DNA Profiling.
 Document includes its work on Computer Forensics (CF) as well as the CF work done by scientists of Ballistics.

Inadequacy of service requestor's administrative procedure – compliance/ exhibit integrity, and shortage of lab's manpower/ consumables/ equipment maintenance/ infrastructure etc. had prompted CFSLs not to accept many cases.

Figure 2.12: *Guesstimate of Forensic Service - Requests Not Accepted by CFSL, Kolkata (During January 2007 – May 2011)*

2.4 PENDENCY OF CASES AT CFSLs

2.4.1 Observations: While the SPAC is seized with empathy over the CFSLs' manpower shortage as a primary contributor to the pendency of cases (Figures 2.3, 2.7 and 2.11) [leading to deficiency of service in not accepting thousands of cases, vide Figures 2.4, 2.8 and 2.12]. For example, a case [Ref. 13/EE/CFSL (H)/10/15629] received in July 2010 by CFSL Hyderabad exclusively for Scanning Electron Microscope (SEM) analysis, was not examined for several months when the SEM was functional. Later, since March 2011 the SEM became out of order, and the case is still pending as on August 25, 2011. Four Reporting Officers at CFSL Hyderabad did not handle toxicological case work for weeks together because of non-availability of scientific assistants. There appear to be strategies for mitigation of large pendency.

2.4.2 Recommendations

- (i) *Create positive attitude among the CFSL scientists.*
- (ii) *Discipline the non-performers giving lame excuses*
- (iii) *Balanced decision in sending scientists on deputation from DFSS/CFSLs. Recall all those scientists who have been sent on deputation by DFSS/CFSLs at the end of their originally permitted tenure without any further extension*
- (iv) *Enforcement of priority to the examination of evidence material and Division-related core duties, whereas the non-essential activities, such as students' project guidance, academic lectures, etc. (within the lab premises or elsewhere) should be accorded least priority.*
- (v) *Encouragement should, however, be given to the R&D work of CFSL-anchored Research Fellows, but not to students of any other stream/course.*
- (vi) *Teaching classes for the Diploma and M. Sc. (FS) students of Panjab University, Chandigarh, being held at CFSL Chandigarh premises, should stop forthwith.*
- (vii) *Scientists up to the level of Scientist-F should get involved in the examination of evidence material by conducting laboratory analysis themselves. However, the Director may assign more complicated cases to the senior scientists.*
- (viii) *Every CFSL should hold monthly reviews in which the Director, Quality Manger, Technical Manager(s), Heads of Divisions, and Reporting Officers should participate. In each of these meetings (decisions to be recorded to ensure follow-up actions) there should be incisive review (technical and administrative components) of cases, NABL-compliance quality assurance, progress of R&D projects, and action taken on the Annual Action Plan of the laboratory.*
- (ix) *There should be mind-set, policy and process for resolving difference in opinion/report among and between the CFSLs/ State & UT FSLs (in the same case). Enablement of conjoint repetition of*

examination by the different scientific fraternity at both their laboratory premises may be one way out. This will ensure continued faith in forensics in the minds of judiciary and public.

2.5 Inconclusiveness of Expert Opinion

2.5.1 Observations: *Table 2.5 illustrates the inconclusive opinions furnished by the three CFSLs that were found to vary from 0% to 87%, depending on the scientific discipline practiced. Some of these figures are very alarming.*

Table 2.5: *Inconclusiveness (in %) in Opinions/Reports by the CFSLs*

S. No.	Operational Facility*/ Division	CFSL		
		Chandigarh	Hyderabad	Kolkata
1.	Audio/ Video Authentication*	22	Expertise not available	Expertise not available
2.	Ballistics	25	02	38
3.	Biology (including DNA*)	25	25	25
4.	Chemistry	N/A	N/A	N/A
5.	Computer Forensics*	18	05	00
6.	Document	07	08	6.5
7.	Explosives	N/A	N/A	N/A
8.	Physics	32	32	54
9.	Toxicology	70	87	80

2.5.2 Recommendations

- (i) *All the laboratory tests should be conducted by strictly adhering to SOPs for different disciplines.*
- (ii) *Inconclusive opinions are also attributed to inadequacy of exhibit's integrity due to long waiting time before the examination is taken up*

as well as to the lack of extended experimental design. This requires fast remediation by way of augmenting the trained manpower so that the exhibits are immediately examined in the laboratory before they get degenerated.

- (iii) *All the viscera cases referred to CFSLs for toxicological examination, which lack mention of any symptoms of poisoning in the post-mortem report from the medico-legal expert, or the investigation report of the IO did not suspect any poisoning, should not be entertained in the laboratory, as it results in waste of analytical efforts and hence increases the pendency.*

2.6 Documenting the Forensic Opinion/Reports

2.6.1 Observations: Major improvements are required in report framing and its syntax and grammar. Uniformity in reporting is absent among the Reporting Officers within a Division (intra-Divisional) and at intra-laboratory and inter-CFSLs. In this context, biennial brainstorming sessions are recommended among the scientists of similar Divisions from all the CFSLs and SFSLs.

SPAC observed that the Reporting Officer (RO), after exhibit examination, prepares the signed/ready-for-dispatch Report and submits that along with the case file to the Technical Manager (TM)/HOD for technical review (including administrative component); the TM initials/signs without writing comment, following which the Report goes for dispatch. The existing practice does not leave pace for actual technical/administrative review of Technical Managers/HoDs.

The laboratory reports are presently prepared in triplicate, each as an original, with full signature(s) of Reporting Officer(s); Chandigarh prepares all of them in white sheets, whereas the other two laboratories have one on white sheet and the rest in pink colour etc. All the three CFSLs dispatch the white sheeted report is to the service-requestor, one is sent to the "Guard File" (kept by CCR Counter personnel) and the other (office copy) remains in the case file. Irrespective of the reasons adduced by the CFSLs to this practice, the SPAC is not convinced about the scientific sanctity of preparing the report in triplicate due to security reasons.

These measures supra and those recommended henceforth assume significance in the light of some uncomfortable observations made by the SPAC at CFSLs Hyderabad and Kolkata:

- a) In a case [Ref. 13/EE/CFSL (H)/10/15511] received by CFSL Hyderabad on May 10, 2010, examination began on January 11, 2011, Report was made ready on January 28, 2011, and the Report and exhibit-remnant were sent on July 13, 2011. However, there was no proof of case-file having been put up to Director at any time.
- b) CFSL Kolkata accepted a case [CFSL (K)/2010/416] wherein the request was to compare a knife for correspondence to the injury marks described

in autopsy (post-mortem) report and gave its opinion. This appears to be an unethical transgression into other professional domain.

2.6.2 Recommendations

- (i) *The SPAC, therefore, recommends that detailed SOP should be developed for recording observations, deductions, interpretations, and report framing.*
- (ii) *The report should be self-speaking, precise and should not only answer the questions asked for by the forwarding agencies, but should also contain the implied queries, which provide leads to the IO for further investigation or help the judiciary in imparting justice. Reasons for arriving at the specific conclusions/opinions should also be given in the report.*
- (iii) *The SPAC recommends that the RO should henceforth prepare and submit only the Draft-Report with the chronologically page-numbered case file to the TM for review; the TM should review, write comment and sign with date. Later, the fair-original Report should be made, signed and processed for dispatch.*
- (iv) *Only two copies of the final report should be generated, one original (on regular white report sheet) to be sent to the forwarding authority and the other (on coloured paper) as the office copy for the case file.*

2.7 Turnaround Time: Quality embodied in forensic examination/opinion needs to be objectively blended with timeliness in providing the service support. The benchmark of turnaround time for forensic services should be 4 weeks (maximum). Forensic scientists, especially at the junior level, spend their maximum time in evidence material examination, followed by R&D, training, stores procurement, equipment maintenance, quality implementation, court attendance, SOC visit, database generation, etc. They also divert considerable attention to academics within and outside the laboratory premises. A reflection of this, visible in turnaround time for case work achievable by various Divisions of the three CFSLs, is given in Table 2.6 showing the range as 30 to 610 days.

Table 2.6: *Average Turnaround Time* by CFSLs for Evidence Material Examination*

S. No.	Operational Facility*/ Division	CFSL		
		Chandigarh	Hyderabad	Kolkata
1.	Audio/ Video Authentication*	97	Expertise not available	Expertise not available
2.	Ballistics	65	115	80
3.	Biology (including DNA*)	179	227	127
4.	Chemistry	99	216	93
5.	Computer	147 [£]	30 [€]	175 [¥]

	Forensics* (CF)			
6.	Document	117 ^φ	77	118
7.	Explosives	610 ^ψ	227	226
8.	Physics	132	57	152
9.	Toxicology	179	240	123

* Time (in days) between date of receipt of parcel at the laboratory and date of lab - report

£ Average of Chandigarh's CF (97) and Shimla's CF (197)

€ Average of Ballistics's CF (30), Document's CF (45) and Physics's CF (15)

¥ Average of Ballistics's CF (187) and Document's CF (163)

φ Average of Chandigarh's Doc (83) and Shimla's Doc (150)

ψ Major reason was the availability of single Reporting Officer – cum – TM for both the Explosives and Chemistry (Narcotics) Divisions during 2007, 08 and 09 and the resultant backlog being cleared in 2010.

SPAC observes that it is a serious situation and such complacency should be thwarted, as it is adversely affecting the competence. Active addressal of manpower issue and avid adoption of strategies recommended supra, are bound to yield positive results by enormously reducing the turnaround time.

2.8 Scene of Crime (SOC) Visits: Most of the police investigators do not possess an adequate scientific knowledge to identify, collect, and pack the clues from the scene of crime, and hence the visit of scientists to the SOC is an essential part of their core-duties, especially for the heinous crimes. For this purpose, some of the State and UT FSLs have dedicated Mobile Forensic Science Laboratories. CFSLs, however, do not have such arrangements to help the Investigation Officers. Therefore, depending on the nature of the crime, ad hoc groups are formed by pooling the requisite scientific expertise and deployed to the site. Table 2.4 gives the figures for the number of SOC visits made and man-days spent on that score by the three CFSLs during January 2007 - May 31, 2011; also provided is the annual average as 43 visits/145 man-days, 9 visits/90 man-days, and 14 visits/174 man-days for Chandigarh, Hyderabad, and Kolkata respectively. *Formation of Rapid Response Forensic Team (RRFT) at every CFSL, therefore, needs no emphasis. SPAC is also of the view that DFSS may initiate appropriate action to impress the Government(s) on the need for legal measures to ensure mandatory forensic assistance in the investigation of heinous crimes, right from the SOC.*

Table 2.7: *Scientific Support Provided by CFSLs at Scenes of Crime (during January 2007 – May 31, 2011)*

SOC Visits	CFSL		
	Chandigarh	Hyderabad	Kolkata
Number of Visits Made (Annual Average)	191 (43)	40 (9)	63 (14)
Number of Man Days Spent (Annual Average)	642 (145)	398 (90)	769 (174)

2.8.1 Recommendations

On perusal of some of the CFSL reports on SOC examination, the SPAC found them, by-and-large, satisfactory, with scope yet for improvement. The following measures are recommended to help in making the SOC team's visit more effective:

- (i) *DFSS may initiate appropriate action for legal measures to ensure mandatory forensic services at SOC in the heinous crimes.*
- (ii) *Maintenance of SOC Visit Register at the Director's Chamber*
- (iii) *Continuing education in SOC examination.*
- (iv) *Sketch showing relative topography of article(s) and person(s) be prepared*
- (v) *Close-up photography with objective revelation; incorporation of contrast scale before every snap by default.*
- (vi) *Provision of "CFSL" printed, field – friendly, disposable jackets for the SOC team members*

2.9 Court Attendance: The data on the number of occasions the scientists of the three CFSLs testified and the resultant man-days spent are given in Table 2.5. The annual average of court attendance stands at 443, 186 and 176 for Chandigarh, Hyderabad and Kolkata respectively; in that order the average man-days per annum are 630, 518 and 425.

Table 2.8: *Court Testimony Tendered by Scientists of CFSLs (during January 2007 – May 31, 2011)*

Court Evidence	CFSL		
	Chandigarh	Hyderabad	Kolkata
Number of Court Attendance (Annual Average)	1956 (443)	823 (186)	778 (176)
Number of Man days Spent (Annual Average)	2783 (630)	2287 (518)	1875 (425)

Courts of law and similarly placed Commissions of Enquiry etc. form the touchstone for assessing the expertise and competence of forensic scientist, as relevant to the case under trial, be it criminal, civil or others. Attending court and giving deposition, an art and science, is the inherent constituent of forensic service. However, to ensure pragmatic availability of scientists' performance time at the laboratory, there is a provision in Section 293 of the Cr.P.C. that personal appearance of certain notified Government forensic cadres need not be insisted upon by the courts. SPAC did not come across any instance of aberration in this peak portfolio of forensic service dispensation.

2.9.1 Recommendations: The SPAC recommends the following:

- (i) *Maintenance of a Court Attendance Register in the Director's office*
- (ii) *Sharing of every court experience with colleagues in the Division*
- (iii) *Training of newly recruited scientists in this aspect*
- (iv) *Continuing education on court testimony*

2.10 R&D ACTIVITIES

Research & Development in a scientific department should be a passion with the scientists, and this should be kindled and patronized by the organizational system and the laboratory's environment. This is especially true in the context of R&D being stipulated as the integral part of core duty in forensic work. For the CFSLs of DFSS, there has never been a dearth of research funds for hand-holding their incumbent scientists. Activities like validation of technologies used, new technologies adopted/innovated, transfer of technology to other FSLs, and handling R&D projects, which help in continuously upgrading the laboratory processes are considered under the broad ambit of R&D activities of the CFSLs. This area has rather been weak at all the three CFSLs due to continuous reduction in manpower. Observations of SPAC are described hereunder.

2.10.1 Validation of Technologies Used: There has been good number of successful attempts to validate techniques and technologies used in forensic practices.

A. At CFSL Chandigarh

- i) Terminal Ballistic Test Firing
- ii) Mitochondrial DNA Typing
- iii) Isolation of DNA from hair, fingerprints and lip-prints
- iv) Mini STR Profiling
- v) Simultaneous identification of ten constituents of saffron, by LC-MS-MS
- vi) Software for audio – video authentication
- vii) Random sampling method for liquor analysis
- viii) Interpretational approach to blood/urine ethanol estimation by Kozelka and Hine method

B. At CFSL Hyderabad

- i) Visual method for stroke sequence determination using Potovix.
- ii) Analysis of narcotic drugs in forensic samples, by GC-MS and HPLC.
- iii) Examination of pesticides and drugs by GC-MS.
- iv) Employment of LC-MS for identifying RDX/PETN/TNT/HMX
- v) Validation of SRMs by CRMs.
- vi) Analysis of GSR by variable pressure SEM-EDXA
- vii) Digital evidence collection
- viii) Isolation of amplifiable DNA from tooth
- ix) Detection of P30 in semen stains by cost-effective prostate cancer kit

C. At CFSL Kolkata

- i) Y-STR typing
- ii) Autosomal and Y-SNP typing
- iii) Acquisition and analysis of digital evidence

2.10.2 New Technologies Adopted/Innovated: This Avenue has seen some good inputs only from CFSL Chandigarh.

A. At CFSL Chandigarh

- i) First-of-its-kind civilian facility established for ballistic evaluation of bullet proof materials (viz. armour, jacket, patka, helmet, plate, and glass etc.)
- ii) Individualization of digitally manipulated machine-generated documents
- iii) Software system for text and language-independent speaker identification

B. At CFSL Hyderabad and CFSL Kolkata

NIL

2.10.3 Transfer of Technology to Other FSLs

This appears to be an area where CFSLs could have done better. Nevertheless SPAC is happy to record the following:

A. CFSL Chandigarh

Software system developed for “Text and Language-independent Speaker Identification” has been transferred to FSLs of some States namely Maharashtra, Haryana, Rajasthan and Himachal Pradesh.

B. CFSL Hyderabad

- i) GSR kits supplied to police stations
- ii) Manual prepared for cyber crime investigators
- iii) Method for DNA isolation from tooth, transferred to the State FSL, Jharkhand

C. CFSL Kolkata

NIL

2.10.4 Five-year Plan R&D Projects

Most of the R&D projects sanctioned to the three CFSLs are DFSS – funded intra-murals (except the one on Single Nucleotide Polymorphism operated successfully at CFSL, Kolkata during 2008-10 with grants from DST’s TIFAC and DFS). Intra-mural projects have been enabled under Plan and non-Plan sectors. Research activities are also carried out by Junior/Senior Research Fellows, registered for Ph.D. with some University and guided/co-guided by CFSL scientists. Informal in-house research is not out of picture as well.

SPAC noted the mortality of many Plan projects and foreclosure/morbidity of on-going XI Five-year Plan (2007-12) projects, which were formally sanctioned only in July 2010, i.e. after a lapse of more than 3 years of the stipulated date of commencement (April 1, 2007) of the Plan period. In addition, the sanctions given were without any year-wise specific appropriation for specific Heads/Project Activity and Logistics and with irregular release of money. Transfer of the Principal Investigator (PI) of the project and the resulting of PI-only-operable idling equipment, and operation of projects originally ill-conceived, but sanctioned, are two more negative impact makers in the process. Notwithstanding, there are as many limping projects (4 at Chandigarh and 2 at Hyderabad) trying to make some headway before the mandated date of completion namely March 31, 2012.

Recommendations

Under the circumstances, the following are recommended by SPAC:

- (i) *R&D projects should not be proposed and sanctioned, just because funds are readily available under the specific budget head. The project proposals should be more incisively vetted in terms of their feasibility and necessity, and proven competence of the PI and Co-PI(s) before they are approved.*
- (ii) *The R&D projects should be so chosen that their final outcomes results in either speeding up the laboratory examination or encompass exhibits on which conclusive opinion was hitherto not possible by employing the prevailing forensic techniques.*
- (iii) *Each proposal from CFSL scientists should have one Principal Investigator (PI) and two Co-PIs, each with equal responsibilities. Any transfers etc. would then not create a gap in manpower, causing adverse effect on the project's progress.*
- (iv) *More professionalism should be infused into the system of sanction, fund-release, oversight, review, mid-course corrections, and assured deliverables. There are in fact ample models at national research funding agencies like DST, DBT, CSIR, ICMR, etc.*
- (v) *DFSS HQ should constitute Project Advisory & Review Committees (PARC) for every project to periodically monitor and review their progress and suggest mid-term corrections, if any. The minutes of such bi-annual meetings should be critically reviewed at the DFSS HQ, and remedial actions, if suggested, be immediately taken.*

2.11 Publications, Patents, Awards, and Presentations: SPAC has observed that the outcome of R&D work is presented mostly at the local, regional, and national scientific gatherings, which do not undergo any peer reviews. Some of the papers/articles are published in local magazines and police bulletins etc indicating awareness creation; many appear in Indian journals having no citation weight. However, during January 2007-May 2011, good original research papers have also been published in peer-reviewed international journals of repute (10 from Chandigarh along with one Chapter contribution in a book, 7 from Hyderabad, and 35 from Kolkata.). DFSS enthuses and recognizes the contributions through a variety of incentives. The

SPAC is, however, surprised that the productivity (R&D publications, etc) of scientists is not made known or shared within the CFSL itself and among the CFSLs.

No information has been brought to the attention of SPAC about patents granted to any CFSLs. Awards of good standing have been bestowed on many scientists of the three CFSLs. For the year 2007, two scientists of CFSL Chandigarh (Dr. R. M. Tripathi for Chemical Sciences and Shri M. C. Joshi for Document Sciences) were decorated with the Govt. of India Home Minister's Award in 2010.

2.11.1 Recommendations

- (i) *Therefore, a mechanism should be evolved to exhibit every publication within the CFSL, and, also to communicate copies thereof to other FSLs/CFSLs as well as to DFSS Headquarters.*
- (ii) *Innovations, designs, developments and improvements in forensic sampling, methods, kits, techniques, and gadgets should be attempted by CFSL scientists with a passion, and validated in simulated forensic ambience; the deserving ones should then be first processed for patenting, followed by adoption, publication and dissemination.*
- (iii) *DFSS should periodically educate and promote awareness about IPR and Patents amongst scientists of CFSLs.*

2.12 CREATION OF DATABASE

Certain fragmented preliminary attempts have been made in CFSLs to create databases, as given hereunder:

A. At CFSL Chandigarh

- (i) Database for ballistics {as the nodal Centre for Integrated Ballistics Identification System (IBIS) having full-fledged hub, which is capable of acquiring and analyzing data inputs from Hyderabad, Kolkata, and other places like Mumbai}
- (ii) Speaker database (multilingual/10 languages)

B. At CFSL Hyderabad

- (i) Database of software, vendors, and licenses relating to analysis of digital evidence
- (ii) Bomb (forensic) data

C. At CFSL Kolkata

- (i) Database for Y HRD
- (ii) Database for Autosomal and Y-SNP
- (iii) Ballistics data thro' IBIS-Trax 3D Station

Databases of forensic indices are the prerequisite for meaningful recognition, appreciation and acceptance of forensic opinion/report especially

from the viewpoint of statistical weight attributable to its affirmative individualization and therefore reliability. From the perspective of homeland security and preventive forensics, there is more imminent need for such information platforms.

2.12.1 Recommendations

Having observed the relatively inadequate thrust on utilization, maintenance, and dissemination of database, SPAC recommends the following for early action:

- (i) *By every operational Division of CFSLs, databases should be created and updated for sharing with agencies (like NIA) through homeland security linked networks (such as NATGRID).*
- (ii) *Through the CFSL's hub of Forensic Informatics Wing, these databases should be networked with the Main Server located at the DFSS headquarters.*
- (iii) *Preventive and lead-giving forensic indices for database could include (while not limiting to) fingerprints, DNA & RNA profiles, retinal/iris patterns, explosives, firearms, chemical/biological/nuclear warfare agents, voice prints, shoe prints, portraits, hair, fibres, paper, ink, security documents, travel documents, currency, narcotics & drugs, tyres, paints, glass, and soil.*
- (iv) *Provision in law could be contemplated so that manufactures of items of forensic indicator listed as above, are obliged to submit samples to DFSS before releasing them for public consumption.*

2.13 HUMAN RESOURCE DEVELOPMENT PROGRAMMES

Professional human resource development (HRD) programmes are indispensable entity. DFSS earmarks a good amount of funds in their annual budget for HRD and CFSLs invariably utilize that well.

2.13.1 For the CFSL Scientists (Conducted/attended): Figures given in Table 2.6 are self-explanatory pointing to the active attendance by scientists of CFSL at relevant professional development programmes within India and overseas (26, 32 and 82 accounted by Chandigarh, Hyderabad and Kolkata respectively). The overall single digit (4) number of programmes conducted for the fellow counterparts among the three CFSLs is indicative of some reluctance to share expertise and disinterest to ensure uniformity.

2.13.2 Recommendations

To be sure of the trainees' grasp of the training received and to enlarge the benefits thereof, SPAC recommends the following:

- (i) *There should be a rigorous written/oral test at the end of each training course*
- (ii) *The scientist deputed for training should give a presentation to all the scientists of the respective CFSL, within a week after completing the course*

- (iii) *Certification of scientists (and three-yearly Re-Certification) should be made mandatory to ensure that they are serious in learning and re-learning to keep themselves abreast with the latest development in their respective field.*

2.13.3 HRD Programmes for the Scientists of Other FSLs: As evident from the Table 2.6, the mandated support by CFSLs to the State/UT FSLs has not been forthcoming to the desirable extent (five programmes by Chandigarh, nineteen by Hyderabad, and, just one by Kolkata).

Table 2.9: *Training Programmes Attended and Imparted by CFSL Scientists (during January 2007 – May 2011)*

Training		CFSL		
		Chandigarh	Hyderabad	Kolkata
Attended		26*	32+*	82*
Imparted to	CFSL personnel	1	3+	NIL
	Other FSL personnel	5	19+ (318) ^Δ	1 (11) ^Δ
	Forensic users and others	Several (7700) ^{Δ£}	43+ (11602) ^{Δ£}	166+ (5633) ^Δ
	Students	(918+) ^{ΔΨ}	(688+) ^{ΔΨ}	(37+) ^{ΔΨ}

* includes training abroad
+ indicates higher figure
()^Δ approximate number of beneficiaries
£ includes trainees from abroad
Ψ does not include PhD Fellows

2.13.4 HRD Programmes for the Users and Others: Enormous efforts and inputs have been accomplished by CFSLs in educating, enthusing and endearing cross-section of forensic end-users including judges, prosecutors, investigators, and others having direct/indirect involvement and interest in forensics. CFSLs, during the last about 4½ years, enlightened mind-boggling number of participants (figures as 7700, 11602, and 5633 for Chandigarh, Hyderabad and Kolkata respectively in the Table 2.6).

2.13.5 HRD Programmes for the University Students

In another facet of HRD, as given in Table 2.6, several hundred non-PhD students (of post-graduate and under-graduate courses of different State-funded as well as private deemed-to-be Universities from all over India) have been trained by CFSLs. Delivering lectures, administering lab practical, and guiding dissertations have all gone into such training (918 at Chandigarh, 688 at Hyderabad and 37 at Kolkata). While appreciation is tenable for grooming youngsters, the SPAC is seriously seized with the issue of surreptitious erosion of DFSS's/ CFSLs' resources such as the quality mind, time and

efforts of their scientists and the quantifiable costs of facility and consumables.

Recommendations

SPAC therefore recommends that an urgent policy decision be taken on this important aspect that affects the core-scientific performance of the CFSLs.

2.14 Technical Library

2.14.1 At CFSL Chandigarh

Library at CFSL Chandigarh is obviously the best of the lot, having spent about Rs.10 lakhs towards scientific journals (19 international including “Nature”, and only one Indian) during 2010. During the same period, Rs. 6.68 lakhs worth of books have been purchased by defraying all the expenditure from “OE” budget-Head. It was understood by SPAC that action has been taken to go in for e-subscription with effect from the calendar year 2011 and hence hardcopy journal subscription was not proceeded with. Library items of the erstwhile GEQD unit of Chandigarh have been taken into the CFSL mainstream. The number of books available is 6110, organized major discipline wise. The reader-friendly library is managed by a Stenographer, not by a professionally trained Librarian. None of the three CFSLs has internet accessibility in their Libraries.

2.14.2 At CFSL Kolkata

SPAC found that the grossly shabby library in CFSL, Kolkata contained with books dumped all over the floor, dismembered chairs and untidy racks. There are Accession Register(s) and Issue Register without any Visitor Entry Register, as shown by an Administrative Assistant “looking after” the library. There are 4490 books in stock and no scientific journal is being subscribed for many years. Meagre amount of funds from the Head “OE” are spent now and then for buying books. Merger of erstwhile GEQD’s library with 521 books has taken place and stock entries are underway. Scientists seem to have forgotten that there is a scientific Library in their premises.

2.14.3 CFSL Hyderabad

CFSL Hyderabad is a way better with well-kept air-conditioned ambience. For the past four years, the library is not handled by a qualified Librarian, but by a scientist of Physics Division. Popular magazines and newspapers are bought in sizeable number (which ought to be trimmed). Besides a couple of complementary bulletins from the national forensic-user agencies, only one Indian scientific journal “Current Science” is received at the library. Collection of books bought under “OE” stands at 5278. Patronage by CFSL scientists is not that obvious. Stock entry of 3000 books is underway post-merger of the library of former GEQD.

2.14.3 Recommendations

SPAC recommends the following to ensure a proper shape for CFSL libraries and their optimum utilization by the scientists:

- (i) *Importance of library should first be felt by all the scientists. Monthly Journal Club meetings may trigger this.*
- (ii) *Adequate space, infrastructure and facility, including e-accessibility with connectivity to DFSS HQ/National Forensic Library/National Forensic Academy (NFA), should be made available for technical library.*
- (iii) *Library should be manned by qualified Librarian(s) to make it a professionally managed entity.*
- (iv) *Exclusive budget Head for “Technical Library” should be instituted.*
- (v) *Internal Library Committee (comprising Director, one mid-career scientist, and, one younger scientist) may be formed to coordinate and guide.*
- (vi) *Priority should be for procuring scientific journals, books, monographs etc.*
- (vii) *A ceiling of three newspapers (one each in English, Hindi and local language) should be adhered to.*
- (viii) *Popular family magazines should not be a part of the Technical Library.*

2.15 IMPLEMENTATION OF QUALITY MANAGEMENT SYSTEM (QMS)

It has been observed by SPAC that the test methods used in Chemistry Divisions need revision and updating. A limited number and quantity of Standards/CRMs are available, that too without any source authenticity. Similarly Toxicology Divisions also need a repository of Standards of poisons, drugs, insecticides, pesticides, herbicides, pyrethroids etc. Policies and procedures need to be developed to maintain confidence in the integrity of standards. Standard operating procedures (SOPs), currently being used, were documented more than a decade back, when the process of seeking NABL accreditation started. These methods need thorough review for their continued suitability to handle the present trends of crimes, lest they become fully obsolete. Validated methods are to be framed for the examination of post-blast compounds formed from different types of explosions in extreme conditions of temperature and pressure.

2.15.1 Recommendations

Although the NABL quality assurance program is in place in the CFSLs, SPAC recommends that, there is an urgent need for proper periodic review of quality system management, up gradation of SOPs, development and execution of proficiency testing (PT) programmes, validation of developed methods/techniques before use, and continuing re-visitation of quality policies.

2.16 FEEDBACK ON CUSTOMER SATISFACTION

All the CFSLs do not have any organized mechanism for obtaining customer feedback on their services offered. However, on perusal of case files, several instances surfaced to highlight forensic contribution that prevented miscarriage of justice and/or accelerated justice delivery in cases involving

plethora of crimes and civil disputes. Ideal approach for CFSLs would then be to receive and study judgments from the concerned courts. SPAC was shown only three such files. In a feedback on questioned document examination, received from Punjab & Haryana High Court, Chandigarh, the enclosure was a judgment (dated April 19, 2010) of the Hon'ble Judge Suryakant pronouncing "*Expert's Report inspires confidence and deserves to be accepted*". In addition, letters have been received from organizations like ONGC, ECIL, Army Postal Service, Canara Bank, and RBI etc. appreciating the training courses conducted for their staff by CFSL's Document Divisions at Shimla/Chandigarh. Such communications have also been received from CBI for the services provided to them in the examination of questioned documents.

Two judgments could be internet – accessed in the foray of DNA profiling by CFSLs Hyderabad and Kolkata. In the first judgment, pronounced on July 27, 2010 in the High Court of Bombay at Goa in Criminal Appeal No: 48/2009, tribute has been paid in the text ".....sexual intercourse.....has been established beyond a reasonable doubt on the basis of the DNA test.....". The second judgment delivered on April 29, 2003 in the High Court of Delhi in CrI. M(M) 3029/1993 and 5264/2002, it has been observed ".....a report was received from the Central Forensic Science Laboratory, Kolkata to the effect thatis the biological father of".

Customer feedback is necessary to enable the service provider make a continuous self-assessment to feel satisfied and yet improve upon the lacuna and incorporate correctional measures to ensure continual improvements, an essential ingredient of TQM.

2.16.1 Recommendations

- (i) *CFSLs should therefore devise and implement ways and means of obtaining feedback from service seekers on lab opinion/reports.*
- (ii) *Format provided in the Perspective Plan from Indian Forensics (2010) and the one adopted by the laboratories of Alcohol, Tobacco, and Firearms and Explosive (ATF, USA) may be the models.*
- (iii) *The present SPAC – designed "Forensic Service Users' Feedback Form" is given at Appendix-I, which should accompany the lab report.*
- (iv) *Action should be taken to ensure that all Trial Courts/Commissions of Enquiry etc., by default, mark a copy of their judgment to the CFSL Director in every case wherein lab report has been taken on their file.*

2.17 ADDITIONAL OBSERVATIONS & RECOMMENDATIONS

Some of the observations made by the SPAC during this exercise (and simultaneous comments and recommendations thenceforth), do not find appropriate space elsewhere in this Report; they are enumerated hereunder.

- (i) *It is commendable that Annual Action Plan is chalked out by every CFSL and followed up. However, surprisingly there is no uniformity in the contents among them. CFSL Chandigarh has a two-in-one booklet named "Progress Made (under Non-Plan and Plan) (2010-11)" and "Annual Action (Non-Plan and Plan) (2011-12)." CFSL Hyderabad brings out two entities "Annual Achievement Report 2010-11" and "Annual Action Plan 2011-12". CFSL Kolkata adopts, without "Contents" page, a single compilation "Annual Action Plan 2011-12 and Carry Forward Annual Action Plan 2010-11". SPAC understands that all the three mean the same; then they should inculcate uniformity (say, as in the Hyderabad version). Similarly, there has to be uniformity in stipulating and generating Monthly Returns by all the Divisions of CFSLs.*
- (ii) *Whenever initials or signatures are affixed, the date, and the name of the signatory in capital letters should also be incorporated underneath. This is applicable to the staff of CFSLs as well as to the outsiders (like the messenger bringing in or taking back case items, report etc.).*
- (iii) *Registers and Log Books, before being put to use, should be serially page-numbered and a certificate by the competent authority that it contains ---number of pages should be made on the first sheet.*
- (iv) *Entry in registers, instrument log books etc should be made legibly, professionally, and completely.*
- (v) *There should be an immediate exercise by DFSS/CFSLs to ensure availability of log book for every instrument in every Division, as well as uniformity in the instrument log books etc., which are now at variance within the Division, between the Divisions and among CFSLs.*
- (vi) *There should be a policy decision at DFSS and action at CFSLs to withdraw those healthy instruments (irrespective of their cost) that lie unused in the three CFSLs due to their obsolescence and such equipment may be officially gifted to the desiring public-funded educational institutions. There are dozens of such equipments stored in otherwise usable space in the three CFSLs.*
- (vii) *Similarly, certified for condemnation and condemnation-worthy items are available in plenty awaiting disposal as per rules; annual disposal drill may be instituted to clear the "attics". Similarly, the annual drill of physical verification of the Division's inventory should strictly be carried out.*
- (viii) *As recommended in Perspective Plan for Indian Forensics (2010), 7-year-withdrawal-replacement cycle should be initiated for equipment, to ensure that the CFSLs are equipped with state-of-the-art facilities and provide the best analytical tools.*
- (ix) *Planning and implementation should be so robust that in future there should not be a gap of more than one month between the physical arrival of an equipment and start of the operation by the CFSL scientists. It is painful to note that the present time gap may*

extend up to one year plus as was the case with AAS and ICP-MS at CFSL Kolkata.

- (x) Contemporary need-based and futuristic pragmatism oriented philosophy should be developed for indenting and procuring of equipment.*
- (xi) The indoor test-firing range in the corridors of Ballistics Division of CFSL Hyderabad is blatantly unscientific. Within couple of months, this indispensable facility should be in its proper state.*
- (xii) Inputs to SPAC reveal non-cooperation of certain multi-tasking staff (MTS) (Lab Attendant and below). It is, therefore, recommended that overall housekeeping and conservancy work may be outsourced, and fresh recruitment to MTS posts be dispensed with.*
- (xiii) At present, in general, too many numbers are assigned to case files, which again vary among Divisions and CFSLs. There should be single uniform clinching system across the spectrum such as:*

A) For CFSLs

- CFSL Chandigarh: CFSL (C)
- CFSL Hyderabad: CFSL (H)
- CFSL Kolkata: CFSL (K)
- CFSL Bhopal: CFSL (B)
- CFSL Guwahati: CFSL(G)
- CFSL Pune: CFSL (P)
- CFSL Delhi: CFSL (D)

B) For Divisions

- Auio-Video: AuVi
- Ballistics: Ball
- Biology: Biol
- Chemistry: Chem
- Computer Forensic: Compu
- DNA: DNA
- Documents: Doc
- Explosives: Expl
- Physics: Phy
- Toxicology: Tox

In future, depending on the re-designation of Divisions and introduction of new Divisions etc, appropriate abbreviations may be given for their uniformity in usage.

C) Case file numbering

Examples

- CFSL (C)/annualized serial number given by CCR Counter/Admin. Office)/Ball/(annualized serial number of Division case)/2011
- CFSL (H)/...../Chem/...../2011

- CFSL (K)/...../Biol/...../2011
- i) Copy of each interaction (for example: “Case Receipt/Acknowledgement” given by CCR Counter to the case bringing messenger; “intimation to the service seeker” about readiness of report) should be in the case file.
 - ii) Considering on one hand the plight of the customers (wasting time, labour and money) and of the Scientist-Experts of the remotely located (Shimla’s) Document Division of CFSL Chandigarh, and, on the other the absence of any scientific/administrative rationale for such isolation, SPAC recommends its immediate and total relocation to Chandigarh. This step would, additionally, enable the CFSL Director to exercise regular monitoring at Chandigarh itself. Eventually, the Shimla space may be retained as an appendage to NFA, the training arm of DFSS.
 - iii) Designations such as GEQD, Dy. GEQD, AGEQD, and ACIO etc should be dropped and appropriately replaced in alignment with mainstream CFSL cadres; this will enable unambiguous implementation of FCS in career progression, and, automatic accommodation of Document expert-scientists under Sec 293 Cr P C.
 - iv) DFSS may highlight to the Government, the importance of taking on board the experts/scientists of FSLs for core contribution and value addition to various Committees engaged in sensitive/hi-tech activities of national importance such as security documents, travel documents, WMD, etc.

3 EVALUATION OF TECHNOLOGICAL CAPACITY AND CAPABILITY OF CFSLs

3.1 The CFSLs should act as epitomes of quality and high standards for the other laboratories to emulate. Every new research, development, and invention in any discipline of science has potential of application in Forensic Science. Newer, better and more reliable technologies developed in all the disciplines of basic science and engineering need to be harnessed for the fight against crime. The CFSLs should therefore scout around for new developments outside the realm of Forensic Science and adopt them for use in CFSLs, standardize the processes and practices, and disseminate the same to other institutions in the country. CFSLs should also take the lead in creating centralized forensic data banks in a uniform format, so that all the laboratories in India could look for single point accessibility. To perform this yeoman service, the central forensic institutions need to maintain a very high standard of analytical capabilities. In view of this, it was considered appropriate to evaluate the technological capacities and capabilities of the three existing CFSLs and also look for inadequacies so as to ensure that they are appropriately accommodated during the process of re-structuring. With this objective in mind, the SPAC focused their action plan on the following:

- 1) Adequacy of analytical procedures to examine evidence materials received in the laboratory
- 2) Adequacy of scientific equipment required to carry out the analytical procedures
- 3) Adequacy of trained manpower to employ appropriate analytical techniques and equipment, interpret the results obtained, and formulate expert opinions for transmission to the service-seekers.

The SPAC team looked into these aspects in the three CFSLs, and their consolidated observations and comments are discussed further.

3.2 ADEQUACY OF ANALYTICAL PROCEDURES

All the three CFSLs under the administrative control of DFSS have been accredited by NABL, Government of India, as per the guidelines contained in the international standard IS/ISO/IEC 17025:2005, which has now been adopted as Indian Standard. As per this document, the laboratory shall use appropriate methods and procedures for all the tests and/or calibrations being performed within its scope. These include sampling, handling, transportation, storage, and preparation of items to be tested and/or calibrated, and, wherever appropriate, an estimation of the uncertainty of measurements as well as statistical techniques for analysis of test and/or calibration data. It is also mandatory that the laboratory shall use test and/or calibration methods, including methods of sampling, which meet the needs of the customer and which are appropriate for the tests and/or calibrations it undertakes. Methods published in international, regional or national standards shall preferably be

used. The laboratory shall ensure that it uses the latest valid edition of a standard unless it is not appropriate or not possible to do so. When necessary, the standard shall be supplemented with additional details to ensure consistent application. In brief, the clause in the international document stresses use of only the validated test methods, which are termed as Standard Operating Procedures (SOP).

3.2.1 Work Procedure Manuals: The Work Procedure Manuals of the CFSLs describing test methods/SOPs were critically examined to assess whether they serve the intended purpose. The following are the general observations for all the three CFSLs:

3.2.1.1. Observations: The following observations have been made by SPAC. Which are applicable to all the three CFSLs.

- i) Test methods, which are limited to physical examination or are qualitative in nature as well as those which are non-destructive were found to be satisfactory.
- ii) However, there are many chemical tests, in which observation, subsequent to the identification test, becomes the criteria of the evaluation, requires certain minimum amount of the evidence material for analysis. This quantity termed as Limit of Detection (LOD), is to be mentioned in the SOP.
- iii) Limit of Detection (LOD), Limit of Quantization (LOQ) and estimation of Uncertainty of Measurement (UOM) are to be reflected in all the SOPs, in which quantitative measurement of the evidence material becomes important parameter for its evaluation. UOM is also important in physical measurements. It has been found grossly ignored in all the CFSLs for many analytical tests described in SOPs.
- iv) The SPAC noticed that, in the absence of any updated SOP available with the CFSLs, different laboratories gave contradicting opinions, though obviously the same material was examined by them. For example, different opinions were given on CDs of much publicized cases of Anara Gupta and eminent lawyer, Shanti Bhushan. Similarly, different explosives were detected by different laboratories in the same bomb blast case. Some laboratories restrict the examination to ABO blood grouping, which may not lead to any conclusive opinion. Absence of quantification of morphine in opium and cocaine in seizures, does not allow the analysis to meet the requirements of law. Another peculiarity was in the examination and reporting of narcotics cases, for which, one CFSL sends (to the service seeker) two separate reports (one from the Chemistry Division and one from the Biology Division) while another CFSL sends one comprehensive report from the Chemistry Division.
- v) During the scrutiny of case files, SPAC observed that many reports/opinions do not serve any useful purpose either to the investigation agency or to the judiciary. The examples given above are the results of application of non-uniform test methods employed across different laboratories. Such results and expert opinions have not only

created confusions in the minds of investigating agencies, but also question the credibility of the forensic science profession in the country.

DFSS had been seized of this problem for long, because of which they formed committees comprising scientists from the Central/State FSLs to prepare SOPs for each type of forensic analysis, which could be made applicable across the country. Test methods under practice or published in related books or journals were chosen for formulating such SOPs. These guidelines were incorporated in the work procedures by the accredited as well as other forensic laboratories. However, these are more than a decade old and various better techniques have been developed since then.

3.2.1.2. Recommendations

The following recommendations are made to augment and strengthen the credibility of the expert opinions:

- (i) *The Standard Operating Procedures were prepared more than a decade ago. Hence these need to be revisited to ensure that they are up-to-date and contain only standard validated techniques.*
- (ii) *Validation of the methods including LOD for qualitative tests should be reviewed suitably for ensuring their being current.*
- (iii) *LOD, LOQ & UOM are to be reflected in all the SOPs, in which quantitative measurement of the evidence material becomes important parameter. Such test methods need immediate review.*
- (iv) *Uniform test methods (SOPs) should be adopted for similar evidence materials in all the forensic science laboratories.*
- (v) *Uniform pattern of expert opinions (as detailed in Section 2.6.2 of Chapter-2) should be adopted.*

3.2.2 Availability of Standards: The evidence materials frequently received at the CFSLs for forensic opinion are bullets, cartridges, fire arms, blood, semen, skeletal remains, poisons, drugs, explosives, questioned documents, voice samples, CDs, and audio/video tapes etc. Examination is conducted to answer certain specific queries of the investigating agency. Forensic scientist analyses the evidence exhibits originating from sources such as scene of crime, records the observations to generate data, and evaluates both the observations and the data to form a scientific opinion/answer and help in justice delivery system. Such examinations are conducted by performing tests involving chemicals, reagents and analytical equipment. Correctness of the opinion depends on the accuracy of the results, which can be produced only by reliable and validated test methods. Such procedures need calibrated instruments and certified reference materials (CRMs), having international traceability.

3.2.2.1 Observations

I. Certified Reference Materials: The quantitative tests, wherever undertaken in forensic analysis, are required to be precise and also

reproducible so as to have an international acceptability. For the sake of credibility in the test results, such analysis of the questioned samples is always carried out by comparing them with known “reference standards”. If we have no confidence in our reference materials, it will be difficult to trust the accuracy of the results and thus the conclusions drawn from them. Now to have confidence in reference material, its certified value presents the best estimate of its true value. Hence the certificate of a reference material should contain information regarding its name, batch number, supplier, its description, statement of intended use, stability, defining the environment for its storage and transportation, special instructions regarding its appropriate use, method of its preparation for experiments, statement of its certified property, and uncertainty of measurements. Such a reference material having a certificate, as stated above, is assumed to be a “Certified Reference Material (CRM)”. These CRMs are essential for Forensic Science Laboratories for calibration of instruments like AAS, EDX, XRD etc., assessment of analytical technique, and assignment of quantitative values to the results. The calibration of CRMs remains valid for a specified period of time. Even certain organic standard materials have their shelf life. Such CRMs need their periodic calibration or re-testing to know the status of their integrity. Certificates issued by the manufacturers of CRMs also contain instructions for re-testing to maintain confidence in their integrity. The problem of the availability of the CRMs is grave.

The SPAC observed that CRMs are not available in the Chemistry, Explosives, and Toxicology Divisions of CFSL Chandigarh. CFSL Kolkata has some of the standards having traceability to National Institute of Standards & Technology (NIST), USA, as available in its Explosives Division. However, the Explosives Division of CFSL Hyderabad is the best repository of standards traceable to NIST. Other Divisions of CFSL Hyderabad and Kolkata are devoid of such standards. No quantitative analysis is being carried out in the Biology Division, except that of DNA recovery. Control positive and control negative are used to eliminate false positive and negative results of the experiments with biological exhibits. However, none of the Biology Divisions of three CFSLs has control samples of hair of different animals, fibres, plants, seeds etc.

II. Purity of Critical Chemicals: In forensic work, apart from CRMs, various other chemicals are used, the purity of which affects the quality of results. With this in view, the laboratory should evaluate supplies of critical consumables, which affect the quality of testing and calibration, and maintain records of these evaluations and approved list of supplies & suppliers. The SPAC observed that no such tests are being done in any of the three CFSLs.

3.2.2.2 Recommendations

- (i) *Every forensic laboratory must, therefore, have a clear policy and action plan for procurement of CRMs and ensuring the purity of critical chemicals.*
- (ii) *DFSS HQ may create a mini set up similar to NIST (USA) to ensure regular supply of all types of the relevant standard materials required for the forensic analysis.*

- (iii) *Biology Groups of all the CFSLs will have to maintain reference (standards) biological agents for comparison.*
- (iv) *Action has to be taken to identify all such chemicals and their characteristic parameters, and to develop procedures to check these parameters for quality assessment. Subsequently, only such quality-ensured chemicals should be used in the forensic examination of evidence materials.*

3.2.3 Lacuna in Toxicological Analysis

3.2.3.1 Observations: Results of the analysis of toxicological samples with opinion “no common poison could be detected” were found in 70%, 87%, and 80% of the cases examined at CFSLs of Chandigarh, Hyderabad and Kolkata respectively. Such reports/opinions are vague and hence do not convey any tangible meaning to the investigators or to the courts of law.

3.2.3.2 Recommendations

- (i) *The exhibits received at CFSLs for toxicological analysis should be stored at 40C temperature to avoid any further decay. The lab examination should be taken up on priority.*
- (ii) *The opinion should contain the names or classes of poisons screened for in the analysis, to make the forensic report more meaningful.*
- (iii) *Techniques employing GC-MS should be evolved and validated to get information about many poisons simultaneously. Instrument-friendly extracts of viscera samples can be simultaneously loaded in the auto-samplers of GC, GC-MS and LC-MS. These attempts can enhance the chances of detection of unknown poisons in very small amounts in at least some of those cases where poison could not be detected.*
- (iv) *The poison detected in the biological samples should be quantitatively assessed and the internationally accepted “lethal dose” should be mentioned in the Report.*

3.2.4 Adoption of Random Sampling Procedure: In cases of seizures containing a large number of identical samples, statistical methods of sampling are invariably used to reduce the number of samples to be analyzed. It reduces the cost of the analysis and also saves valuable time of the Reporting Officer (RO), to enable him/her to generate forensic report in time. Samples in such a case are given unique number in the very beginning. Samples in packages can be taken as identical, if they are identical in size and weight, bear identical markings, and if the results of one spot test are also identical. This scrutiny is to be done subsequent to the assignment of unique number to each sample. Identical samples are grouped together followed by random sampling from each group.

3.2.4.1 Observations: It has been observed that the correct procedure of sampling is not in vogue in Chemical Science Divisions of the three CFSLs. In one of the instances at CFSL Hyderabad, the RO reported a case (Ref. Case

No. CFSL (H)/EE/2010/15351) without assigning any serial number to the samples received. The court was not convinced that the opinion pertains to the representative samples. The samples with the seal of the RO were returned with a direction of conducting a fresh laboratory analysis of all the samples. This resulted in avoidable efforts.

3.2.4.2 Recommendation: *The internationally accepted standard statistical sampling methods need to be followed in crime cases comprising large number of samples and should be recorded in the file and mentioned in the opinion. Similarly, representative sample taken from a single large size of solid, liquid, or gas exhibits, should also be recorded on the file and mentioned in the opinion.*

3.2.5 Need of Generating Complete Profile of Drug Samples

3.2.5.1. Observations: Opinions issued from CFSLs indicate the presence of a specific drug as an answer to a specific query of the investigating agencies. In cases wherein forensic report reveals mere detection of drug(s), the prosecution argues that the whole seizure should be treated as contraband under Section 2 (xvi) (e) of the NDPS Act for awarding punishment. However, courts do not admit this submission. CFSL Chandigarh conducts analysis to quantitatively estimate the specific drug while others do not. In that case the court considers the amount of the drug detected in the seizures to be covered under the Act. Complete profile of the drug samples along with co-constituents is not generated in any of the laboratories as its importance is ignored. If another drug is detected in the profile of the sample, the whole seizure will be termed as “preparation”, and its punishment is thereafter related to the amount of the seizure.

3.2.5.2. Recommendations

- (i) *Capabilities for generation of data with sophisticated instruments like GC, Capillary LC, and Capillary GC coupled with High Resolution MS, GC-MS-MS and LC-MS-MS followed by statistical analysis of such data are needed.*
- (ii) *Profiling of each sample with quantities more than “small quantity” (vide NDPS Act) is needed for source identification and intelligence to understand the trafficking pattern, and also for creating data bank. This will also help in controlling drug abuse problems, and in planning health services for the treatment of drug addicts.*

3.2.6 Creation of Database of Forensic Indices: Databases as valuable source of information has been well understood by forensic scientists. No such attempts have yet been made at the national level to create data banks and subsequent augmentation by new information. Data banks of DNA profiles of suspects/offenders/criminals/convicts, voice samples of suspects/offenders involved in ransom, bombing and terrorist activities, drugs, poisons, explosive substances, weapons, ammunition, paint, glass, foot wear marks, tyre marks, gems, inks, paper, water marks, revenue stamps, stamp papers, government seals, currency, security paper, features of passports are urgently required. Determination of age/period of documents, which continues to be vexing

problem world over, may be addressed to some extent if databases of related materials like inks, papers, water marks etc. are available for reference purposes.

3.2.6.1. Recommendations

- (i) The scientist should identify many more parameters for database creation, rather than the routine analysis of the case samples intended for submission to the investigation agencies and the courts.*
- (ii) Requisite data for certain items could also be collected from their manufacturers.*
- (iii) All such information will be deposited at a central place, to be managed by another set of personnel. These activities however need manpower with appropriate skills in data bank management. The State laboratories should also be made aware of the advantages of participating in pooling and sharing the data. Further, the requisite data of all the licensed fire-arms in the country are also to be collected and stored at this place.*

3.3 ADEQUACY OF SCIENTIFIC EQUIPMENT

The requirement for the NABL accreditation of any laboratory is that the scientific equipment housed therein must comply with the requirements of international standard IS/ISO/IEC 17025: 2005. This Standard states that, "The laboratory shall be furnished with all the items of sampling, measurement and test equipment required for the correct performance of the intended tests. Equipment and its software used for testing, calibration, and sampling shall be capable of achieving the required accuracy and shall comply with the specifications relevant to the tests concerned. Before being placed into service, equipment shall be calibrated or checked to establish that it meets the laboratory's requirements and complies with the relevant standard specifications". All the three CFSLs under the administrative control of DFSS have been accredited, with their scope of accreditation, by NABL, to test certain specific items with certain specific validated methods involving the use of test equipment. SPAC observed that necessary instruments, required for the test methods, are available in all the three CFSLs. These are housed in congenial environment and are under annual maintenance contracts (AMC). Service engineers of the suppliers maintain their calibration status as per the manufacturers' instructions.

3.3.1 Procurement of Scientific Equipment: SPAC, during its visit to these CFSLs, found that purchase of scientific equipment had been done in a haphazard manner, especially because of long delays in obtaining financial sanction from MHA and then processing of indent by the Procurement Wing. It takes 2-3 years from the time a scientist raises the demand and gets the equipment installed in the laboratory. This results in "somehow" spending the funds allotted to the CFSLs under the head Machinery & Equipment (M&E). It has been found by the SPA Committee that a number of costly equipment, procured by CFSLs, have remained grossly under-utilized. This situation is the result of inadequate advanced planning by the scientists in identifying their

requirement of equipment for the laboratory analysis of evidence material and conducting R&D activities. Administrative pressure may also have had its own impact. In addition, continuous depletion of scientific manpower to handle the sophisticated equipment had also been an added reason for their under-utilization. Holistic view of the laboratory requirement vis-à-vis the available manpower has not understandably been taken while initiating the procurement process.

3.3.2 General Observations for the Three CFSLs: Integrated Ballistics Identification System (IBIS) purchased in 2009, each costing Rs.4.2 crores (cost of AMC-Rs 40 lakhs) for all the three CFSLs under DFSS has remained grossly under-utilized in terms of crime case analysis (viz. 47 cases at CFSL Kolkata, 91 cases at CFSL Hyderabad, and 2232 cases at CFSL Chandigarh). Department of Forensic Science Maharashtra (Mumbai) has used the IBIS hub at CFSL Chandigarh in 86 cases. FSL Haryana also provides inputs to the database. CFSL, Chandigarh being the hub of IBIS, data of fired ammunition and weapons of all the participating laboratories is stored in this laboratory. Data for 2500 cases comprising 7500 exhibits is now stored in this centre. Only few laboratories (Haryana, Mumbai, Hyderabad, and Kolkata) are contributing and sharing the data of fire-arms. Most of the bullet/cartridge comparisons at CFSL Kolkata are still being done with the help of comparison microscope, which remains an old and traditional technique, and the existing scientists have more faith on it. It is incidentally important to take serious cognizance of the recent Safety Audit observation of Intelligence Bureau, wherein it has been recorded that “The IBIS system installed at CFSL to maintain data on Ballistic tests etc. is remotely controlled by the vendor in Canada who may have access to the top secret data maintained by CFSL. The system is linked to main server of CFSL located at Chandigarh and its other centres in Hyderabad & Kolkata. CFSL needs to initiate action to protect its data from unauthorized remote access”.

General slackness was noticed on the part of the scientists of Document Division to use equipment in the examination of exhibits as well as in R&D activities. Even stereo microscopes are not being used in day to day work. Logbooks of major equipments employed in the examination process are not being maintained properly nor their usage recorded in the respective case files.

3.3.3 CFSL-wise Observations: Some of the CFSL-wise observations on other scientific equipment made by the SPAC are given below:

3.3.3.1 CFSL Chandigarh

- i) UV-Vis and Capillary HPLC have been appropriately used for quantitative analysis in drug cases, but apparently without validated methods.
- ii) GC-MS is now rarely used as is evident from about 50 scanned cases of drugs, explosives, and narcotics reported during 2010.
- iii) During perusal of the case files of 2010, it is seen that FT-IR Spectrophotometer has been used for identification of organic explosive substances in post-blast residues. No logic could be found for the

interpretation of IR spectra in these files or on personal discussion with the RO for all such cases.

- iv) HPTLC is not being used for the last four years.
- v) LC-MS-MS was installed in 2007. In response to the SPAC Pro-forma SPAC-13, it was shown as having been used for the analysis of 400 samples. The log book signed by SSO (Chem.) without date did not contain any entry including the above 400 samples. Instrument remained under comprehensive annual maintenance contract during the last two years and the same is continuing till September 15, 2011. There was no entry in this register of any service carried out by the supplier.
- vi) DIBS procured during 2009 for Computer Forensics of erstwhile GEQD has been rarely used (5 entries in the log book), and, about two weeks back, it has been shifted to the Physics Division of CFSL.
- vii) Projectina in Physics Division is out of working order. Image Analyzer System is not used for the last two years, and it is occupying a large space.
- viii) Both Polygraph and EEG (BEOS) procured for Forensic Psychology work are not in use for long for want of trained man-power.
- ix) Kappa Crossing Line Examination System, procured for the determination of sequence of strokes, was not found useful for its specific purpose; but it is satisfying to note that the equipment is being used for alternative purposes in document examination (image enhancement) in Document Division, Shimla. However, Raman Spectrometer has not been much used either for exhibit analysis or for R&D.
- x) There is apparent justification in the requirement of updated versions of instruments like Docucenter-Nirvis, VSC-7000, and Forensic Xp 4010D for ink differentiation, image enhancement etc.
- xi) All the equipment procured for DNA profiling, Voice recognition, Audio-Video Tape analysis, and Computer Forensics are well maintained and are being continuously used, both in case analysis and research. However, some DNA related equipment are awaiting withdrawal/condemnation.

3.3.3.2 CFSL Hyderabad

- i) Scientists are using GC-MS and LC-MS-MS for the analysis of majority of the drug and explosive cases.
- ii) A large number of the cases received in Toxicology Division belong to alcohol analysis in biological specimens. In majority of such cases, the analysis is carried out about six months after the samples are received at CFSL. The samples were found dry, as is evident from the opinions given in the case files. Even the low temperature facility for the storage of samples has not been working since March, 2011. The samples could have dried up either due to faulty sealing on the part of the medical officer or due to improper storage in the laboratory. Timely analysis of the samples would not have resulted into this situation. Head Space GC

with Auto-sampler can help in the quick analysis of such biological samples.

- iii) Three HPTLCs available in CFSL Hyderabad have been rarely used in the case work. Some case entries were found in the respective log-book only for one of the instruments, whereas others have not been used for more than three years.
- iv) One GC-MS in Toxicology Division of CFSL Hyderabad is used for both case analysis and research. Beside, the Division is in an advanced stage of procuring another GC-MS for handling a Plan project, in which the project leader has been transferred. Further, two Research Associates have not been recruited so far for the Plan project, which notionally started in 2007, re-casted in 2009, standing still presently, and, to be completed by March 2012.
- v) Capillary Electrophoresis, FT-Raman Spectrophotometer, TGA-DSC, XRD, and IMS are all out of working order since many years.
- vi) FT-IR, purchased in the erstwhile GEQD Hyderabad in 2006, was installed only in the year 2010 and has been used only in two cases so far, taking the episode nowhere near cost [Rs. 60 lakhs]-effectiveness. Also shocking is that their instruments-room is awaiting installation of UPS for the last several months, making the scientist scary to use the equipment

3.3.3.3 CFSL Kolkata

- i) GC-MS has been used for confirming the identity of drugs, explosives and poisons in majority of such occasions. Confirmation with CRMs is however not practised.
- ii) Many instruments like IBIS, SEM, VSC-2000 and VSC-5000 are not optimally used. LC-MS-MS, GC-FTIR Spectrophotometer, HPLC, HPTLC, UV-Vis, AAS and Fluorescence Spectrometer are either not in use or are out of working order.
- iii) Fourier transform infra-red (FTIR) spectrometer bought in 2003 at a cost of Rs 41 lakhs for ink analysis at GEQD Kolkata could be used only for about 10 cases before it became defective in 2006. Now it is obsolete and waiting for condemnation. Raman Spectrometer, purchased in 2005 at the cost of Rs 25 lakhs, has been used only in 13 cases till now, though fully operational.
- iv) Scanning Electron Microscope-Energy Dispersive X-ray Analyser (SEM-EDXA) purchased in 2009 at a cost of Rs 1.5 corers, meant for trace element analysis including gunshot residue (GSR) analysis, has been used only in 15 cases (including two GSR related cases).
- v) Instruments procured for DNA profiling are maintained well and are continuously used for the analysis of evidence material and in research. There are however many DNA-related equipment which are working but not being used, should be withdrawn. The equipment, which are not working should be condemned.

3.3.3.4 Recommendations

- (i) Compliance to the observations for all the CFSLs, as above, is to be done on priority to ensure that the equipment remain fully functional and are utilized evidence material analysis work.*
- (ii) Methods developed for the analysis with LC-MS-MS need validation.*
- (iii) The instrument's Log book must be strictly maintained for their utilization in evidence material examination with case reference details.*
- (iv) Logbooks of major equipments employed in the examination process are to be properly maintained and their usage recorded in the respective case files.*

3.3.4 New Technologies and Equipment to be deployed: SPAC has examined the capability and capacity of the existing technologies/methods to render forensic service as per the mandate of CFSLs of DFSS. Limitations have also been recognized. Alternative ways and means are hence suggested to address such deficiencies and also to move fast forward.

Recommendations

- (i) Automatic Signature Identification System currently being used by FBI Laboratory, USA should be studied for its affectivity & validity in the Indian context. It may usher in greater objectivity and better efficiency in terms of the output of scientists.*
- (ii) Extraction of Data from Flash Memory of Cell Phones: Cell phones are frequently received in the laboratory for extraction of data such as SMS/MMS, audio-video, pictures, phone directory etc. The data is stored in memory card, internal memory/flesh memory of the phone. Scientists in CFSLs can extract data from memory card, but are not in a position to extract data from flash memory of mobile phones of different types. The FBI (USA) laboratory has developed tools such as Cell Phone Investigative Kiosks (CPIK) for extraction of such data, and also for extraction of data from broken/damaged media such as hard disc, compact disc etc. But their tools and techniques are understandably classified; efforts are needed to have that technology transferred to Forensic Science Laboratories in India.*
- (iii) Extraction of Data from Encrypted Digital Media: There is a need for an advanced Cryptologic and Electronic Device Analysis Facility for decryption of encrypted data received/retrieved from various media. Moreover, when the encrypted data received from Blackberry phone, Skype, Voice over Internet Telephone etc. are to be analyzed; the CFSLs need help from service providers to share the data decryption key. Such enablement is very important to tackle the fast changing trends in crime. Similarly, detection and examination of voice recording through Voice over Internet/Internet telephony is an emerging field. As recorded voice may be encrypted during transmission, more research/validation is needed in this area. CFSL Chandigarh has taken up a project under XI Plan to develop suitable*

techniques to explore this area; however more scientists/engineers need to be inducted to carry out extended research work as the use of Internet telephony is increasing day by day because of its easy accessibility, low cost, and faster communication.

- (iv) Detection of Morphing in Digital Environment: It is a very difficult and challenging task for the experts to detect morphing in digitally edited video/image. The FBI laboratory has developed some software tools for the automatic detection of photo-morphing. Efforts are therefore needed to transfer the technology to India.*
- (v) Facial Recognition from Blurred CCTV Footage: It has been observed that in a large number of cases, the video received from DVR is of very poor quality generally due to low resolution of CCTV camera and distance between the object and the source. Mask on the face of culprit is another compounding factor. Therefore, we need suitable filters and software tools for enhancement of such video recordings to fix the identity of person(s). Some software tools such as AVID System are available to enhance the video quality. Such systems/software need to be inducted in CFSLs. Similar is the situation for enhancement of spurious audio & video recordings. In many cases, the quality of audio/video recording was found to be suffering due to poor quality of recording device, background noise and other disturbances of the surroundings. Authentication of video footage from recordings made in non-linear mode is another difficult arena. A cautious approach is needed for authentication of such recordings. Software tools to enhance the image quality of audio/video recordings and systems like Intergraph that are commercially available for analysis of noisy signals should be made available to CFSLs. Systems like Velocity Q9.1 and other advanced software tools for frame-by-frame analysis as well as for simultaneous but separate analysis of audio & video signals need to be positioned at CFSLs.*
- (vi) Switch over to Digital Photography: Photography (especially of questioned documents) is still being done using conventional black & white photographic films and papers, which have now become scarce in the market. It is stressed that the laboratories should switch over to the contemporary digital camera photography, which is speedier and more economical. Self demonstrative Juxtaposed charts can be got made through this technology in most of the cases with ease and better efficiency. Manipulation protective software, which is now commercially available, should be used for forensic photography and all the documents be photographed and their records be kept in the laboratory for future use in courts etc.*
- (vii) Head Space GC with Auto-sampler for Biological Specimens: There is heavy receipt of specimens of blood and urine for the analysis of alcohol in Toxicology Division of CFSL Hyderabad. Cases are analysed as per chronological order of their receipt. It has understandably become difficult to analyse and report such cases within six months time. Such instruments generally have the capability to analyze about 100 samples a day. Hence 1460 samples*

analyzed during the entire 2010 by four ROs can be analyzed using this instrument and reported by only one RO within 15 days. The system automatically mitigates the issue of possible erroneous results (for the amount of alcohol) given by conventional techniques in (say) situations involving diabetic patients.

- (viii) *Automatic Processing and Extraction of Visceral Samples: Processing of the visceral samples involves cutting, maceration, digestion and then extraction of poisons and drugs therein with organic solvents. There is a serious health hazard for the persons involved in handling the viscera. Such multi-step manual processing consumes a lot of time. The SPAC recommends that “Head Space Gas Chromatograph (HS-GC) with Auto-Sampler should be available in the CFSLs to speed up the analysis of volatiles as in the estimation of ethanol. Procurement of optimally usable equipment, with a facility of automation to digest and extract the viscera, is, therefore, recommended.*

3.3.5 Calibration of Analytical Instruments: Appropriate tools and techniques are required for forensic analysis of the evidence material, sometimes available in traces. The sensitivity, specificity, and rapidity afforded by these instruments will have a direct bearing on the accuracy of the results obtained. In addition, calibration of instruments is equally important for achieving reliably accurate results. Calibration is achieved by employing CRMs/SRMs, and by tapping the instrument's in-built provision/in-built reference library. This is being taken care of by CFSLs in accordance with NABL accreditation.

Recommendations

SPAC is of the view that, once-validated software employed in forensic analysis should regularly be “re-validated” by periodically ascertaining their performance integrity through simulation studies.

3.3.6 Maintenance of Calibration Status: Checking of the calibration status and its maintenance to the accepted levels of accuracies agreed at the time of the procurement, is handled by specially trained engineers of the suppliers of the instruments. It has been observed in the current audit that most of the sophisticated instruments in all the three CFSLs are maintained under Annual Service Contracts, and some of them are comprehensive in nature. Certain instruments procured more than 5 years ago were not found under AMC, because of the reluctance of the firms to enter into such agreement due to non-availability of necessary spares required for their maintenance.

3.3.7 Calibration of Measuring Tools: All the CFSLs are getting their measuring instruments like weights, thermometers, glass apparatus (like volumetric flasks, measuring cylinders, pipettes, burettes, and beakers), measuring tape, measuring scales, hygrometer, ammeters, voltmeters, Vernier callipers, and screw gauges etc. calibrated either from National Physical Laboratory (NPL) Delhi or from NABL accredited commercial organizations. Even ovens and furnaces affecting the quality of the results are getting calibrated from NABL accredited laboratories.

Recommendations

National Institute of Standards and Technology (NIST, USA) - standard bullets and NIST standard casings that are being developed to maintain correctness of measurement with Comparison Microscope and Integrated Ballistic Measurement instruments will have to find space in.

3.3.8 Video Conferencing Facility for Court Testimony: Reporting Officers spend a lot of their time for travel to tender evidence in courts, especially for outstation cases. Creation of video conferencing facility will save the valuable analytical time of the experts and also reduce the financial expenditure.

Recommendation

If deemed fit, DFSS may interact with the competent judicial authority.

3.4 ADEQUACY OF TRAINED MANPOWER

3.4.1 The Present Status of Scientific Manpower: In addition to the case work, the scientists have to visit scene of crime, tender court testimony, conduct R&D activities (including validation of forensic techniques and their dissemination to other FSLs), and develop database for forensic indices. Personnel performing specific tasks shall be considered as qualified on the basis of appropriate education, training, experience, and/or demonstrated skills, as required. It is essential for a forensic scientist to have good conceptual knowledge of his subject of specialization and also a solid foundation of the forensic insights. A good communication skill in preparing the analytical report, interpretation of the results, forming the expert opinion, and then presentation of his findings in the courts of law is, therefore, very essential.

The SPA Committee holds that quality, timeliness, and credibility of forensic service are the most important objectives of DFSS and the CFSLs should be adequately geared up to provide the reports on forensic findings within one month (maximum) to the Investigating Agency or the Courts, as the case may be. This is not becoming possible today due to continuously depleting manpower and increasing expectations of the customers. As per the Govt of India Order No DFSS/15(16)2011/MHA/PM-II dated June 02, 2011 for re-distribution of scientific and ministerial manpower (Appendix-D), some staff of three CFSLs of Chandigarh, Hyderabad and Kolkata have been transferred to the newly created laboratories located at Bhopal, Guwahati and Pune. This has resulted in further shortage of scientific staff. Only one Reporting Officer is in position now in many Divisions, which has virtually stalled their functioning. All the posts of SA, SSA, JSO, SSO, AD, and DD are lying vacant in the Explosives Division of CFSL Hyderabad. It can be seen from Table 3.1 below that there is a large pendency of cases in CFSLs. The existing backlog problem will continue till adequate and well-trained manpower is available.

3.4.2 Need for Continuous Training: Great satisfaction is derivable on witnessing the adeptness of the available scientists in comprehending and

conducting tests and handling instruments. The SPAC's scrutiny of case files has, however, shown that many scientists in CFSLs need to have better understanding of interpretation of the results of the tests conducted and the data generated by them through instrumental analysis. The experimental data noted in many case files is grossly insufficient for drawing appropriate conclusions. Incoherence in logical deduction and incomplete reflection in the framing of opinion have also come to SPAC's attention. Similarly, the concept of "Synopsis" of Case File, as was being practised earlier by Document Experts to enable smooth deposition in courts, is not presently being implemented by any Division.

Table 3.1: *Pending and Unaccepted Cases in Three CFSLs*

Laboratory	Number of cases pending (As on 31. 5. 2011)	Number of cases not accepted (during 1. 1. 2007 to 31. 5. 2011)
CFSL Chandigarh	648	6042
CFSL Hyderabad	967	106+
CFSL Kolkata	1884	413

+: Toxicology Division does not accept cases from certain agencies since 2008; but the Division's response for the number of cases "not accepted" was furnished as 'NIL'

Recommendations

- *The laboratory management should ensure the competence of all the scientific personnel who operate equipment, perform tests on case exhibits, evaluate results, and sign the final reports. Certification of scientists (and re-Certification) by competent authority should enable this.*
- Adequate and well-trained manpower be made available to meet the challenges.
- *Weekly group discussions, monthly journal club meetings, monthly review meetings and biennial discipline-wise brainstorming sessions among colleagues should be in place at CFSLs as enablers to enhance their quality and skills.*

4 STANDARDS ON WORK NORMS FOR EVIDENCE MATERIAL ANALYSIS

4.1 EXISTING WORK NORMS

Work norms for evidence material analysis in forensic science laboratories were prepared in the past and circulated from time to time by the BPR&D/DFS of MHA to various Central and State FSLs for their guidance. The work-norms were last revised in November 2002 for various forensic disciplines and circulated vide BPR&D letter no. CFIs/12(1)2001 dated November 12, 2002 (copy at Appendix-E). These work-norms were formulated on the basis of a 'work-unit', which consisted of one SSO/SO/JSO, two SSA/SA, one Lab. Asst, and one Attendant. During all these years, only fragmented work units have existed due to inadequate scientific strength in most of the Divisions of CFSLs, and hence their turnover/output could not be properly assessed on the basis of these work-norms. It was also envisaged in 2002 work-norms (Appendix-E) that the staff strength shall be reviewed on the basis of these work-norms after every three years. However, no such reviews have so far been conducted. The present exercise is aimed towards that direction.

4.2 LIMITATIONS OF THE EXISTING WORK NORMS

4.2.1 Work Dynamics: The existing multi-partner-unit based work-norms provided scope for divided responsibility without specific accountability, which is traceable only to the Forensic Analyst [Reporting Officer (RO)] and not shared by other members of the work-unit. In the absence of the complete work-unit, non-focused and perfunctory attitude of different constituents of the work-unit is generally visible, which creates an adverse impact on timeliness of the services. This work-unit-based system, however, did not result in improving the efficiency of the evidence material examination. Besides, it has not been able to achieve the required quality standards to meet the desired as well as implied expectations of forensic clientele. The system also did not appropriately take into account the time spent by the scientists on other activities like court attendance, crime scene visit, R&D, and human resource development activities. During the past decade, several forensic laboratories have acquired NABL accreditation necessitating broad changes in the evidence material examination procedures. R & D activities were also undertaken during this period, which diverted substantial human resource. At present, the Analysts utilize only 40-50% of their time for the evidence material examination and the remaining part of the case related work is mostly carried out by the supporting technical staff. The Analysts spend rest of their time on multifarious assignments like procurement of stores, maintenance and upkeep of equipment, SOP development, Quality Management System (QMS) implementation, training, lectures, and other associated duties that dilute their focus on the core area of examination of evidence material. In the multi-partner work-unit-based work-norms, a scientist's individual contribution cannot clearly be identified and evaluated for the total annual output, which has, however, now gained primary importance in career progression through Flexible Complementing Scheme (FCS) of promotion.

4.2.2 Inadequacies Observed in Forming Expert Opinion: Case files for the period January 2007 to May 2011 and a large number of sample files of the year 2010 were perused by the SPA team. The team found a number of shortcomings. The scientific contents of most of the final reports were not found to be comprehensive and the furnished expert opinions were not very clear, precise, and self-speaking. In many cases, the expert opinion contained only the analytical results, without their interpretations. Quantification and probability components in analytical interpretations were found to be missing, even when they were essential from the point of view of legal requirements. Requisite full-dimension work plan was not found, wherever needed and incidences of inconclusive and qualified opinions were high. The expert opinion, on the other hand, should be unambiguous, demonstrative, conclusive, and user-friendly.

4.2.3 Timeliness in the Analysis of Evidence Material: Timeliness in the analysis of evidence material is a hallmark of world-class forensic science laboratory services. It requires optimal number of scientific, technical, and secretarial human resources in CFSLs and DFSS HQ to transform them into world-class forensic institutions. The average turnaround time between the evidence material received and the expert opinion prepared is alarmingly high. This includes “analytical time” as well as the “waiting time” before initiating examination, and statistically ranges from 30 to 610 days (see Table 2.3).

The Forensic Analysts, many a times, adopts shortcuts to quickly dispose-off the cases, rather than formulate a thoroughly comprehensive expert opinion. The apparent reasons are availability of only fractured work-units, running out of time schedules to meet the work norms, and pressures from the forwarding authorities to expedite. Out of the above, the inadequacy of trained human resources and inadequate scientific culture in the CFSLs were found to be the major roadblocks. An attempt has, therefore, been made to re-visit the existing work-norms to counter such inadequacies.

4.2.4 Job Specification of Different Levels of Scientists: *Under the SPAC's present proposal to alleviate the existing maladies, the responsibility of analysis of exhibits and forming the expert opinion starts from the Scientist-B level (the entry point to the scientific cadre under FCS) who would first undergo dedicated induction-level training programme for a duration of one year. The lateral-entry scientists at the higher posts will also undergo initial dedicated forensic training for six months, if they are new to the field of forensic science laboratory functioning. The underlying philosophy behind these recommendations is that the levels of Analyst should be broadened to Scientist-B, -C, -D, and E levels, so that the scientists up to fairly senior levels also directly contribute to the evidence material examination and provide their expertise developed over the years. This will ensure that the quality of forensic opinions/reports goes up and conclusive opinions are given even in the most complicated cases. The proposed work distribution for scientist-B upwards in the Division's hierarchy is given in Table 4.1.*

Table 4.1: *Job Specification for Various Levels of Scientists*

Category	Job Specification
Scientist-B	<p>1st year</p> <p>Induction training at NFA (LNJN NICFS) for the first six months after he/she joins the CFSL. During the subsequent six months, he/she will be attached, on full-time basis, with senior scientists for on-the-job practical training at the CFSL, where he/she is posted.</p> <p>2nd year</p> <p>For the first six months- 40% of time for crime exhibits examination and expert opinion in simple cases, 40% of time for R&D, and 20% time for attachment with seniors for on-the-job training in complicated cases.</p> <p>During the subsequent six months- 60% of time for crime exhibits examination and expert opinion, and 40% of time for R&D.</p> <p>3rd year</p> <p>80% of time for crime exhibits examination and furnish expert opinion, and 20% of time for R&D.</p>
Scientist-C	80% of time for crime exhibit examination and expert opinion and 20% of time for SOC visits and R&D
Scientist-D	80% of time for crime exhibit examination, expert opinion & supervision, SOC visit, and Quality Management. 20% of time for, R&D, and other activities of the Division.
Scientist-E & F	30% of time for crime exhibit examination, expert opinion & thorough scrutiny of all the case files of the Division, to take follow up actions to ensure quality & timeliness of laboratory output. 70% of time for overall guidance to junior Analysts in difficult cases, mentoring, SOC visits, R&D, database, training, laboratory management, technology selection & procurement, trouble shooting, and general administration of the Division.
Scientist- G	Thorough scrutiny of randomly selected reported case files, ensure quality & timeliness of the laboratory output, creation of new facilities, monitoring the R&D programs, technology induction, procurement, customer satisfaction. he will be responsible for the general administration of the laboratory, establishment, finance and management of common infrastructural support.

4.3 PROPOSED SINGLE-SCIENTIST-BASED WORK UNIT

4.3.1 The SPAC is of the view that the existing system of “multiple-scientists-unit” based work norms has many limitations and cannot sustain in the changed scenario, and hence there is an urgent need to introduce a more realistic and sustainable approach. The form of “single-scientist-based unit”, as suggested in the Terms of Reference for the SPA Committee, was considered for evolving modified work-norms, henceforth termed as “work-norms”. With the induction of FCS for promotion, single-scientist-based work-norms with full technical support services and provision of proper supervision at the required levels are the only alternative to assess the requisite scientific performance of individuals. The proposed system shall also consider the time spent by individual scientist in other activities, such as scene of crime (SOC) visits, court testimony, R&D, database generation, supervision of case analysis, HRD, and other miscellaneous administrative functions, whenever assigned.

4.3.2 In the proposed system of single-scientist-based work-norms, the technical support personnel are not assigned to the individual scientist, as in the earlier system, but are pooled together in the Division for optimum utilization of their technical services. The technical staff will provide the requisite technical support to the Analysts during the evidence material examination. All the technical and instrumental facilities present in the laboratory of the Division will also be maintained by the technical staff under the supervision of the Division in-charge.

4.3.3 The work-norms based on single-scientist unit have been computed on the basis of overall work output data received from different CFSLs for the period January 2007- May 2011. The team visited the laboratory work stations of each CFSL under DFSS and studied the processes and protocols adopted therein. Detailed discussions were held with the working scientists at different levels and the case files for year 2010 were also seen. More than 15 files of every discipline were randomly picked up for micro-level studies on quality and timeliness of the case work. The computations were made on the basis of the average percentage of time spent by a scientist in case examination and furnishing expert opinion in randomly selected case files and the available fractured work unit examining the crime exhibits.

4.3.4 While evolving the work-norms, the SPA Committee laid emphasis on two major aspects i.e. quality of the expert opinion and its timeliness. Case exhibit analysis and its interpretation is the core function of the forensic science professionals and hence the Analysts (Scientist-B upwards) should be impressed upon that they should focus their efforts towards the evidence material related forensic domain. The output of every world-class forensic science laboratory is measured through the quality of the expert opinion and its court testimony to provide truthful and robust evidence. The other constituents of the core area are case-related R&D, court testimony, crime scene visits, database, and training.

4.3.5 The laboratory should develop a good scientific culture and healthy scientific environment so that scientists up to the rank of scientist ‘F’ enjoy independently working in the lab and feel the pride and a sense of job satisfaction, rather than merely supervising the work of their juniors. All the

mundane activities need to be taken away from the scientists up to the Scientists-D level and be centrally handled by the Division in-charge, who should be provided with exclusive human resources for this purpose. The Committee is of the strong view that an efficient forensic science laboratory should take a maximum of 4 weeks time to furnish an unambiguous expert opinion, while maintaining its quality.

4.3.6 The SPA Committee felt that the examination of the evidence material and furnishing expert opinions may have global ramifications and hence they should be so comprehensive that they are internationally acceptable. The CFSLs should, therefore, grow as scientist-based institutions for their sustainability, as the job functions are mainly creativity-based scientific research and value-based support services, requiring appreciation of scientific interpretation of findings during court testimony. *The SPA Committee is of the view that the ratio of single-scientist work-unit to the supporting technical staff (comprising 1 Technical Assistant from the pool) of 2:1 will be the right proportion for achieving optimal efficiency. For this purpose each Division will have fully trained technical staff responsible for assisting in handling exhibits and operation, trouble shooting, and maintenance of equipment and Stores. Further, each Division will have a Data Entry Operator (DEO) whose services will be utilized by the HOD and the Analysts.* The proposed work-norms package also envisages phased dispensation of multi-task staff (MTS) primarily by out-sourcing the housekeeping work and by avoiding fresh recruitment to such cadres (Laboratory Attendant downwards).

4.3.7 The Concept of Normalized Case: While evaluating how many cases can be completed by a work-unit in a prescribed time, it is important to consider how many exhibits the specific case contains. A case may have only one exhibit to analyze whereas the other may have hundreds or even thousands of them. With this in view, the concept of “normalized case” has been evolved for precise evaluation of the total annual output vis-à-vis the work-norms. The new Work-norms are, therefore, arrived at by considering a maximum number of exhibits undertaken for conducting laboratory examination, is to be called as one “normalized case” and these figures have been computed for various forensic services in evidence material analysis. With the above in view, the evidence analysis work-norms for single-scientist-unit for various forensic services provided by CFSLs, as worked out by the SPAC.

4.3.8 The single-scientist-unit work norms for evidence material analysis have been computed on the basis of availability of total of 180 working days in a year and seven hours on each working day. The total time taken for examining the evidence material is considered to be the sum of the time taken for various sub-activities as detailed hereunder.

- Average time taken by an Analyst for checking, opening and processing of all the evidence materials (T_1)
- Average time taken by an Analyst in conducting preliminary tests for all the evidence materials (T_2)
- Average time taken by an Analyst in conducting confirmatory tests for all the evidence materials (T_3)

- Average time taken by an Analyst in documentation of expert opinion including interpretation of analytical results for all the evidence materials (T₄)
- Average time taken in technical audits and administrative reviews of the expert opinion (T₅)

Therefore, the total time ($\sum T$) taken for examining the evidence material, pertaining to one case, is

$$\sum T = T_1 + T_2 + T_3 + T_4 + T_5$$

Hence, the total number of cases to be examined by an Analyst in a year, termed as 'Work Norm', is evaluated as:

$$\begin{aligned} \text{Work Norm} &= \frac{\text{Time available to an Analyst in a year}}{\sum T} \\ &= \frac{180 \times 7 \text{ hrs.}}{T_1 + T_2 + T_3 + T_4 + T_5} \end{aligned}$$

The time taken to complete the individual sub-activity for different types of evidences/analyses was considered by the SPAC and the large sample values were clubbed together to get a gross average time estimate for various activities.

4.3.9 While evaluating the revised work-norms, SPAC has given primary importance to the quality requirements for evidence material analysis, interpretation of results, and formation of unambiguous, demonstrative, conclusive and self-speaking expert opinion (including quantitative analysis, probability, and estimation of uncertainty of measurements, wherever applicable). The work-norms for single-scientist based work-unit for different forensic services are proposed in Table 4.2.

Table 4.2: Facility-wise Proposed Work-norms

S. No.	Forensic services	No. of Normalized Cases ^α to be examined /year ^β by single-scientist work unit ^δ of the Division	Scope ^ε
1.	DNA Profiling	80-100 Normalized Cases <i>(Each normalized case consisting of up to 5 exhibits)</i>	DNA Profiling as per the requisite SOPs
2.	Narcotics, Drugs of Abuse, and Spurious Medicines	120-150 normalized cases <i>(Each normalized case consisting of up to 10 exhibits for qualitative</i>	Detection and estimation of narcotics and drugs under NDPS Act and profiling their co-constituents for quantities greater than "small quantity", as defined

		<i>analyses or 5 exhibits involving one quantitative analysis or 1 exhibit involving five quantitative analyses)</i>	in NDPS Act.
3.	Explosives, Bombs, IEDs	120-150 Normalized Cases <i>(Each normalized case consisting of up to 5 exhibits)</i>	Analysis of post-blast explosive residues, IEDs, Unexploded explosive material, examination of pyro-technics etc., as per the requisite SOPs.
4.	General Chemistry (Including Fire, Arson)	120-150 Normalized Cases <i>(Each normalized case consisting of up to 5 exhibits)</i>	Arson, fire accelerants, General / Instrumental Analysis of Chemical substances as per the requisite SOPs.
5.	Toxicology	120-150 Normalized Cases <i>(Each normalized case consisting of up to 5 exhibits)</i>	Identification & estimation of poisons as such and in visceral and other body samples in poisoning cases and detection & estimation of over doses of drugs in biological samples as per the SOPs.
6.	Counterfeit Consumer Goods	120-150 Normalized Cases <i>(Each normalized case consisting of up to 5 exhibits)</i>	As per the SOPs to be generated
7.	Chemical Warfare Agents	120-150 Normalized Cases <i>(Each normalized case consisting of up to 5 exhibits)</i>	SOP for characterization of chemical molecules to be finalized by a specialists group
8.	Arms & Ammunition	100-120 Normalized Cases <i>(Each normalized case consisting of up to 5 exhibits)</i>	Firearms & Ammunition identification, Bullet examination, Range of firing, Time of firing, GSR residue analysis etc. as per the requisite SOPs.

9.	Questioned Documents	<p>120-150 Normalized Cases</p> <p><i>(Each normalized case consists of conclusive/qualified opinion pertaining to:</i></p> <ul style="list-style-type: none"> a. Authorship of one person (or), b. Typewriting (or), c. Alteration/indentation/sequence of stokes (or), d. Seal stamp impression (or), e. Age of documents (or), f. Combination thereof (or), g. Other related examinations 	All types of questioned documents examination as per the requisite SOPs.
10.	Counterfeits (Currency, Security Documents, Travel Documents)	<p>120-150 Normalized Cases</p> <p><i>(Each normalized case consisting of up to 5 exhibits)</i></p>	All types of questioned currency, security/travel documents examination as per the requisite SOPs.
11.	Prints & Patterns (Fingerprints, Footprints, Iris Pattern & others)	<p>100-120 Normalized Cases</p> <p><i>(Each normalized case consisting of up to 50 exhibits)</i></p>	All types of prints & patterns examination / comparison as per the requisite SOPs.
12.	Photo Parleys & Photo Fits	180-200 cases	As per the SOPs
13.	Metallurgy & Materials Source Correspondence	<p>100-120 Normalized Cases</p> <p><i>(Each normalized case consisting of up to 5 exhibits)</i></p>	Physical measurements, morphological and structure examination, Trace elements profiles, Tool marks, Deciphering of erased marks, Counterfeit coins, Fibers & fabrics, glass/ plastics, etc. as per the SOPs.

14.	Computer and Network Forensics	150-180 Normalized Cases <i>(Each normalized case consisting of up to 45GB exhibits)</i>	Retrieval and analysis of computer data as per the requisite SOPs.
15.	Audio/Video Authentication and Speaker Identification	80-100 Normalized Cases <i>(Each normalized case consisting of up to 5 exhibits pertaining to one speaker or one exhibit for authentication)</i>	Speaker identification/ Authentication of audio / video recordings as per the requisite SOPs.
16.	Hand-held Device Forensics (Mobile Phone, Palm-top Computers etc.)	200-250 Normalized Cases <i>(Each normalized case consisting of up to 10GB exhibits)</i>	Retrieval and analysis of memory card, SIM card computer data, as per the requisite SOPs.
17.	Image Processing	80-120 Normalized cases <i>(Each normalized case consisting of up to 5 exhibits)</i>	Video image enhancement/authentication as per the requisite SOPs
18.	Polygraph	80-100 Normalized cases <i>(Each normalized case consisting of up to 1 subject)</i>	Lie detection tests, as per the requisite SOP
19.	Brain-mapping, Other Non-invasive Cognitive Response Analyses	80-100 Normalized cases <i>(Each normalized case consisting of 1 subject)</i>	Tests as per the requisite SOP
20.	Narcoanalysis	80-100 Normalized cases <i>(Each normalized case consisting of 1 subject)</i>	Tests as per the requisite SOP
21.	Analysis of Nuclear Materials & Devices	80-100 Normalized cases <i>(Each normalized case consisting of 5 exhibits)</i>	SOP for radio-isotope analysis to be finalized by a specialists group

^αWhere quantification of “normalized case” is not amenable, the HOD, in consultation with the QM, may come out with appropriate quantification, and proceed thereupon.

^β 180 working days/year (this includes Govt. prescribed leave/holidays and other contingencies)

^δ One technical staff from the Division pool will be shared by two Reporting Officers. Instrumental support by two dedicated Lab Assistants per Division, and stenographic assistance (by one Stenographer in each Division) will be shared by all Reporting Officers. Housekeeping and conservancy will be ensured by outsourcing. Scientific quasi-ministerial activities, such as maintenance of Division Case Register, inter-Divisional/Sectional liaison etc. will be handled by one Technical Assistant (to be known as staff TA) attached to the Division In-charge.

^ε All the requisite tests should be conducted as per the SOPs with comprehensive expert opinion to be submitted within a maximum of 4 weeks. The scope of the work also includes court testimony by the scientist concerned.

4.3.10 Organizational Values

The above work-norms have been evolved with the assumption that the complete system functions with optimal efficiency and fosters appropriate scientific culture in the organization. With the mission of customer-satisfaction based prime objective and globally competitive forensic services through quality, technology, and innovation, all the CFSLs should be internally aligned and externally focused to achieve the work norms. Leadership at every level should be “motivator and facilitator” to all the stake holders rather than being a mere “controller and enforcer” and, thus, strive for higher employee satisfaction. A feeling of ownership and the sense of belonging should be inculcated in each cadre, to ensure that they feel proud of being part of the organization. These are a few remote measures to ensure that the mandated objectives of quality and timeliness in providing forensic science services to forensic clientele are fully achieved.

5

NEW STRUCTURE OF CFSLs

5.1 Internal as well as external threats from terrorist activities have now become a global phenomenon and they are continuously affecting the “homeland security”. All the countries are making concerted efforts to foil and prevent the evil and protect the homeland by employing a varied set of strategies. India is facing a major challenge of unrest and atrocities from Maoists and Naxalites on one hand and escalated cross-border terrorism on the other. Iron hand control of organized terrorism in Punjab (1980s/1990s) through the Operation Blue Star illustrates the country’s determination to quash lawlessness and rebellion.

Role of forensic science in homeland security is being ascertained in recent times, especially after its major contribution in the investigation of terrorist atrocity (September 2001) in the USA. It needs extrapolation of conventional forensics for the new role, institutionalization of specialized forensic science capabilities, and operational integration with the agencies handling intelligence, law enforcement, investigation and Defence. Some of the examples are reconstruction of crimes, health threats and catastrophes; management and identification of victims in disasters; DNA profiling of own people and of enemies; development of diagnostic assays, reference collection of biological agents for comparison, and bio-containment laboratories for handling and investigating bio-crimes/bio-terrorism; and integration of security enabling biometrics and proactive intelligence.

Forensic science is capable of providing intelligence support to investigations for the prevention, interdiction, disruption, attribution, and prosecution of terrorism for homeland security. Fresh avenues of threat (e.g., nuclear radiation and anti-forensic techniques) pose more severe problems. However, there are ways and means to address them through innovative implements, integrated databases, and informative intelligence. National Investigation Agency (NIA), Multi-Agency Centre (MAC), National Intelligence Grid (NatGrid) and National Counter-Terrorism Council (NCTC) are some of the recent Indian strategic projections in this context. Employment of conventional, emerging and futuristic forensics for homeland security is of urgent concern in the face of global, external and internal threats. From the imminent perspective of homeland security, thrust forensic areas for practice and R & D have been identified in the *Perspective Plan for Indian Forensics (2010)* for swift adoption. Some of them are new to the Indian forensics arena, while some are being practiced in a limited manner.

5.2 MANDATE FOR CFSLs

With an aim to provide forensic science support to the Homeland Security during national exigencies including natural calamities, the proposed mandate for the CFSLs is detailed below:

- 1) To provide forensic science services to Homeland Security, to Justice Delivery System and, to the States in emerging areas, on mutual agreeable condition.
- 2) To carry out R&D for innovation of technologies and create new scientific knowledge for achieving excellence of S&T applications in Justice Delivery System.
- 3) To develop databases of various forensic indices.
- 4) To validate new technologies and their transfer to the State/UT/Central Forensic Science Laboratories.
- 5) To organize skill development programmes.
- 6) To develop linkages with related important scientific institutions and State/UT FSLs under their jurisdiction.
- 7) To assist DFSS in implementation of QMS and development of forensic science laboratories in the States of their jurisdiction.
- 8) To provide necessary assistance in management of disaster and crime scenes.
- 9) To act as referral FSS Institutions for evidence material examination. Every CFSL would serve as the "Lead Laboratory" for the States under their jurisdiction (as defined at the Para 1.9 of the Chapter-1)

This is a totally new mandate to the functioning of the CFSLs, which requires their complete re-structuring to effectively meet the country's forensic demands in the prevailing national as well as global scenario. The existing three CFSLs, the upcoming three and the herein-SPAC-proposed one for Delhi will all fall in the same line.

5.3 EXPERTISE TO BE CREATED AT EACH CFSL

To meet the new enlarged and focused mandate, re-engineering the CFSLs would require modification of certain existing operational units of analytical techniques, de novo creation of hi-tech analytical processes, and creation of databases for a large number of forensic indices. Expertise is to be in place at each of the CFSLs to handle the following broad categories of services/cases:

- ❖ **Terrorism and Counter-terrorism** (Cyber Crime, Computer Hacking, Classical/Electronic Documents, Encryption/Decryption, Image Processing, Biometrics, Audio/Video Authentication, Mobile Intercepts, Tracking mobile phone signals, e-mails, threat letters, and Forensic Databases of Photographs, Fingerprints, Iris Patterns, DNA Profiles, and Voice Prints)
- ❖ **Weapons of Mass Destruction (WMD)** (Biological Warfare, Chemical Warfare, and Nuclear Warfare)
- ❖ **Smuggling/Contraband Products** (Narcotics & Drugs of Abuse, Explosive Substances, Super-poisons, Arms & Ammunition, Wild Life and Human Trafficking)
- ❖ **Computer Crimes**
- ❖ **Counterfeit** (Currency, Travel Documents like Passport, Visa etc., Access Cards, and Gems & Jewellery)

- ❖ **Explosion, Fire and Arson**
- ❖ **Mass Disasters** (Rail/Road/Air Accidents, Natural Calamities, and Formation of Rapid Response Forensic Teams)
- ❖ **Identification of Mutilated Dead Bodies and Missing Persons, and, Restoration of Kinship**

These categories of forensic science service are either already available across the Divisions of CFSLs (though some in part only) or warrant augmentation of the present capacity as well as capability. The situation also calls for strategic consolidation and redeployment of resources. For example, with respect to creation and updating databases at the operational Division level, and, management of “Hub” at the Forensic Informatics Division level networked with Main Server at DFSS HQ, meant primarily to be of forensic intelligence use in homeland security, fresh start is needed first by a think-tank session among the chiefs of NIA, DRI, IB, RAW, NatGrid, and DFSS in order to ascertain their (customers’) exact requirement for its ultimate reflection in the design of the database template, in the sourcing for data extraction and in the data entry operation. Considering the formation and deployment of Rapid Response Forensic Teams (RRFT), the approach should be to plan their ever-readiness. RRFT-duty roster may be drawn up every year in such a way that a group of six scientists (comprising one Scientist B/C/D/E each from Criminalistics, Chemistry, Human Identification, and Digital Forensics, one Forensic Photographer, and one Fingerprint Expert), headed by a Scientist E is on-call-duty for a week for SOC visit/examination, and, as needed request additional input/service from any specialist-colleague(s).

5.4 DISCIPLINES TO BE HANDLED IN EACH CFSL

The SPA Committee therefore proposes that the following broad activities should be handled in all the CFSLs of the DFSS, with each discipline-wing comprising the designated Division/ Facility/ Capability. The hi-tech sounding designations imply and include the relevantly associated classical/ conventional forensic analyses.

5.4.1 Human Identification Group: This Group would be responsible for handling the following types of forensic analysis:

- Autosomal DNA Profiling
- Mitochondrial and Y-DNA Profiling
- Forensic Anthropology
- Microbials Analysis
- Wild Life Forensics

5.4.2 Chemical Sciences Group: This Group would be responsible for handling the following types of forensic analysis:

- Narcotics, Drugs of Abuse, and Spurious Medicines
- Explosives, Bombs, IEDs, Fire & Arson
- General Chemistry including Poisons
- Chemical Warfare Agents

- Food Adulterants and Counterfeit Consumer Goods

5.4.3 Criminalistics Group: This Group would be responsible for handling the following types of forensic analysis:

- Arms & Ammunition
- Questioned Documents (Classical & Electronic), Counterfeits (Currency, Security Documents, and Travel Documents)
- Fingerprints, Footprints, Iris Patterns and Other Prints & Patterns
- Photo Parleys and Photo Fits
- Trace Materials
- Crime Scene Management & Rapid Response Forensic Team

5.4.4 Digital Forensics Group: This Group would be responsible for handling the following types of forensic analysis:

- Computer & Network Forensics
- Mobile Phone Forensics
- Audio-Video Authentication
- Image Processing

5.4.5 Forensic Psychology Group: This Group would be responsible for handling the following types of forensic analysis:

- Polygraphy
- Brain-mapping
- Narco-analysis
- Other Non-invasive Cognitive Response Analyses

5.4.6 Physical Sciences & Engineering Group: This Group would be responsible for handling the following types of forensic analysis:

- Road/Rail/Air Accidents (Analysis of Materials and Recording Devices, and Reconstruction)
- Nuclear Forensics (Analysis of Materials & Devices)

5.4.7 Forensic Informatics Group: This Group would be responsible for handling the following types of forensic enablement:

- Databases Hub (Creation, Maintenance, Comparison, Dissemination and Updation)
 - ◆ DNA and RNA Profiles
 - ◆ Portraits, Iris Patterns, Fingerprints, and Voiceprints
 - ◆ Firearms
- National Forensic Information Resource Centre

The database hubs of these Groups of the CFSLs would, in turn, be networked with the main server at DFSS HQ Similarly, forensic e-library of the

CFSLs would be networked with the National Forensic Information Resource Centre at DFSS HQ.

5.4.8 Quality Management Group: This Group would be responsible for handling all the activities of quality implementation, including the following:

- QC/QA unit
- Laboratory Information Management System

5.4.9 Business Office: This office would be responsible for handling all activities related to case files and exhibit tracking system.

5.4.10 Administration Division: This Division would be responsible for handling the following activities:

- Establishment
- Procurement and Stores
- Finance & Accounts
- Estate Management
- Security, Safety, and Vehicles
- Legal Affairs (PR, RTI, Court Cases, Complaints, and Grievances)
- Rajbhasha Implementation

5.4.11 CFSL Director's Secretariat: To ensure continuous improvements in the quality, quantity, as well as the timeliness of the scientific outputs, each CFSL shall be headed by Director, preferably a Scientist-G. The duties include thorough scrutiny of randomly selected reported case files, ensure quality & timeliness of the laboratory output, creation of new facilities, monitoring the R&D programs, technology induction, procurement, and customer satisfaction. He will be responsible for the administration (technical & general) of the laboratory, establishment, finance and management of common infrastructural support.

5.5 SECURITY MEASURES TO BE ADOPTED

The CFSLs have a large number of high-tech facilities with costly equipment for the analysis of evidence materials collected from the scene of crime. These CFSLs deal with terrorist cases, murder cases, cyber crime, money laundering, and fire arm cases and hence they face threat from the terrorists and the criminals whose cases are being examined. The security measures at most of the CFSLs are not fully fail-proof in identifying any external intrusions and monitoring of movements of undesirable elements within the premises. All the three CFSLs share the campus with Central Detective Training Schools (under BPR&D/MHA) and hence the security arrangements have to be inclusive. The Documents Division of CFSL Chandigarh at Shimla does not have any trained security guard in the premises. As the case exhibits, including computer storage devices, are kept in the premises, strict vigil is essential to prevent wilful damage/theft by insiders/vested interests. *A missing iPhone from GEQD Hyderabad, which was sent as a crime exhibit by Delhi Police, in May 2009, could be mentioned as a case in point.* A large number of

students visit the laboratories for pursuing various courses and research work, consult library, which may result in security lapses. In view of the above, the following measures are recommended for strengthening the security of these CFSLs:

- (i) *Strict access control measures using Door-frame Metal Detectors (DFMDs) and Hand-held Metal Detectors (HHMDs) are essential for checking and frisking at the main entrance and entry points of laboratories. Baggage scanner should also be installed at the entry point.*
- (ii) *CCTVs are recommended to be installed at all the strategic points to detect any suspicious movement.*
- (iii) *Smart card system is recommended to be introduced for access control of the employees.*
- (iv) *Laboratory areas are recommended to be divided into zones, in view of the sensitivity of the examinations being done, with the windows of the laboratories secured by iron grills.*
- (v) *The security of Laboratory records is also recommended to be ensured.*
- (vi) *Electronic surveillance measures with proper lighting should be incorporated in the Campus.*
- (vii) *Security at the main gate should be upgraded. CISF should preferably be deployed to man the security of all the CFSLs. In case it is not possible to deploy CISF, SPF should be entrusted with the job.*
- (viii) *The respective CFSLs should get the antecedents of the contractual staff verified through the local police rather than leaving it on the contractor. Services of the outsourced staff should be utilized only for the non-sensitive functions.*
- (ix) *Case Reports stored in the computer systems should be removed after examination of the exhibits and the report is dispatched. Back up should be taken, which can be preserved after proper sealing. Use of CDs and Pen Drives for storing case reports should be dispensed forthwith.*
- (x) *Forensic Analyst should be accountable for the safe custody of case exhibit(s), as any missing/theft of these exhibits could adversely affect the case under investigation. Besides, these missing objects could be replaced or tampered with by the miscreants.*
- (xi) *Documents Division should have a separate access control to prevent entry of visitors.*
- (xii) *Visit of students from different colleges/laboratories to the lab be discouraged; instead, they could be taken to conference hall for briefings by the experts.*

- (xiii) *Computers having the Internet connection should not have classified information stored on them. Internet connections should not be given to computers used for processing classified or sensitive organizational work. All the stand-alone computers should have passwords, which should periodically be changed.*
- (xiv) *Intercom facility should be provided at the main gate.*
- (xv) *Relevant registers (Log-in Records) in respect of visitors, photocopy machines, etc. should be maintained as per the Manual of Departmental Security Instructions, issued by MHA in 1994.*

5.6 FIELD OF WORK IN EACH GROUP/DIVISION

Prioritized portfolios are listed below.

- Analysis of Evidence Material
- Scene of Crime Visit
- Court Testimony
- R&D including Technology Validation
- Database Creation and Updating
- Skill Development Programme
- Implementation of QMS
- Customer Feedback
- Scientific Interaction
- Regulatory Work

5.7 RESOURCE REQUIREMENT

5.7.1. Human Resource: Effective forensic scientists move with ease between the world of cutting-edge science & technology and that of analysis of evidence material obtained from the crime scene. Senior scientists in the laboratories serve as catalysts for the younger scientists and expand their horizons in analytical skills. In fact, every crime case received in the Laboratory is unique and hence has to be handled in the research mode. It requires critical reasoning and integrated thinking of forensic domain knowledge, which leads to self-discovery, a powerful path of learning. It is essential for a forensic scientist to have good conceptual knowledge of his subject of specialization and also a solid foundation of the forensic insights. A good communication skill in preparing the analytical report, interpretation of the results, forming the expert opinion, and then presentation of his findings in the courts of law is, therefore, very essential. All this needs a pooling of knowledge, skill and ability from the elderly and the youth, to become the source for serving homeland security. Concomitant is the requirement of other associated resources like manpower, infrastructure etc.

The total manpower requirement for the seven CFSLs is discussed in detail in the Chapter 7 of this report. The manpower has been evaluated on the basis of the single-scientist work norms (evolved in Chapter-4) and expecting that about 500-600 crime cases would be received for forensic analysis in most of the Divisions.

5.7.2. Functional Areas: Every CFSL building should have the following five designated areas for smooth functioning of various organs and a close interaction between them:

- 1) Business Area (To function on every day including Saturdays, Sundays, and Holidays on round-the-clock basis): The functions of this set up are
 - Case/Exhibits Receipt and Dispatch
 - Exhibit Storage (Inward/Outward)
 - Case Record Storage (Inward/Outward)
 - Rapid Response Forensic Team (RRFT)
 - CCTV Cameras Monitoring
- 2) Laboratory Area
- 3) Director's Secretariat & Administrative Office
- 4) Convention Facility (Comprising Conference Room, Lecture Room, Pantry, Cafeteria, and Guest House)
- 5) Support Services Area

Note: Specially designed vehicle is to be stationed in the Business Area for Rapid response Forensic Team for crime scene management and collection of evidence materials in an efficient manner.

5.7.3. AUXILIARY SERVICES: Auxiliary services like building maintenance, transport, house-keeping, horticulture, security, and data-entry operations shall be out-sourced to the extent possible.

5.7.4. Scientific Performance Audit: In view of the ever-changing scenario of technological inputs in perpetrating crime and increased sophistication in the availability of global forensic science and technology for evidence analysis, it is recommended that such Scientific Performance Audits should be conducted for all the CFSLs, once in every three years. This exercise would ensure that all the CFSLs remain continuously updated and provide effective forensic support to the courts and investigation agencies. Similar exercise should also be conducted for all State FSLs who are beneficiary of Central Funds through Police Modernization Grant of Union Home Ministry. This would provide an impetus for effective forensic science services in Law & Justice.

5.7.5. Adequate Financial Powers: For smoother functioning of the CFSLs and to avoid unwarranted delays due to unnecessary correspondence with the DFSS HQ/MHA, the Directors of CFSLs should be armed with financial powers at par with the Directors of other scientific laboratories of the Departments under Govt. of India.

5.7.6. Advisory Committees for the Thrust Areas for Each CFSL: Specific "Thrust Areas" for handling mission-mode R&D projects by each of the seven CFSLs have been identified at Para 1.8 and hence, each CFSL would constitute a "Project Advisory and Review Committee (PARC)" for every major R&D project. This committee would comprise of external experts in the field and their tenure would be same as that of the project.

6.1 EXISTING ORGANIZATIONAL STRUCTURE OF DFSS

Based on the recommendations contained in the NHRC Report (1999) entitled “**State of the Art Forensic Science: for Better Criminal Justice**”, the Forensic Science Division of Bureau of Police Research & Development (BPR&D) was made an independent entity, directly reporting to the PM Division of the MHA. The entity was named as Directorate of Forensic Science (DFS), and was shifted from the BPR&D premises to the Floor-8 of Block-9, CGO Complex, New Delhi. As per the **Perspective Plan for Indian Forensics (2010)**, DFS was later renamed as Directorate of Forensic Science Services (DFSS). The manpower structure of DFSS Headquarters comprises a Chief Forensic Scientist-cum-Director (Scientist-G level), one SSO Grade-I (FS) and 18 non-scientific staff (including Group-D staff). After the then Chief Forensic Scientist-cum-Director retired, about two years back, no permanent incumbent has yet been positioned. Three different ad-hoc arrangements were made to position scientists on this post. No scientific organization can be run effectively with such ad-hoc arrangements, as the directions to different CFSLs have to flow from the top, a position which needs continuity as well as stability. In addition, the post of Chief Forensic Scientist-cum-Director is only at the level of Scientist-G, which is too low to attract and retain a visionary scientist to head this important national set up. *Most of the scientific Departments like DRDO, ISRO, CSIR, DBT, ICMR etc. are headed by scientists of the level of Secretary to Govt. of India and hence the level of the head of the forensic set up at the Central level be upgraded to a Secretary level of Scientist and re-christened as Director General (DG) DFSS. It is, therefore, recommended that a separate Department of Forensic Science be created under the MHA.*

Presently the DFSS HQ has no organizational structure whatsoever to handle all their activities. Most of the work is handled in an un-structured manner by the two scientists and a set of administrative staff, which is totally inadequate. Apart from the grossly inadequate scientific manpower available (only two) at the DFSS HQ, it is suffering from inadequacy of space, appropriate infrastructure, e-enablement, library facility, and other logistic supports required for efficient functioning of a headquarters of an important scientific organization, from where the national policies are evolved and monitored and major policy decisions are taken.

6.2 LIMITATIONS OF THE EXISTING ORGANIZATIONAL STRUCTURE

DFSS should fulfil the role of an Apex Body for carrying out planning, legislation, implementing, and monitoring of forensic science services of the country. It should also act as the central coordinating body in the areas of

forensic science to homeland security, and hence it should be state-of-the-art in its contents and structure. The structure should be self-contained, involving multifarious skills, and wide range of specializations. The present organizational structure of the DFSS HQ, in terms of scientific manpower, is grossly inadequate to handle the desired mandate of evolving policies for forensic science at the national level, planning the *modus operandi* of their execution, coordination, and supervision of the forensic science activities of the CFSLs, handholding of 28 State/UT FSLs, and liaison with the Planning Commission, MHA, Investigating Agencies (Central, UT, as well as State), Police, Judiciary, NABL, and other Scientific Institutions. DFSS HQ has also been providing scientific help to other countries (e.g. Bhutan, Maldives, Seychelles, and Vietnam) for establishing their forensic science laboratories, and would continue to do so in more measures. However, the inadequacies cited earlier result in compromising the quality, quantity, as well as the timeliness of the scientific output and adversely affecting the process of continuous improvements, an essential component of Total Quality Management (TQM).

Most of the time the two scientists of DFSS HQ remain busy only with the fire-fighting activities, which results in many routine, but important, issues pending due to lack of manpower. Many a times such delays percolate to its outlying units, viz. the CFSLs and adversely affect their efficiency. One such example is the modification of the “Research Fellowship Scheme of DFSS”, which is to be completed by incorporating the new UGC guidelines on the subject. This delay in issuing the new guidelines has hampered the continuity of this important scheme, due to which no new JRFs have recently been inducted and the R&D component of DFSS has irreversibly suffered.

The role of DFSS HQ would further enhance manifold after the “Forensic Act (2011)”, presently under formulation, is passed in the Parliament and implemented. This Act seemingly includes the activities like Proficiency Testing and certification of Forensic Professionals, regulating the Private Forensic Labs, for framing of National Standards, and Creation of Forensic Database etc., which have to be handled by DFSS HQ. The technology in perpetrating crimes is getting increasingly sophisticated, and hence DFSS HQ has to evolve comprehensive skill development policies and programmes for continuously updating the knowledge-base of the existing scientists, police investigators, and members of the judiciary.

6.3 MANDATE OF DFSS HQ

- 1) To formulate plans, policies, and legislations to promote and regulate quality, capacity, and capability building for forensic services in the country.
- 2) To facilitate high quality, on time and credible forensic services to the Homeland Security and Justice Delivery System.
- 3) To encourage Research & Development activities for innovation of technologies to strengthen forensic services by instituting financial assistance and fellowship schemes for intra-mural and extra-mural R&D and other incentive programmes.
- 4) To establish linkages with the national and international scientific and forensic institutions and universities for cooperation, transfer of

- technical know-how and technology, skill development, exchange of scientific personnel, and sharing of information.
- 5) To disseminate knowledge on forensic services to the stake-holders by supporting/organizing training, awareness programmes, symposia, seminars, hands-on workshops and national/international conferences.
 - 6) To promote concept of Quality Assurance and Quality Control in forensic services.
 - 7) To advise Central and State Governments in forensic matters and extend forensic assistance to manage national disasters/calamities.
 - 8) To develop National Forensic Information Grid including databases on various forensic indices to control recidivism and strengthening Homeland Security.
 - 9) To promote the concept of Quality Assurance and Quality Control in forensic services.

With this in view, the DFSS HQ requires a major re-engineering of the set up by augmenting the manpower, especially at the senior levels.

6.4 RE-ENGINEERING OF DFSS HQ

The Article 246 read with the entry 65(c) of the Union List in the Seventh Schedule of the Indian Constitution vests the Parliament with the exclusive powers to make laws with respect to Union agencies and institutions for scientific or technical assistance in the investigation or detection of crime. As the power of the Union Government is co-extensive with the power of Parliament, appropriate action should be taken to improve the effectiveness of forensic science in the country. To ensure continuous improvements in the quality, quantity, as well as the timeliness of the scientific outputs, DFSS HQ, the apex forensic body in the country, shall be headed by DG, a Scientist of the level of Secretary to the Govt. of India, with the following secretariat:

DG'S SECRETARIAT	
To coordinate and correspond within the organization as well as with outside agencies and assist the DG in day to day techno-managerial activities	Headed by Scientist- F/E/D- 1 <i>(having good communication skills)</i> PPS- 1 PA- 2 MTS- 2

Besides the DG's Secretariat, the DFSS HQ shall have the following major Divisions to assist the DG:

- 1) Policy Planning, Service, and Standards Division
- 2) S&T Cooperation Division
- 3) Establishment Division

Each Division shall have following units, functions, staff required and Standing Committees:

Name of the Division /Units	Functions/ Mandate	Staff required for each Division/Units	Standing Committee to advise on the subject
1) Policy Planning, Service, & Standards Division		Scientist G -1 (Advisor) PS-1 DEO-1	
a) Planning Unit	<ul style="list-style-type: none"> Project Planning & deployment of funds Preparation of AAP, 5 Year Plan, MTA, Project Monitoring & Evaluation H.R. Planning & deployment 	Scientist F/E-1 (Unit Head) Scientist E/D/C/B-3 Technical Staff- 3 PA to Head- 1 DEO- 1 MTS- 2	<ul style="list-style-type: none"> i. Performance Appraisal Committee (To conduct Scientific Performance Appraisal and review work norms) ii. Research Advisory Committee (Advise on S&T activities, Planning & review of Research Projects) iii. Subject Expert Panels
b) Secretariat of FRDA	<ul style="list-style-type: none"> To assist FRDA to carry out its functions 	PPS to Chairman and Members- 7 PA- 7 DEO- 7 MTS- 7 US- 1 SO- 3 Assistant/ LDC- 3 DEO- 3	<ul style="list-style-type: none"> i. Expert Committee on Standards ii. Scientific Working Group on Testing Methods iii. Audit Teams (for authorizing accrediting agencies) iv. Subject Panels (Registry of Experts)
c) Forensic Services & Statistics Unit	<ul style="list-style-type: none"> Compilation of services by State and Central Organisations Service statistics & analysis including future projections Capacity and capability building Scientific performance Audit 	Scientist F/E- 1 (Unit Head) Scientist D/C/B- 3 Technical Staff- 2 PA to Head- 1 DEO- 2	<ul style="list-style-type: none"> i. Forensic Service and Planning (For Advising on capacity and capability building) ii. Expert Panel (for Scientific Performance Audit, To be updated every three years)
d) Quality Management System Unit	<ul style="list-style-type: none"> Infuse concept of Quality control and Quality Assurance in Forensic services. To formulate uniform SOPs for methods. To formulate and validate forensic standards. 	Scientist D/C- 1 (Unit Head) Scientist B- 1 DEO- 3	<ul style="list-style-type: none"> i. Standing Committee on QMS ii. Panel of Subject Experts
e) HRD Unit	<ul style="list-style-type: none"> To formulate 	Scientist F/E- 1 (Unit Head)	Expert Panel of Senior Directors

	<p>course calendar on HRD programmes</p> <ul style="list-style-type: none"> • Trainings of: <ul style="list-style-type: none"> ○ New Recruits ○ R&D Project Management ○ Middle & Top Level Management ○ Indian Scientists Abroad • Workshop/ Symposia and Seminar, Annual Forensic Conferences • National Forensic Academy • Skill Development Programmes for Developing Countries • Higher education in India and abroad • Travel grants for training and conferences abroad 	<p>Scientist D/C/B- 3 PA to Head- 1 DEO- 3 MTS- 1</p>	
2) S&T Cooperation Division		<p>Scientist G - 1 (Advisor) PS- 1 DEO- 1</p>	
a) International Cooperation Unit	<ul style="list-style-type: none"> • To forge International cooperation for sourcing of novel required technologies from abroad and eventual tech. transfer, • To share technological know-how with other countries • To look after Forensic Improvement Grant (FIG) to State Forensic Sector 	<p>Scientist F- 1 (Unit Head) Scientist E/D- 2 PA to Head- 1 Technical Staff- 3 MTS- 2</p>	<p>Expert Committee on International Cooperation</p>
b) State Coordination Unit			<p>Expert Committee on Forensic Development in States</p>
c) National Forensic	<ul style="list-style-type: none"> • To develop and manage forensic 	<p>Scientist F/E - 1 (Unit Head)</p>	<p>Standing Committee for Information</p>

Information Resource Centre (comprising four groups viz. i. Forensic Indices databases ii. Organizational Information Databases iii. National Information Grid Centre at HQs iv. National Forensic Library	indices databases, Library, Organizational databases, website management, and linkages with other forensic labs.	Scientist D/C- 4 (Database Managers) Scientist B- 5 (Assistant Database Managers) PA to Head- 1 DEO- 5 Scientist C/B- 1 (Librarian) Scientist B- 2 (Assistant Librarian) MTS- 2	Resources
3) Establishment Division		Scientist G - 1 (Advisor) PS- 1 PA- 1	
a) Personnel Matters b) Recruitment, Assessment & Posting Unit c) Estate: Land & Buildings d) Procurement & Stores e) Accounts & Finance f) Safety & Security g) Legal Affairs h) Public Relations i) Rajbhasha	<ul style="list-style-type: none"> Administer DFSS HQs and its outlying units To deal with land & building matters Intellectual Property, Court Cases, Parliament Questions RTI, Complaints, Grievances Publications, Media and Liaison 	Director/Dy. Secretary (Administration)- 3 (for Finance; Procurement; Establishment) U.S./Desk Officer - 8 Asstt./UDC/LDC- 8 MTS- 8 Security Officer- 1 Assistant Security Officer- 2 Legal Officer- 1 PRO- 1 Hindi Officer- 1	

6.5 TOTAL MANPOWER REQUIREMENT AT DFSS HQ

With the above detailed activities to be performed at the DFSS HQ in view of its enlarged mandate, the SPA Committee recommends that the following manpower is to be created and placed at their disposal:

Secretary to Govt. of India (Director General)	1
Scientist-G (Advisor)	3
Scientist-F (Joint Advisor) Scientist-E (Deputy Advisor) Scientist-D (Asstt. Advisor) Senior Librarian (Scientist-C) Librarian (Scientist-B)	31 (11 Scientist F & E and 20 Scientist D,C & B)
Director/Dy. Secretary Administration	3
Section Officers/PS	6
Accounts Officer/US/PPS	17

Public Relation officer (PRO)	1
Legal Officer	1
Hindi Officer	1
Security Officer/Asstt. Security Officer	3
Technical Staff	3
Admin Staff (PA/Office Executives)	26
Data Entry Operators*	19
Multi-task Staff *	24
Car Drivers *	11

(*DEOs, MTS, and Car Drivers with vehicles shall be out-sourced)

The scientists deployed at the DFSS HQ are proposed to be designated as DG, Advisor, Jt. Advisor, and Dy. Advisor etc. on the pattern of DST/DBT/ICMR to truly reflect their functional responsibilities/duties at the headquarters and differentiate them from the scientists working in the Central Forensic Science Laboratories. However, the scientific posts of DFSS HQ would form a common cadre with those of the CFSL's scientific posts and would be eligible for promotion under the Flexible Complementing Scheme (FCS). The existing post of Senior Scientific Officer Grade I (Forensic Science) at the DFSS HQ is recommended to be upgraded to the level of Scientist-E (Jt. Advisor) and be re-christened as Staff Officer to the DG FSS to make his role more meaningful. The present SSO Grade-I (FS) post at DFSS HQ is the only one of its kind in the entire forensic set up and hence it should be abolished.

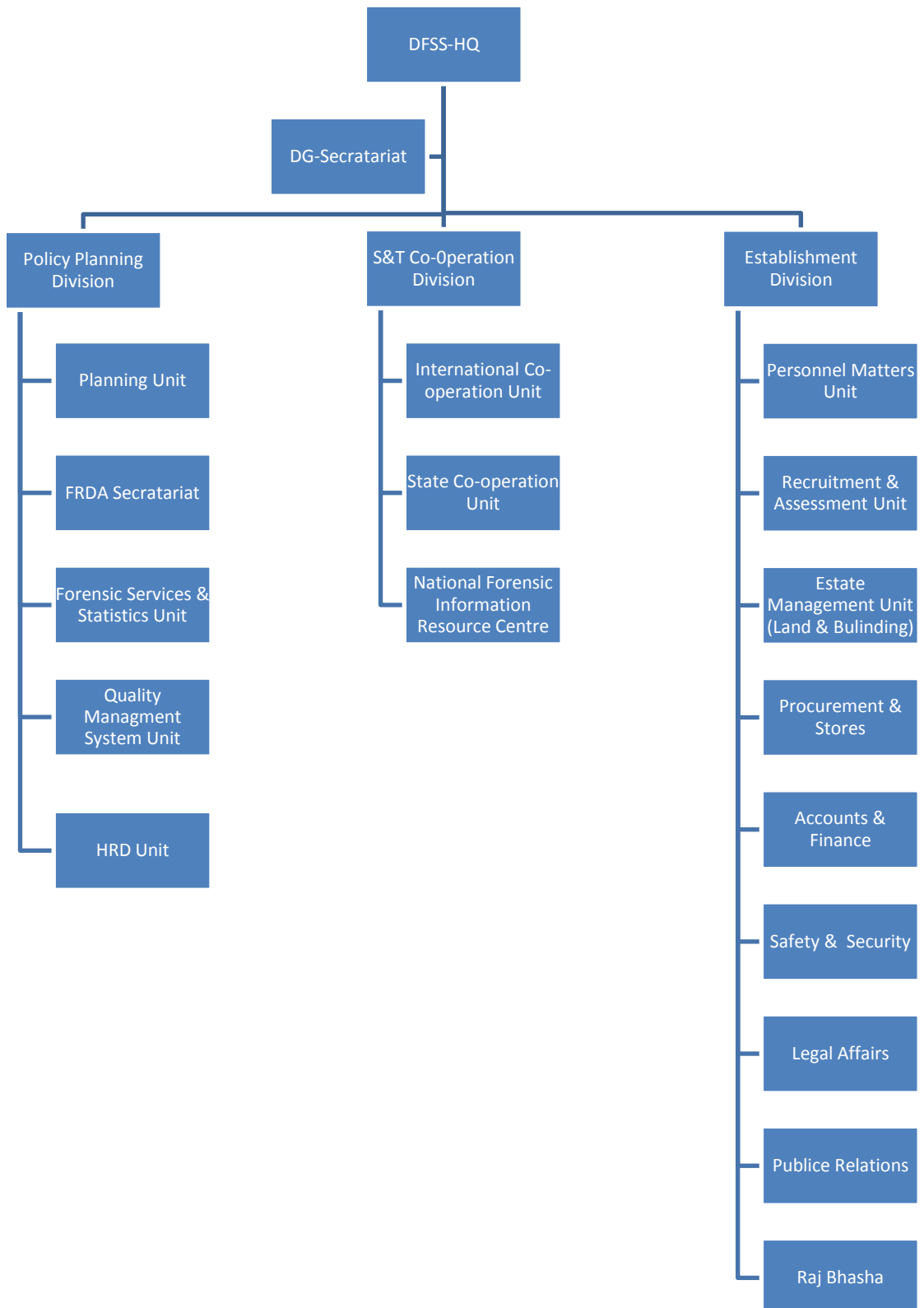
6.6 HOUSING THE DFSS HQ

Apart from providing scientific and administrative manpower sufficient enough for the DFSS HQ to efficiently carryout their mandated role of being the apex body in the country, they should also be provided with adequate functional space for their office, preferably near to the Home Ministry for closer liaison. The SPAC considers that a floor area of approximately 50,000 sq. feet should be adequate to meet their scientific, technical, and office accommodation requirements.

6.7 THE PROPOSED ORGANIZATIONAL STRUCTURE OF DFSS HQ

The presently re-engineered/proposed organization structure for the DFSS HQ indicating the functional compartments is illustrated hereunder.

THE PROPOSED ORGANIZATIONAL STRUCTURE OF DFSS HEADQUARTERS



7.1 Effective Homeland Security requires the involvement of forensic science services well before the event takes place, whereas the criminal justice system, requires it only after the event. Forensic science supports intelligence gathering, investigation and operations aimed at prevention, interdiction, attribution, and prosecution of terrorism. Six CFSLs of DFSS are in place to provide forensic science support services to all the organizations associated with the homeland security. One additional CFSL at Delhi is proposed by SPAC for handling emergent requirements of National Investigation Agency (NIA). The geographical jurisdiction of each CFSL has already been detailed at Para 2.5 of Chapter 2. Various disciplines of forensic science and the associated procedures, as applicable to homeland security, are to be urgently developed. DFSS is to provide a national capability to conduct and coordinate forensic analyses of evidence from bio-crime to bio-terror investigations. It needs to fill up the gaps in the capabilities on short- and long-term basis to address the requisite forensic support to facilitate investigation of violent and financial crimes of terrorism and counter terrorism (violent and financial), weapons of mass destruction, counterfeit currency, smuggling of contrabands, mass disasters (natural or manmade) and many such other areas. With this objective in mind, various requisite services to be provided by CFSLs have been detailed earlier at Para 5.4 of Chapter-5. The technological transformation is always revolutionary in results and evolutionary in execution. In managing these changes, the human resource has to play a very vital role.

The SPA committee has noticed that the total sanctioned scientific and ministerial manpower of DFSS HQ and CFSLs, as on June 1, 2011, is 422 scientific and ministerial posts, spread over DFSS HQ and all the six outlying units. It contains 104 Group-A officers (from Director to Senior Scientific Officer level) in different scientific disciplines of six CFSLs. A considerable number of vacancies remain vacant perennially, which results in backlogs in the scientific output of these labs and delays in submitting the expert opinions.

7.2 SCIENTIFIC MANPOWER REQUIREMENT IN CFSLs

Evaluation of manpower required to fully meet the mandate is a painstaking process and requires an open, honest and objective thinking at all levels. It is imperative to grasp the ethos of forensic science and its strength and weaknesses, analyze the ground realities and then evolve the right structure. The past has to be blended with the present needs and future projections otherwise forensic science organizations may not be able to proceed forward to the desired goals and objectives. Forensic science needs right kind of bold decisions by the Government and must be implemented efficiently and within a set time frame.

SPAC had observed a number of scientific inadequacies in the expert opinions formulated by some of the Reporting Officers, which create confusion during court testimony. Evidence material analysis is generally limited to produce answers to the queries asked by the user in his requisition letter. Many other examinations, that help the Analyst in substantiating the veracity of his interpretations of the results, are not undertaken due to shortage of time as well as manpower deficiencies. The data on the other constituents of the evidence material are not generated in absence of a detailed analysis, as their importance is ignored. However, such analytical data are relevant to prospective evaluation of the evidence during the court testimony. Analytical data on all the constituents of evidence material becomes important to evaluate their full evidential value. The data generation on such evidence material is also helpful for source identification and further intelligence processes for NatGrid for homeland security. The SPAC concluded that the complete analytical data on evidence material should be obtained to meet the futuristic needs, and it should be complemented by the data generated in the other state FSLs. Such database is essentially required for large varieties of evidence material, narcotics, explosive residues, IED remains, audio/video recordings, and DNA profiling etc. Such database, once generated from the evidence material, becomes credible and assists the investigation agencies to anticipate new trends of crime and to identify hot-spots for taking preventive measures. In the absence of such databases, the resulting preventive action plans are vague and ineffective.

7.2.1. The requirement of scientific and technical manpower has been computed on the basis of preparedness for handling 500/600 cases referred by the forwarding authorities/investigating agencies for forensic services in each Group of the CFSLs and the new work norms evolved for them (Chapter 4). This number of the cases would involve approximately 1000-1200 '*normalized cases*' to be annually examined. However, every Group would have a few sub-disciplines where the receipt of cases would be lower than others; even then a minimum basic trained manpower has to be positioned therein. Apart from the evidence material examination, at least three additional scientists in each group are to be catered for making RRFT to handle SOC visits, handling skill-development programmes, customer feedback, scientific interaction and regulatory work.

7.2.2. Additional Scientific Manpower for R&D Activities: Though scientists in every discipline would carry out R&D activities to solve the intricate problems faced during laboratory analysis of crime exhibits and in crime-scene related issues, the SPAC has proposed that each CFSL must also undertake certain Mission-mode R&D Programs in the forensic disciplines specified in Para 1.8 of Chapter-1. In view of the changed mandate of CFSLs to provide forensic services to the homeland security, various disciplines virgin to CFSLs, namely Trace DNA, Express Genome Analysis, Wild Life Forensics, NBC Warfare, Image Processing, Brain Mapping & Narco-analysis have emerged. These new areas have to be implemented by way of conducting research or validating the existing technologies by evolving requisite SOPs. The task of creating databases for various forensic indices should also be taken up as a mission-mode project, wherein all the Central/State FSLs will have to

contribute. Facilities in the area of Nuclear, Biological, & Chemical (NBC) Warfare are to be created *ab initio*, as this field is nascent to the Indian forensic science laboratories. All these virgin disciplines require additional manpower to support the mission-mode R&D projects in the respective thrust areas identified for each CFSL.

7.2.3. The manpower requirement for all the sub-disciplines of every Group of each CFSL has been clubbed together and the final figures are given in the Table 7.1.

Table 7.1: *Proposed Scientific and Technical Manpower for Each CFSL*

S. No.	Group	Forensic Services to be Offered	Total Number of Scientists (Analyst) in the Group	Total Number of Technical Staff in the Group	Total Number of MTS* in the Group
1.	Human Identification Group	<ul style="list-style-type: none"> • Autosomal DNA Profiling • Mitochondrial and Y-DNA Profiling • Forensic Anthropology • Microbials Analysis • Wild Life Forensics 	15	8	2
2.	Chemical Sciences Group	<ul style="list-style-type: none"> • Narcotics, Drugs of Abuse, and Spurious Medicines • Explosives, IEDs, Fire & Arson • General Chemistry including Poisons • Chemical Warfare Agents • Food Contamination and Counterfeit Consumer Goods 	15	8	3
3.	Criminalistics Group	<ul style="list-style-type: none"> • Arms & Ammunition • Questioned Documents (<i>Classical & Electronic</i>) • Counterfeits (<i>Currency, Security Documents, and Travel Documents</i>) • Fingerprints, Footprints, Iris Patterns and Other Prints & Patterns • Photo Parleys and 	23	12	3

		<ul style="list-style-type: none"> Photo Fits Trace Materials Crime Scene Management & Rapid Response Forensic Team 			
4.	Digital Forensics Group	<ul style="list-style-type: none"> Computer & Network Forensics Mobile Phone Forensics Audio-Video Authentication Image Processing 	16	8	2
5.	Forensic Psychology Group	<ul style="list-style-type: none"> Polygraphy Brain-mapping Narco-analysis Other Non-invasive Cognitive Response Analyses 	10	5	1
6.	Physical Sciences & Engineering Group	<ul style="list-style-type: none"> Road/Rail/Air Accidents (<i>Analysis of Materials and Recording Devices, and Reconstruction</i>) Nuclear Forensics (<i>Analysis of Materials & Devices</i>) 	6	3	4
7.	Forensic Informatics Group	<ul style="list-style-type: none"> Databases Hub National Forensic Information Resource Centre 	12	6	2
8.	Quality Management Group	<ul style="list-style-type: none"> QC/QA unit Laboratory Information Management System 	3	2	1
9.	Major R&D Project Group	<ul style="list-style-type: none"> Handling mission mode R&D Projects in the Specified Thrust Areas 	10	5	1
10.	Business Office (to work on round-the-clock basis)	<ul style="list-style-type: none"> Case files/evidence materials (<i>receipt/dispatch/storage</i>) RRFT (<i>Control Room</i>) CCTV Camera Monitoring 	6	-	5
11.	Director CFSL	<ul style="list-style-type: none"> Head of the laboratory 	1	1	1

Total	117	58	25
Grand Total (for seven CFSs including SPAC proposed CFS at Delhi)	819	406	175

7.3 CAREER PROGRESSION OF SCIENTIFIC MANPOWER

The Government of India has already sanctioned Flexible Complementing Scheme (FCS) of promotion to Group-A level of scientists in the DFSS HQ and its outlying units. As the FCS, in the present form, has been approved for promotions upto the Scientist-F level, the scheme would cover the existing levels of Senior Scientific Officer (to be re-christened as Scientist-B) to Director (to be re-christened as Scientist-E).

7.4 CAREER PROGRESSION OF TECHNICAL MANPOWER

The FCS approved by the Govt. of India for Group-A level of scientists in the DFSS HQ and its outlying units, does not cover the existing technical personnel (Laboratory Assistants to JSOs) employed at the CFSs. SPAC, therefore, recommends that these technical posts be brought under "Limited Flexible Complementing Scheme" of promotion, on the pattern of DRDO Technical Cadre (DRTC), the rules for which should accordingly be framed expeditiously. To bring uniformity, the new nomenclature for the technical cadre of DFSS should also be changed as follows:

Existing Designations	Modified Designations
Laboratory Assistant	Technical Assitant-A
Scientific Assistant	Technical Assitant-B
Senior Scientific Assistant	Technical Assitant-C
Junior Scientific Officer	Technical Officer-A
New post to be created	Technical Officer-B

The existing SSAs/JSOs, having Masters degree in any branch of science (i.e. fulfilling the essential qualification criterion for the direct recruitment for the post of Scientist-B), would be considered for selection to the post of Scientist-B without any age-bar. They should also be considered for upgradation to the post of Scientist-B through a *Limited Departmental Examination* followed by interviews, for which a policy is to be evolved on the pattern of DRDO. Once the above schemes are in place, the technical cadre posts would be filled up only at the Technical Assitant-A level, for which the essential qualification would only be Bachelors Degree in Science with Diploma in Lab Technology or Diploma in Engineering. However, such freshly recruited Technical Assistants should compulsorily undergo 3-months induction training at NFA (LNJN NICFS) to make them suitable for the forensic laboratory work.

7.5 ADMINISTRATIVE MANPOWER REQUIREMENTS IN EACH CFSL

The SPAC is of the view that all multi-task and auxiliary work services required in the laboratory should be outsourced as far as possible, except when legally unavoidable. The requirement of administrative manpower essential for each CFSL is given in the Table 7.2.

Table 7.2: Administrative Manpower Proposed for Each CFSL

S. No.	Rank	No. of Post	Pay Scale
1.	Controller of Administration (Under Secretary)	1	PB-3 G.P- 5400
2.	Section Officers	7	PB-2 G.P- 4600
3.	PS to Director	1	PB-2 G.P- 4600
4.	Assistants	6	PB-2 G.P- 4200
5.	Security Officer	1	PB-2 G.P- 4600
6.	Asstt. Security Officer	3	PB-2 G.P- 4200
7.	Junior Accountant	1	PB-2 G.P- 4200
8.	Stenographer Grade II	8	PB-2 G.P- 4200
9.	Hindi Translator	1	PB-2 G.P- 4200
10.	UDCs	13	PB-1 G.P- 2400
11.	Stenographer Gr.III	5	PB-1 G.P- 2400
12.	LDCs	5	PB-1 G.P- 1900
13.	Hindi Typist	1	PB-1 G.P- 1900
14.	Data Entry Operator (DEO)*	11	
15.	Staff Car Drivers*	2	
Total (for one CFSL)		66	
Total (for seven CFSLs)		462	

**The service of DEO, MTS, and Car Drivers should be outsourced to the extent possible*

7.6 CAREER PROGRESSION OF ADMINISTRATIVE MANPOWER

The component of Administrative Cadre at DFSS and its outlying units is extremely small and hence the administrative staff would become stagnant in their post for long. This will also result in large disparities between their career progressions at DFSS *vis-à-vis* the other constituent organizations of MHA. To avoid such an eventuality, the administrative cadre of DFSS be merged with that of the MHA to provide an equal opportunity to them in their career progression. Such a merger would increase the level of satisfaction among the administrative cadre of DFSS and increase their operational efficiency.

7.7 TOTAL SCIENTIFIC, TECHNICAL & ADMIN. MANPOWER REQUIRED AT DFSS HQ

The major functions of DFSS HQ and the requisite human resource requirement have already been discussed in detail in Chapter-6. The requisite number of posts at different ranks required at DFSS HQ has been compiled in the Table 7.3.

Table 7.3: *Scientific, Technical and Administrative Manpower for DFSS HQ*

Secretary to Govt. of India (Director General)	1
Scientist-G (Advisor)	3
Scientist-F (Joint Advisor) Scientist-E (Deputy Advisor) Scientist-D (Asstt. Advisor) Senior Librarian (Scientist-C) Librarian (Scientist-B)	31 (11 Scientist F & E and 20 Scientist D,C & B)
Director/Dy. Secretary Administration	3
Section Officers/PS	6
Accounts Officer/US/PPS	17
Public Relation officer (PRO)	1
Legal Officer	1
Hindi Officer	1
Security Officer/Asstt. Security Officer	3
Technical Staff	3
Admin Staff (PA/Office Executives)	26
Data Entry Operators*	19
Multi-task Staff *	24
Car Drivers *	11
Total	150

*The service of DEO, MTS, and Car Drivers should be outsourced to the extent possible

7.8 TOTAL MANPOWER REQUIREMENT IN THE ORGANIZATION

Based on the above analysis manpower requirement, the total Scientific, Technical and Administrative manpower requirement in the organization is given in Table 7.

Table 7.4: Total Manpower requirement in the organization

Rank/ Designation	Human Resource Requirement At DFSS HQ	Human Resource Requirement At Seven CFSLs	Total Human Resource Requirement in the Organization
Scientific cadre			
Secretary to Govt. of India (Director General)	1	-	1
Scientist-G (Advisor)	3	7	10
Scientist-F(Joint Advisor) Scientist-E (Deputy Advisor) Scientist-D (Asstt. Advisor)	31	812	843
Senior Librarian (Scientist-C) Librarian (Scientist-B)			
Technical Cadre			
Technical Staff	3	406	409
Administrative Cadre			
Director/Dy. Secretary Administration	3	-	3
Accounts Officer/US/PPS	17	7	24
Section Officers/PS	6	56	62
Public Relation officer (PRO)	1	-	1
Legal Officer	1	-	1
Hindi Officer	1	-	1
Security Officer/Asstt. Security Officer	3	28	31
Admin Staff (PA/Assistant/UDC/ LDC)	26	168	194
Data Entry Operators*	19	77	96
Multi-task Staff *	24	175	199
Car Drivers *	11	21	32
Total	150	1757	1907

*The service of DEO, MTS, and Car Drivers including vehicles should be outsourced to the extent possible

Thus, it emerges that the total number of 854 scientific posts (from Secretary to Scientists- B) are required for manning the DFSS HQ and 7 CFSLs, and the total number of 409 supporting technical staff (spread over various ranks) is required in all the 7 CFSLs and DFSS HQ. Similarly, 317 administrative manpower and 327 outsourced personnel (DEO/MTS/Drivers) for the DFSS HQ and its outlying laboratories would be essential. At present, the existing sanctioned strength of scientific and ministerial posts of various categories in CFSL and DFSS HQ is 422. This comprises 104 scientific posts of group 'A' category (from Sr. Scientific Officer Grade II to the rank of Chief Forensic Scientist), 106 technical staff (from the rank of Gazetted Gr. 'B' (33 JSOs), and 73 non-Gazetted Group-B, -C & -D), and 212 administrative manpower (comprising 8 Gazetted and 204 ministerial staff) staff. SPAC recommends that additional posts for different categories of staff may accordingly be created.

7.9 RE-DESIGNATION OF POSTS FOR FCS IMPLEMENTATION

The Flexible Complimenting Scheme of promotion is now in place for the scientific cadre posts starting from the level of Scientist-B (equivalent to Senior Scientific Officer-II) to the Scientist-F posts in all the six CFSLs and DFSS HQ. The SPA Committee therefore proposes that all the existing scientific posts in DFSS may be re-designated to the equivalent rank of scientific cadre posts covered by the FCS.

7.10 FORMATION OF CENTRAL FORENSIC SCIENCE SERVICE

The only solution for the improvement of career prospects of the young scientists would be to create an organised service, which may be called 'Central Forensic Science Service' with cadre structure suitably designed to cover the staff needs of all these institution. The members of the cadre may fill up the posts in all the CFSLs, including CFSL (CBI), forensic wing of NPA, and the proposed NFA (LNJP NICFS). The SPAC is fully convinced that constitution of this service will create synergy, preserve and strengthen the scientific culture in these institutions.

7.11 UTILIZATION OF SEASONED FORENSIC SCIENTISTS RESOURCE

The pendency in evidence material examination and refusal of cases by CFSLs are on the increase in some of the disciplines. This is not a good situation, as many important crime case investigations do not get the benefits of forensic science services and result in prolonged litigation and delays in justice delivery. The process of recruitment of a scientist from the market is time consuming and most of the time experienced forensic scientists are not easily available. It is, therefore, recommended that the services of retired forensic scientists of proven professional credibility could be harnessed in the case examination work to reduce pendency. Their rich experience could also be utilized for participation in major R&D projects, in imparting skill development programmes, and for SOC visits during forensic exigencies. This is in conformity with the recommendations contained in the Perspective

Plan for Indian Forensics (2010), wherein the concept of Reserve List of Experienced Forensic Scientists (RELIEF) has been suggested.

Requirement of other resources such as laboratory space, infrastructure, equipment etc. would appropriately be worked out by DFSS.

The Scientific Performance Audit Committee (SPAC) carried out an in-depth audit of the scientific performance of the three existing CFSLs, studied their capacities and capabilities, identified the gaps therein, and recommended appropriate measures for re-engineering the DFSS HQ and the existing CFSLs to fulfil the new DFSS vision, “Render High Quality, on Time, and Credible Forensic Services to Justice Delivery System” (Para 1.3). The SPAC is confident that the measures recommended herein, if accepted and implemented, would give a tremendous boost to the forensic activities in the country, bring them at par with the world-class forensic laboratories, and provide infallible evidential support to the homeland security. The major chapter-wise recommendations contained in the SPAC Report, along with the relevant paragraph numbers are summed up in the succeeding paragraphs.

8.1. INTRODUCTION

8.1.1. Another CFSL be established at Delhi to exclusively provide all the forensic services pertaining to national exigencies and NIA. This CFSL would also serve as a laboratory to provide on-the-job practical training to the scientists undergoing training at NFA, Delhi. Alternatively, the CFSL (CBI) be brought under the folds of DFSS and suitably augmented to meet the requirements of CBI, NIA, and training to forensic scientists. (Para 1.6)

8.1.2. All the seven CFSLs (3 existing, 3 being established at Pune, Guwahati and Bhopal, and 1 SPAC-proposed at Delhi) are to be christened as CFSLs and hence their role/mandate should also be the same. (Para 1.6)

8.1.3. Each of the seven CFSLs would carry out R&D work in all the disciplines. However, the major Mission-Mode R&D projects would be undertaken only in the forensic thrust area specified for the laboratory. These laboratories should also act as lead laboratories for the States under their defined geographical jurisdiction. (Para 1.8 and 1.9)

8.2. SCIENTIFIC PERFORMANCE OF CFSLs

8.2.1. Every CFSL should form a Rapid Response Forensic Team (RRFT) for quickly reacting to the requests for Scene of Crime visits. (Para 2.1.7)

8.2.2. Uniform pattern in the maintenance of case records and evidence materials in respect of their purity, integrity, and chain of custody be evolved and adopted at all the seven CFSLs. (Para 2.2.1.4)

8.2.3. All the appropriate administrative as well as scientific measures should be adopted to ensure that the timeliness and credibility of case opinions/reports and thus the level of the client’s satisfaction remains high. (Para 2.3.4)

8.2.4. Pendency of Cases at CFSLs: Appropriate administrative as well as scientific measures are to be adopted to reduce pendency of the lab examination of evidence materials in all the CFSLs. Some of the measures are (Para 2.4.2)

- i) Create positive attitude among the CFSL scientists and discipline the non-performers giving lame excuses. This requires cultural change in the organization.
- ii) Balanced decision is to be taken in sending scientists on deputation from DFSS/ CFSLs. Scientists sent on deputation should be recalled at the end of their originally permitted tenure.

- iii) Enforcement of priority to the examination of evidence material and Division-related core duties, whereas the non-essential activities, such as students' project guidance, academic lectures, etc. should be accorded least priority.
- iv) Encouragement should, however, be given to the R&D work of CFSL-anchored Research Fellows, but not to students of any other stream/course.
- v) Teaching classes for the Diploma and M. Sc. (FS) students of Panjab University, Chandigarh, being held in the CFSL Chandigarh premises, should be stopped forthwith.
- vi) Scientists up to the level of Scientist-F should get involved in the examination of evidence material by conducting laboratory analysis themselves.
- vii) Every CFSL should hold monthly meeting amongst Director, Quality Manager, Technical Manager(s), Heads of Divisions, and Reporting Officers to incisively review the technical and administrative components of cases, quality assurance, R&D projects, and Annual Action Plan progress.

8.2.5. Inconclusiveness of Expert Opinion: The SPAC, after scrutiny of a large number of case files, found that many final reports/opinions were inconclusive for which the following measures are recommended(Para 2.5.2):

- i) All the laboratory tests should be conducted by strictly adhering to SOPs for different disciplines.
- ii) Inconclusive opinions are also attributed to degeneration of exhibits due to long waiting time before conducting the examination and lack of extended experimental design. This requires fast remediation by augmenting the trained manpower.
- iii) All the viscera cases referred to CFSLs for toxicological examination without mentioning any symptoms of poisoning in the post-mortem report, or the investigation report of the IO not suspecting any poisoning, should not be accepted in the laboratory.

8.2.6. Documenting the Forensic Opinion/Reports (Para 2.6.2)

- i) Detailed SOPs should be developed for recording observations, deductions, interpretations, and report framing.
- ii) The report should be self-speaking, precise and should not only answer the questions asked by the forwarding agencies, but should also contain the implied queries, which may provide leads to the IO for further investigation or help the judiciary in imparting justice. Scientific reasons for arriving at the specific conclusions/opinions should also be given in the report.
- iii) The RO should prepare and submit only the Draft-Report to the Technical Manager for review, who should write comments and put his signature of approval or otherwise with date. Later subsequent to administrative review, the final Report should be made, signed and processed for dispatch.
- iv) Only two copies of the final report should be generated, one original (on regular white sheet) to be sent to the forwarding authority and the other (on coloured paper) as the office copy for the case file.

8.2.7. Scene of Crime (SOC) Visits (Para 2.8.1)

- i) DFSS may initiate appropriate action for legal measures to ensure mandatory forensic presence at SOC in the heinous crimes.

- ii) SOC Visit Register should be maintained at the Director's Chamber
- iii) Scientists should be provided continuing education in SOC examination.
- iv) Scientists should prepare sketch showing relative topography of article(s), victims, and person(s) witnessed at the SOC.
- v) Close-up photography with objective revelation; incorporation of contrast scale by default before every snap.
- vi) Provision of "CFSL" printed, field – friendly, disposable jackets for the SOC team members.

8.2.8. Court Attendance (Para 2.9.1)

- i) Maintenance of a Court Attendance Register in the Director's office
- ii) Sharing of every court experience with colleagues in the Division
- iii) Training of newly recruited scientists in this aspect
- iv) Continuing education on court testimony

8.2.9. Five-year Plan R&D Projects (Para 2.10.4)

- i) R&D projects should not be proposed and sanctioned, just because funds are readily available in the budget. The project proposals should be incisively vetted in terms of their feasibility and necessity, and proven competence of the PI and Co-PI(s) before their approval.
- ii) The R&D projects should be so chosen that their final outcomes results in either speeding up the laboratory examination or encompass exhibits on which conclusive opinion was hitherto not possible by employing the prevailing forensic techniques.
- iii) Each proposal from CFSL scientists should have one Principal Investigator (PI) and two Co-PIs, each with equal responsibilities. Any transfer of manpower etc. should not cause adverse effects on the project's progress.
- iv) More professionalism should be infused into the system of sanction, fund-release, oversight, review, mid-course corrections, and assured deliverables. There are in fact ample models at national research funding agencies like DST, DBT, CSIR, ICMR, etc.
- v) DFSS HQ should constitute Project Advisory & Review Committees (PARC) for every project to periodically monitor and review their progress and suggest mid-term corrections, if any. The minutes of such bi-annual meetings should be critically reviewed at the DFSS HQ, and remedial actions, if suggested, be immediately taken.

8.2.10. Publications, Patents, Awards, and Presentations (Para 2.11.1)

- i) CFSL Scientists should be motivated to publish their research papers in Peer-reviewed journals of international repute.
- ii) A mechanism should be evolved to disseminate the findings of every research publication within the CFSL, and, also to other FSLs/CFSLs as well as to DFSS Headquarters.
- iii) Innovations, design & development, and improvements in forensic sampling, methods, kits, techniques, and gadgets should be attempted by CFSL scientists with a passion, and validated in simulated forensic ambience; the deserving ones should then be first processed for patenting, followed by adoption, publication and dissemination.

- iv) DFSS should periodically make the CFSL scientists aware about IPR and Patents.

8.2.11. Creation of Database (Para 2.12.1)

- i) Every operational Division of CFSLs should create forensic databases and update them for sharing with agencies (like NIA) through homeland security linked networks (such as NATGRID).
- ii) Through the CFSL's hub of Forensic Informatics Wing, these databases should be networked with the Main Server located at the DFSS headquarters.
- iii) Preventive and lead-giving forensic indices for database could include (while not limiting to) fingerprints, DNA & RNA profiles, retinal/iris patterns, explosives, firearms, chemical/biological/nuclear warfare agents, voice prints, shoe prints, portraits, hair, fibres, paper, ink, security documents, travel documents, currency, narcotics & drugs, tyres, paints, glass, and soil.
- iv) Provision in law could be made so that manufactures of items of forensic indicators are obliged to submit samples to DFSS before releasing them for public consumption.

8.2.12. Human Resource Development Programmes (Para 2.13.1)

- i) Proficiency Certification of scientists (and three-yearly re-certification) should be made mandatory to ensure that they are serious in keeping themselves abreast with the latest development in their respective fields.
- ii) There should be a rigorous written/oral test at the end of each training course
- iii) The scientist deputed for training should give a presentation to all the scientists of the respective CFSL, within a week after completing the course.
- iv) An urgent policy decision is to be taken on HRD Programmes for the University students that affect the core-scientific performance of the CFSLs.

8.2.13. Technical Library (Para 2.14.3)

- i) Importance of library should be felt by all the scientists. Monthly Journal Club meetings may trigger this.
- ii) Adequate space, infrastructure, and facilities, including e-accessibility with connectivity to DFSS HQ/National Forensic Library/National Forensic Academy (NFA), should be made available for the technical library of CFSLs.
- iii) Library should be manned by qualified Librarians to make it a professionally managed entity.
- iv) Exclusive budget Head for "Technical Library" should be instituted.
- v) Library Committee (comprising Director, one mid-career scientist, and, one younger scientist) may be formed to coordinate and guide the library functions.
- vi) Priority should be for procuring scientific journals, books, monographs etc.
- vii) A ceiling of three newspapers (one each in English, Hindi and local language) should be adhered to. Popular family magazines should not be a part of the Technical Library.

8.2.14. Implementation of QMS (Para 2.15.1)

- Although the NABL quality assurance program is in place in all the CFSLs, there is an urgent need for periodic review of quality system management, up gradation of SOPs, development and execution of proficiency testing (PT) programmes, and validation of test methods/techniques before use.

8.2.15. Feedback on Customer Satisfaction (Para 2.16.1)

- i) CFSLs should devise and implement ways and means of obtaining feedback from service-seekers on lab opinion/reports. "Forensic Service Users' Feedback Form" is given at Appendix-I, which should accompany the lab report.
- ii) Action should be taken to ensure that all Trial Courts/Commissions of Enquiry etc., by default, mark a copy of their judgment to the CFSL Director in every case wherein lab report has been taken on their file.

8.2.16. Additional Observations & Recommendations (Para 2.17)

Some of the observations made by the SPAC during this exercise (and simultaneous recommendations thenceforth), do not find appropriate space elsewhere in this Report; they are enumerated hereunder.

- i) There should be uniformity in the contents of Annual Action Plan of every CFSL for proper follow up. Similarly, there has to be uniformity in stipulating and generating Monthly Returns by all the Divisions of CFSLs.
- ii) Wherever initials or signatures are affixed, the date, and the name of the signatory in capital letters should also be incorporated underneath. This is applicable to the staff of CFSLs as well as to the outsiders.
- iii) Registers and Log Books, before being put to use, should be serially page-numbered and a certificate by the competent authority that it contains --- number of pages should be made on the first sheet.
- iv) Entry in registers, instrument log books etc should be made legibly, professionally, and completely. There should be uniformity amongst all the CFSLs.
- v) There should be a policy decision at DFSS and action at CFSLs to withdraw all the obsolete equipment (irrespective of their cost). Such equipment may officially be gifted to the desiring public-funded educational institutions and save usable laboratory space.
- vi) Similarly, certified for condemnation and condemnation-worthy equipment are awaiting disposal. Annual disposal drill may be instituted. Similarly, the annual drill of physical verification of the Division's inventory should strictly be carried out.
- vii) As recommended in Perspective Plan for Indian Forensics (2010), 7-year-withdrawal-replacement cycle should be initiated for equipment, to ensure that the CFSLs are equipped with state-of-the-art facilities and provide the best analytical tools.
- viii) Planning and implementation should be so robust that in future there should not be a gap of more than one month between the physical arrival of an equipment and start of the operation by the CFSL scientists. It is painful to note that the present time gap may extend up to one year plus, as was the case with AAS and ICP-MS at CFSL Kolkata.

- ix) The indoor test-firing range in the corridors of Ballistics Division of CFSL Hyderabad is blatantly unscientific. This indispensable facility should be brought into proper state.
- x) The overall housekeeping and conservancy work may be outsourced, and fresh recruitment to MTS posts be dispensed with.
- xi) There should be single uniform pattern of numbering the case files across the spectrum.
- xii) Copy of each interaction (for example: "Case Receipt/Acknowledgement" given by CCR Counter to the case bringing messenger; "intimation to the service seeker" about readiness of report) should be in the case file.
- xiii) The Document Division of CFSL Chandigarh at Shimla should be immediately relocated to Chandigarh. The accommodation at Shimla may be retained and used as an appendage to NFA, the training arm of DFSS.
- xiv) Designations such as GEQD, Dy. GEQD, AGEQD, and ACIO etc should be appropriately replaced in alignment with mainstream CFSL cadres; this will enable unambiguous implementation of FCS in career progression, and, automatic accommodation of Document expert-scientists under Sec 293 Cr P C.
- xv) DFSS may highlight to the Government, the importance of taking on board eminent forensic scientists for core contribution and value addition to various Committees engaged in sensitive/hi-tech activities of national importance such as security documents, travel documents, WMD, etc.

8.3. TECHNOLOGICAL CAPACITY/CAPABILITY OF CFSLs

8.3.1. Work Procedure Manuals (Para 3.2.1.2)

- i) The Standard Operating Procedures prepared more than a decade ago need to be up-to-dated with standard validated techniques.
- ii) Uniform test methods (SOPs) should be adopted for examining similar evidence materials in all the forensic science laboratories.
- iii) Validation of the methods including LOD for qualitative tests should be reviewed suitably for ensuring their being current.
- iv) LOD, LOQ & UOM are to be reflected in all the SOPs, in which quantitative measurement of the evidence material becomes important parameter. Such test methods need immediate review.

8.3.2. Availability of Standards (Para 3.2.2.2)

- i) Every forensic laboratory must, have a clear policy and action plan for procurement of CRMs and ensuring the purity of critical chemicals.
- ii) DFSS HQ should create a mini set up similar to NIST (USA) to ensure regular supply of all relevant standard materials required for the forensic analysis.
- iii) Biology Groups of all the CFSLs must maintain reference (standards) biological agents for comparison.
- iv) Action has to be taken to identify all critical chemicals affecting the quality of the results and their characteristic parameters, and to develop procedures for their quality assessment. Only such quality-ensured chemicals should be used in the forensic examination of evidence materials.

8.3.3. Lacuna in Toxicological Analysis (Para 3.2.3.1)

- i) The exhibits received at CFSLs for toxicological analysis should be stored at low temperature (40C) to avoid any further decay. The lab examination should be taken up on priority.
- ii) The opinion/report should contain the names of drugs and poisons or their classes screened in the analysis, to make the forensic report more meaningful.
- iii) Techniques employing GC-MS should be evolved and validated to get information about many poisons simultaneously. Instrument-friendly extracts of viscera samples can be simultaneously loaded in the auto-samplers of GC, GC-MS and LC-MS. This would enhance the chances of detection of unknown poisons in very small amounts in at least some of those cases where poison could not be detected.
- iv) The poison detected in the relevant biological samples should be quantitatively assessed and the internationally accepted "lethal dose" should also be mentioned in the Report.

8.3.4. Adoption of Random Sampling Procedure (Para 3.2.4)

- The internationally accepted standard statistical sampling methods need to be followed in crime cases comprising large number of samples and should be recorded in the file and mentioned in the opinion.

8.3.5. Generating Complete Profile of Drug Samples (Para 3.2.5)

- i) Capabilities for generation of data with sophisticated instruments like GC, Capillary LC, and Capillary GC coupled with High Resolution MS, GC-MS-MS and LC-MS-MS followed by statistical analysis of such data are needed.
- ii) Profiling of each sample with quantities more than "small quantity" (vide NDPS Act) is needed for source identification and intelligence to understand the trafficking pattern, and also for creating data bank. This will also help in controlling drug abuse problems, and in planning health services for the treatment of drug addicts.

8.3.6. Creation of Database of Forensic Indices (Para 3.2.6)

- i) The scientist should identify additional parameters for database creation, rather than the routine analysis of the case samples intended for submission to the investigation agencies and the courts.
- ii) Requisite data for certain items should also be collected from their manufacturers.
- iii) All such information will be deposited at a central place, to be managed by another set of personnel. These activities however need manpower with appropriate skills in data bank management. The State laboratories should also be made aware of the advantages of participating in pooling and sharing the data. Further, the requisite data of all the licensed fire-arms in the country are also to be collected and stored at that place.

8.3.7. Adequacy of Scientific Equipment (Para 3.3)

- i) A large number of equipment processed by the CFSLs has remained grossly underutilized. It is therefore recommended that a "Need-based identification Committee" be formed at DFSS HQ to scrutinise the proposal rather than solely depending on the indenters.

- ii) Adequate advanced planning by scientists to be done to identify their requirements of equipment, materials and manpower to ensure their proper utilization.
- iii) All the CFSLs have to ensure that the equipment remain fully functional and are utilized for evidence material analysis work.
- iv) Methods developed for the analysis with LC-MS-MS need validation.
- v) The instrument's Log book must be strictly maintained for their utilization in evidence material examination with case reference details.
- vi) Security of the forensic data collected and stored on computers should be ensured to avoid the access and manipulation by the unscrupulous elements.

8.3.8. New Technologies and Equipment to be Deployed (Para 3.3.4)

- i) SPAC has examined the capability and capacity of the existing technologies/methods to render forensic service as per the mandate of CFSLs of DFSS. Limitations have also been recognized. Alternative ways and means have been suggested to address such deficiencies. Effectiveness and validity of new technologies are to be studied in the Indian context before procurement.
- ii) New technologies and modern equipment internationally available should be deployed to upgrade the forensic services in all the CFSLs.

8.3.9. Calibration of Analytical Instruments (Para 3.3.5)

- The validated software employed in forensic analysis should regularly be "re-validated" by periodically ascertaining their performance integrity through simulation studies.

8.3.10. Calibration of Measuring Tools (Para 3.3.7)

- All measuring tools and instruments used in forensic examinations must be periodically got calibrated through the accredited institutions in India/abroad.

8.3.11. Video Conferencing Facility for Court Testimony (Para 3.3.8)

- Reporting Officers spend a lot of their time for travel to tender evidence in courts, especially for outstation cases. Creation of video conferencing facility in consultation with judicial authority should be considered which will save the valuable analytical time of the experts and will reduce the financial expenditure.

8.3.12. Adequacy of Trained Manpower (Para 3.4.2)

- i) HRD should be made a continuous process during entire service career, right from the time a fresh scientist is recruited.
- ii) The laboratory management should ensure the competence of all the scientific personnel who operate equipment, perform tests on case exhibits, evaluate results, and sign the final reports. Certification of scientists (and re-Certification) by competent authority would enable this.
- iii) Adequate and well-trained manpower be made available to meet the requirements of mandate of the laboratory.
- iv) Weekly group discussions, monthly journal club meetings, monthly review meetings and biennial discipline-wise brainstorming sessions among

colleagues should be in place at CFSLs as enablers to enhance their quality and skills.

8.4. STANDARDS WORK NORMS FOR EVIDENCE MATERIAL ANALYSIS

8.4.1. Proposed Single-Scientist-based Work Unit (Para 4.3)

- i) The SPAC is of the view that the existing system of “multiple-scientists-unit” based work norms has many limitations and cannot sustain in the changed scenario in view of fragmented unit. With the induction of FCS for promotion, single-scientist-based-unit work-norms with full technical support and a provision of adequate supervision are the only alternative. The proposed system shall consider the time spent by individual scientist in other activities, such as scene of crime (SOC) visits, court testimony, R&D, database generation, supervision of case analysis, HRD, and other miscellaneous functions.
- ii) Scientific culture and cohesive scientific environment in the laboratory need to be developed so that scientists up to the rank of scientist ‘F’ should enjoy independently working in the lab and feel the pride and a sense of job satisfaction.
- iii) The services of technical support personnel should be pooled together in the Division for optimum utilization of their technical skills. All the technical and instrumental facilities present in the Division will be maintained by the technical staff under the supervision of the Division in-charge.
- iv) All the mundane activities need to be taken away from the scientists up to the Scientists-D level and be centrally handled by the Division in-charge, who should be provided with exclusive human resources for this purpose.
- v) The Committee recommends that an unambiguous and quality expert opinion must be furnished within a maximum of 4 weeks time.

8.4.2. Organizational Values (Para 4.3.10)

- i) The timeliness and work-norms for evidence materials examination have been evolved with the assumption that the complete system functions with optimal efficiency and fosters appropriate scientific culture in the organization.
- ii) With the mission of customer-satisfaction based prime objective and globally competitive forensic services through quality, technology, and innovation, all the CFSLs need to be internally aligned and externally focused to meet the work norms.
- iii) To ensure the mandated objectives of quality and timeliness in providing forensic science services to forensic clientele, there is need to inculcate a feeling of ownership and the sense of belonging and pride of being in the organization in each cadre.

8.5. NEW STRUCTURE OF CFSLs

8.5.1. Mandate For CFSLs (Para 5.2)

With an aim to provide forensic science support to the homeland security, national exigencies and natural calamities, the SPAC proposes the following new mandate for the CFSLs:

- i) To provide forensic science services to Homeland Security, to Justice Delivery System and, to the States in emerging areas, on mutually agreed conditions.
- ii) To carry out R&D for innovation of technologies and create new scientific knowledge for achieving excellence of S&T applications in Justice Delivery System.
- iii) To develop databases of various forensic indices.
- iv) To validate new technologies and their transfer to the State/UT/Central Forensic Science Laboratories.
- v) To organize skill development programmes.
- vi) To develop linkages with related important scientific institutions and State/UT FSLs under their jurisdiction.
- vii) To assist DFSS in implementation of QMS and development of forensic science laboratories in the States of their jurisdiction.
- viii) To provide necessary assistance in management of disasters and crime scenes.
- ix) To act as referral FSS Institutions for evidence material examination. Every CFSL would serve as the “Lead Laboratory” for the States under their jurisdiction (as defined at the Para 1.9 of the Chapter-1)

This requires complete re-structuring of CFSLs to effectively meet the country's forensic demands in the prevailing national as well as global scenario. The existing three CFSLs, the upcoming three and the herein-SPAC-proposed one for Delhi will all fall in the same line.

8.5.2. Expertise to be created at each CFSL (Para 5.3)

- To meet the new enlarged and focused mandate, re-engineering of the CFSLs would require modification of certain existing operational units of analytical techniques, de novo creation of hi-tech analytical processes, and creation of databases for a large number of forensic indices. The broad categories of services/cases/expertise as required to be created at each of the CFSLs i.e. Terrorism and Counter-terrorism, Weapons of Mass Destruction, Smuggling/Contraband Products, Computer Crimes, Counterfeit, Explosion, Fire and Arson, Mass Disasters, Identification of Mutilated Dead Bodies and Missing Persons, and, Restoration of Kinship. Specially designed vehicle is to be stationed in the Business Area for Rapid Response Forensic Team for crime scene management and collection of evidence materials in an efficient manner.

8.5.3. Scientific Performance Audit (Para 5.7.4)

- i) In view of the ever-changing scenario of technological inputs in perpetrating crime and increased sophistication in the availability of global forensic science and technology for evidence analysis, the SPAC recommends that Scientific Performance Audits should be conducted for all the CFSLs, once in every three years. This would ensure appropriate and timely remedial actions that may become imperative.
- ii) DFSS should prepare a policy document on scientific performance audit for all the CFSLs to ensure that all of them remain continuously updated in their infrastructure, technology, human resources, database generation, work

norms to provide credible and effective forensic support to the courts and investigation agencies in time bound manner.

- iii) Similar exercise should also be conducted for all State FSLs who are beneficiary of Central Funds through Police Modernization Grant of Union Home Ministry. Through such audits, these laboratories will also get an opportunity for introspection of their work procedures and take appropriate remedial actions, wherever required.

8.5.4. Adequate Financial Powers (Para 5.7.5)

- Directors of CFSLs should be armed with financial powers at par with the Directors of other scientific laboratories of the Departments under Govt. of India.

8.5.5. Advisory Committees for the Thrust Areas (Para 5.7.6)

- Specific “Thrust Areas” for handling mission-mode R&D projects by each of the seven CFSLs have been identified at Para 1.8 and accordingly each CFSL would constitute a “Project Advisory and Review Committee (PARC)” for every major R&D project. This committee would comprise external experts in the field and their tenure would be same as that of the project.

8.6. RE-ENGINEERING OF DFSS HEADQUARTERS

8.6.1. Organizational Structure Of DFSS Head Quarters (Para 6.1)

- i) The SPAC recommends that DFSS should fulfil the role of an Apex Body for carrying out planning, legislation, implementation, and monitoring of forensic science services in the country. It should act as the central coordinating body for all the states in the areas of forensic science providing services to homeland security, and its contents and structure should be self-contained, involving multifarious skills, and wide range of specializations.
- ii) Being the apex body for the development of forensic science in the country, the organizational structure of the DFSS HQ, in terms of scientific manpower, and the supporting infrastructure should be such that it can handle the desired mandate of evolving policies for forensic science at the national level, planning the modus operandi of their execution, coordination and supervision of the forensic science activities of the CFSLs, handholding of 28 State/UT FSLs, and liaison with the Planning Commission, MHA, Investigating Agencies (Central, UT, as well as State), Police, Judiciary, NABL, and other Scientific Institutions. DFSS HQ has also to provide scientific help to other countries (e.g. they have helped Bhutan, Maldives, Seychelles, and Vietnam) in establishing their forensic science laboratories). The inadequacies cited in the report results in compromising the quality, quantity, as well as the timeliness of the scientific output and adversely affect the process of continuous improvements, an essential component of Total Quality Management (TQM).
- iii) The Committee recommends that the Directorate of Forensic Science Services (DFSS) be upgraded to the level of a separate department under the MHA to evolve and implement proactive and reactive forensic policies for Homeland Security and National Calamities to provide high quality and timely services with international credibility. This Department should be headed by a Secretary level Scientist (designated as Director General), as prevalent in the major scientific organisation like DRDO, ISRO, CSIR, DBT, ICMR etc.

- iv) The scientific posts of DFSS HQ would form a common cadre with those of the CFSL's scientific posts and would be eligible for promotion under the Flexible Complementing Scheme (FCS). The existing post of Senior Scientific Officer Grade I (Forensic Science) at the DFSS HQ is recommended to be upgraded to the level of Scientist-E (Jt. Advisor) and be re-christened as "Staff Officer to the DG FSS" to make his role more meaningful. The present SSO Grade-I (FS) post at DFSS HQ is the only one of its kind in the entire forensic set up and hence it should be abolished.

8.6.2. Housing The DFSS HQ (Para 6.6)

- The SPAC considers that a floor area of approximately 50,000 sq. feet should be adequate to meet scientific, technical, and office accommodation requirements of DFSS HQ.

8.6.3. The Proposed Organizational Structure Of DFSS HQ (Para 6.7)

- To effectively meet its mandate, the re-engineered DFSS HQ should be staffed by 150 personnel comprising 35 scientists and a supporting group consisting of 61 administrative staff. The remaining 54 Personnel (Data Entry Operators, Multi-task Staff, and Car Drivers) are to be outsourced.

8.7. HUMAN RESOURCE

8.7.1. Scientific Manpower Requirement in CFSLs (Paras 7.2.1 & 7.2.2)

- i) The committee has computed the requirement of scientific and technical manpower on the basis of preparedness for handling 500/600 cases for each Group in each of the CFSLs and the new work norms (Chapter 4). This number of the cases would involve approximately 1000-1200 'normalized cases' to be annually examined.
- ii) A total of 117 scientists and 58 technical personnel have been proposed for each of the CFSLs and thus a total of 819 scientists and 406 technical personnel are required for seven CFSLs. This includes additional scientific and technical manpower recommended for each of the CFSLs to carry out mission-mode R&D activities.
- iii) A few of new disciplines to provide the requisite forensic support for Homeland security have been proposed in each CFSL

8.7.2. Career Progression of Scientific Manpower (Para 7.4)

- i) The Government of India has already sanctioned Flexible Complementing Scheme (FCS) of promotion to Group-A level of scientists in the DFSS HQ and its outlying units. As the FCS, in the present form, has been approved for promotions upto the Scientist-F level, the scheme would cover the existing levels of Senior Scientific Officer (to be re-christened as Scientist-B) to Director (to be re-christened as Scientist-E).
- ii) The FCS approved by the Govt. of India for Group-A level of scientists in the DFSS HQ and its outlying units, does not cover the existing technical personnel (Laboratory Assistants to JSOs) employed at the CFSLs. SPAC, therefore, recommends that the technical posts be brought under "Limited Flexible Complementing Scheme" of promotion, on the pattern of DRDO Technical Cadre (DRTC), the rules for which should accordingly be framed expeditiously. To bring uniformity, the new nomenclature for the technical cadre of DFSS should also be adopted.

- iii) The existing SSAs/JSOs, having Masters degree in any branch of science (i.e. fulfilling the essential qualification criterion for the direct recruitment for the post of Scientist-B), would be considered for selection to the post of Scientist-B without any age-bar. They should also be considered for upgradation to the post of Scientist-B through a Limited Departmental Examination followed by interviews, for which a policy is to be evolved on the pattern of DRDO.
- iv) Once the above schemes are in place, the technical cadre posts would be filled up only at the Technical Assistant-A level, for which the essential qualification would only be Bachelors Degree in Science with Diploma in Lab Technology or Diploma in Engineering. However, such freshly recruited Technical Assistants should compulsorily undergo 3-months induction training at NFA (LNJN NICFS) to make them suitable for the forensic laboratory work.

8.7.3. Administrative Manpower Requirements in CFSLs (Para 7.5 & 7.6)

- i) A total of 66 administrative personnel have been proposed for each of the CFSLs and thus a total of 462 administrative staff is required for seven CFSLs. The service of DEO, MTS, and Car Drivers should be outsourced to the extent possible.
- ii) The administrative cadre of DFSS should be merged with that of the MHA to provide an equal opportunity to them in their career progression. Such a merger would increase the level of satisfaction among the administrative cadre of DFSS and increase their operational efficiency.

8.7.4. Total Manpower Requirement in the Organization (Para 7.8)

- i) A total number of 854 scientific posts (from Secretary to Scientists- B) are required for manning the DFSS HQ and 7 CFSLs, and the total number of 409 supporting technical staff (spread over various ranks) is required in all the 7 CFSLs and DFSS HQ. Similarly, 317 administrative manpower and 327 outsourced personnel (DEO/MTS/Drivers) for the DFSS HQ and its outlying laboratories would be essential.
- ii) Housekeeping, horticulture, security, and transport related jobs should preferably be outsourced. Fresh recruitment of MTS (Multi Task Staff) should be dispensed with in future
- iii) The present sanctioned strength of scientific and ministerial posts of various categories in CFSL and DFSS HQ is 422. This comprises 104 scientific posts of group 'A' category (from Sr. Scientific Officer Grade II to the rank of Chief Forensic Scientist), 106 technical staff (from the rank of Gazetted Gr. 'B' (33 JSOs), and 73 non-Gazetted Group-B, -C & -D), and 212 administrative manpower (comprising 8 Gazetted and 204 ministerial staff) staff. SPAC recommends that additional posts for different categories of staff may accordingly be created. This would involve an annual expenditure of Rs. 125 Crores (approx.).

8.7.5. Re-Designation of Posts for FCS Implementation (Para 7.9)

- The SPA Committee recommends that all the existing scientific posts in DFSS may be re-designated to the equivalent rank of scientific cadre posts covered by the FCS.

8.7.6. Formation of Central Forensic Science Service (Para 7.10)

- The SPAC recommends that a common service cadre of organized service called 'Central Forensic Science Service' be created for all forensic scientists working in the CFSLs, including CFSL (CBI), forensic wing of NPA, and the proposed NFA (LNJP NICFS). The SPAC is fully convinced that constitution of this service will create synergy, preserve and strengthen the scientific culture in these institutions.

8.7.7. Utilization of Seasoned Forensic Scientists Resource

- The SPAC recommends that the services of retired forensic scientists of proven professional credibility could be harnessed in the case examination work to reduce pendency, for participation in major R&D projects, in imparting skill development programmes, and for SOC visits during forensic exigencies. This is in conformity with the recommendations contained in the Perspective Plan for Indian Forensics (2010), wherein the concept of Reserve List of Experienced Forensic Scientists (RELIEF) has been suggested.

**RECOMMENDATION NO. 4 OF THE PERSPECTIVE PLAN FOR
INDIAN FORENSICS (2010)**

Recommendation No. 4 of the Perspective Plan for Indian Forensics (2010) is enumerated below:

- (i) Definition of portfolios, distribution of duties and satisfaction of clients should be in place, supported and sustained by policy directions, programme advisories, manpower strengthening, infrastructure augmentation, knowledge acceleration and customer consultation.
- (ii) The DFSS Headquarters should continue to function from New Delhi, but with immediate strengthening in terms of space, managerial strength, infrastructure, management network and other logistics.
- (iii) The practice of retaining Director/Chief Forensic Scientist as the Head should continue with the additional prefix of "Scientist G" for meeting the ongoing Flexible Complementing Scheme (FCS) requirement.
- (iv) One post of Scientist E/Deputy Director and three posts of Scientist D/Assistant Director should be created and filled immediately for posting at the Headquarters. The existing post of Senior Scientific Officer Grade I (Forensic Science) at the headquarters should be, without any financial commitment, converted into Assistant Director since these two posts carry the same pay band and grade pay; and then, this lone cadre/post of SSO Gr. I (FS) in the entire forensic set up should be abolished. Subsequently, the existing cadre of Senior Scientific Officer Grade II (CFSLs) should be re-designated as Senior Scientific Officer.
- (v) DFSS Headquarters should have three portfolio – clusters, namely (a) *Administration & Resources*; (b) *Service & Quality*; and, (c) *Training & Research*; each cluster (having two wings each) should be coordinated by one Assistant Director under the guidance of the Chief through the Deputy Director.
- (vi) Under the cluster "*Administration & Resources*," there should be two Wings, namely (a) *Administration* and (b) *Infrastructure & Human Resource Recruitment and Progression (HRRP)*. The "*Administration*" Wing should be led by an Under Secretary (Finance) to Government, preferably a person retired in this cadre, on reemployment for five years and so on.
- (vii) For these Wings and for the other Wings under the remaining two clusters, there should be action for (a) assessing groups/subgroups, number & cadre of ministerial & allied staff and other logistics and (b) making available the requirements thereof.
- (viii) "*Administration*" Wing should deal with subjects covering: (a) Establishment; (b) Budget; (c) Purchase; (d) Five-year Plans and Special Schemes; and (e) Miscellaneous. "*Infrastructure & HRRP*" Wing should deal with: (a) Building, equipments, vehicles

and other infrastructure (from headquarters to the field Mobile Labs); (b) HR recruitment and assessment; (c) HR motivation and welfare; (d) HR career progression; (e) HR grievance redressal; and (f) Reserve List of Forensic Professional (RELIF).

- (ix) “*Service & Quality*” cluster should have two Wings, namely (a) *Services & Rapid Response Forensic Authority (RAREFA)*, and (b) *Standards & Quality*. In turn, each of them should have two sub – Wings: *Services* and, *RAREFA* should be two such sub-Wings; “*Services*” should coordinate: all forensic services (SOC, analysis, court testimony etc.), in- house R & D, in – house training, client feedback on every lab report and Forensic Stakeholders’ Consultative Committee (*FOSHCOM*). Each CFSL should have *FOSHCOM* comprising five members (representing local judiciary, prosecution, police, social welfare and laboratory) with three-year term, holding consultation / meeting every January and July. “*RAREFA*” should be a 24 x 7 networked rapid entity responding to emergency, evidence, hazardous materials and disaster, through the mobile and other seats of “*Services*” and by formation of ad hoc special groups; reconstruction of scene of crime / occurrence should also be under its purview. Both these sub-Wings can in addition invite and utilize the services of those enrolled in RELIF, on mutually win-win terms.

“*Standards & Quality*” Wing should have two sub-Wings, namely (a) *Standards*; and (b) *Quality*; the former should procure and distribute authentic samples & reference controls, arrange validation of methods, bring out Standard Operating Procedures (SOPs) & Manuals, and coordinate outputs as discipline based guidelines through the formation of Scientific Task Forces (STFs). The “*Quality*” sub-wing should ensure proficiency testing (PT), good laboratory practice (GLP), quality audit and liaisoning of accreditation of Central / State / UT laboratories by NABL.

- (x) The two Wings of the third portfolio – cluster “*Training & Research*” should be “*Training & Academics*” and “*R & D, e-Library & Intelligence*.” Under the sub-Wing “*Training*”, all non in-house training / induction / continuing education / continuing professional development courses and programmes in India and abroad should be dealt with, for forensic personnel of the Centre, States and UTs; there should also be sensitization / awareness sessions in forensic science for users like judiciary, prosecution and police. For this exclusive purpose, a National Forensic Academy (NFA) should be in place by renaming the existing National Institute of Criminology & Forensic Science (NICFS) after shedding its Criminology component which in turn may be appropriately taken care of by MHA. NFA should be under the administrative control of DIFOSER. Forensic Science Unit of SVP National Police Academy (Hyderabad) should also become part/extension of the NFA. The second sub-Wing “*Academics*” should focus on encouraging and endorsing regulation of forensic education and academia (by the herein proposed Forensic Council of India (FOCI), *Vide Annexure –III*), and coordinating the said Council’s efforts to certify and re-certify forensic professionals.

“*R & D, e- Library & Intelligence*” wing should have three sub-Wings. The first one “*R & D*” should act in matters pertaining to problem – solving & proactive research, product development, intramural & extramural research (IMR & EMR), project funding, crazy ideas grant (CRAIG), attracting external research funds, PhD – research fellowship, and grooming of the upcoming (India’s heartland) CFSL at Bhopal into a national Centre for Novel Forensics (CENOF). The “*e-Library*” sub-Wing should be the nodal National Forensic Library at DIFOSER headquarters with state of the art facilities, wealth of hardcopies / softcopies of books, monographs, reviews, reports, proceedings and international & Indian journals, and high capacity congestion proof server for internet access to e-journals etc. by any genuine Indian forensic establishment. The third sub-Wing “*Intelligence*” at headquarters should design, develop, maintain and update Forensic Information and Documentation Centre (FOSIDOC) by generating and obtaining relevant databases from forensic as well as from non – forensic sources, to share lead giving and prophylactic details with national intelligence agencies especially for homeland security.

- (xi) In order to effectively steer DIFOSER for efficient service delivery within the framework of work vs. time vs. budget, guiding beacons should be available. At the helm, therefore, a five-member Policy Panel (POP) headed by a (retired) Supreme Court Judge should be formed for three-year term; others in POP should be (i) Vice President of the proposed Forensic Council of India – Member; (ii) Joint Secretary (MHA) (GoI) – Member; (iii) Joint Secretary (Fin) (GoI) – Member; and (iv) Director-cum-Chief Forensic Scientist – Member Secretary. POP should meet every January and July. Also there should be three Programme Advisory Committees (PACs) to advise the three portfolio clusters. Each PAC (AR-PAC, SQ – PAC and TR – PAC) should have three members with three-year term and meet every April and October.

APPENDIX - B

No. CFI/S&T/CFSL/4/86/Vol II/GPA-II
Government of India
Ministry of Home Affairs
.....

New Delhi, April 16, 1998.

Office Memorandum

SUBJECT: Reorganisation of the CFSLs' functioning under the BFR&D.

The undersigned is directed to state that the proposal for restructuring of the three Central Forensic Science Laboratories under the Bureau of Police Research and Development has been considered by the Government and it has been decided to amend the activities of all the three laboratories so as to enable each laboratory to mainly focus on the Research and Development activities in one of the three broad areas of Forensic Science viz., Forensic Biological Sciences, Forensic Physical Sciences and Forensic Chemical Sciences. While preserving their composite nature, the three laboratories shall henceforth, be developed as 'Centres of Excellence' for Research and Development, and Specialized Training in the following fields of Forensic Science:-

- Central Forensic Science Laboratory, Calcutta - Forensic Biological Sciences
- Central Forensic Science Laboratory, Chandigarh - Forensic Physical Sciences
- Central Forensic Science Laboratory, Hyderabad - Forensic Chemical Sciences

It has also been decided that the Neutron Activation Analysis Unit of CFSL, Calcutta shall henceforth, function under the administrative control of CFSL, Hyderabad.

2. Besides focusing on their core activity, each laboratory will continue to carry out the routine Forensic Analysis of Crime Cases, in all the fields of Forensic Science received from Central Government, State Governments and the Union Territories. These laboratories shall also act as the Referral Centres for Forensic Analysis of Crime Cases which require extensive investigation and high expertise and are received for expert opinion from the Courts of Law, and other State and Central Forensic Science Institutions and other Crime Investigating Agencies in India.

3. The present sanctioned Scientific and Technical staff strength of the three CFSLs is as given as under:

CFSL Calcutta	CFSL Chandigarh	CFSL Hyderabad	Total
92	78	78	248

App. B-1

4. With the proposed reorganisation as mentioned above, the sanctioned Scientific and Technical manpower resources in the three Central Forensic Science Laboratories shall be re-distributed as under:-

Sl. No.	Designation of the Post	CFSL Calcutta		CFSL Chandigarh		CFSL Hyderabad		Total
		Centre of Excellence Division	Crime Case Examination Units	Centre of Excellence Division	Crime Case Examination Units	Centre of Excellence Division	Crime Case Examination Units	
1.	Director							1
2.	Deputy Director	3	-	6	-	10	-	19
3.	Assistant Director	1	-	6	-	10	-	17
4.	Scientific Officer	3	5	5	4	12	3	42
5.	Jr. Scientific Officer	2	5	8	4	16	3	38
6.	Sr. Scientific Assistant	2	8	3	8	8	5	34
7.	Scientific Assistant	2	9	4	6	6	5	32
8.	Laboratory Assistant	2	9	3	7	6	5	32
9.	Laboratory Attendant	3	10	4	8	7	6	38
10.	Armourer	-	-	1	-	-	-	1
	Sub Total	20	46	40	37	75	27	245
	Total	67		78		103		248

* including the Neutron Activation Analysis

5. The Director General, Bureau of Police Research and Development may deploy the Scientific manpower in the Crime Case Examination Units from the Centre of Excellence Divisions as and when required, depending upon the work load. The distribution of ministerial staff in the three CFSLs will, however, remain unchanged.

6. The Forensic Science Wing of the Bureau of Police Research and Development will identify problems of the Forensic Science and allied services in the country and initiate, stimulate, guide, promote and control the above activities and coordinate with various Institutions, Organizations, Ministries, Universities, Research Institutes, Police and other Law Enforcement, Regulatory Agencies and individuals in India and abroad, interested in the subject.

This issues with the approval of Integrated Finance Division of the Ministry of Home Affairs vide their Diary No: 1868/FA(H)/98 Dated: 16.04. 1998.

Desk Officer, GPA-II
Ministry of Home Affairs


(दलीप कपूर)
DALIP KAPUR
डेस्क ऑफिसर
गृह मंत्रालय
Desk Officer
Ministry of Home Affairs

Copy to:

1. Director General, Bureau of Police Research and Development New Delhi;
2. Secretary, Dept. of Science and Technology, Government of India;
3. Joint Secy. (Home), Ministry of Home Affairs

App. B-2

4. Chief Forensic Scientist cum Director(FS), BPR&D, New Delhi;
5. Advisor(S&T), Planning Commission, New Delhi;
6. Pay and Accounts Officer, DCPW, New Delhi;
7. Director, Central Forensic Science Laboratory, Calcutta;
8. Director, Central Forensic Science Laboratory, Chandigarh;
9. Director, Central Forensic Science Laboratory, Hyderabad;
10. Head, Neutron Activation Analysis Unit, BARC, Trombay, Mumbai;
11. Directors of State Forensic Science Laboratories;
12. Director, Intelligence Bureau;
13. Director, Central Bureau of investigation;
14. Director, National Institute of Criminology and Forensic Science, New Delhi;
15. Director, National Police Academy, Hyderabad;
16. Director, BARC, Trombay, Mumbai;
17. DGPs/IGPs of all Central and State Police Forces;
18. Guard file;
19. 10 Spare Copies.


Desk Officer, GPA-II
Ministry of Home Affairs

(दलीप कपूर)
(DALIP KAPUR)
डेस्क अधिकारी
Desk Officer
गृह मन्त्रालय
Ministry of Home Affairs

APPENDIX - C

No. CFI/S&T/CFSL/486 Vol II
BUREAU OF POLICE RESEARCH & DEVELOPMENT
MINISTRY OF HOME AFFAIRS
GOVERNMENT OF INDIA
BLOCK No. 11, 3rd/4th FLOOR
C.G.O. COMPLEX,
NEW DELHI - 110 003.

Dated : 29 December, 1998

OFFICE ORDER

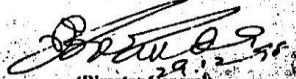
As per the Government of India, Ministry of Home Affairs Memorandum No. CFI/S&T/CFSL/486 Vol II/GPA-II dated 16 April, 1998 the three CFSLs under BPR&D (Viz CFSL Chandigarh, CFSL Calcutta and CFSL Hyderabad) have been restructured as Centres of Excellence in the specified disciplines as follows :

1. Central Forensic Science Laboratory, Calcutta - Forensic Biological Sciences
2. Central Forensic Science Laboratory, Chandigarh - Forensic Physical Sciences
3. Central Forensic Science Laboratory, Hyderabad - Forensic Chemical Sciences

It has also been decided that their predominant role would be to undertake R&D activities with a view to develop new forensic techniques, adapt the latest developments in basic sciences for forensic analysis and disseminate this information to the other Central/State FSLs. In addition, they would also carry out the forensic analysis of crime exhibits restricted to the following cases :

1. All Central Government Cases.
2. Cases from the states which do not have any forensic set up.
3. Cases referred by the courts of law.
4. Highly sophisticated cases referred by the state laboratories for which expertise does not exist with them. However routine cases would not be entertained.
5. Cases referred by the neighbouring Countries.

With the above in view, the states are advised not to send their routine cases to the respective CFSLs and rather get them examined in their own state FSLs. They should also ensure that the facilities, which do not exist at present, may be created in their laboratories on priority. Similarly those states, which have not yet established their own FSLs, may do so on priority for which technical advice of BPR&D scientists would be made available, as and when required.


(Director General)
Bureau of Police Research & Development

To
DGP/IGP of all the States / Union Territories
Commissioners of Police, (Metro Towns)
Directors, FSL (All the States)
Directors, CFSLs of BPR&D

DD (Bio)

11.1.99

All Staff members
D.V.

11/1/99

APPENDIX - 2
 No. DFSS/15(16)2011/MHA/PM-II - 705

Government of India
 Ministry of Home Affairs

New Delhi Dated the May, 2011.

2nd June 2011

copy for Dr. Senari

OFFICE MEMORANDUM

SUBJECT: Re-Distribution of existing scientific and ministerial manpower in Central Forensic Science Laboratories, Hyderabad, Kolkata, Chandigarh/ Shimla, new Hi- Tech Central Forensic Institutes, Bhopal, Pune, Guwahati and Directorate of Forensic Science Services, New Delhi-regarding.

The undersigned is directed to state that the consequent upon setting up of three Hi-Tech CFIs at Bhopal, Guwahati and Pune, the proposal for redistribution of Scientific and Ministerial manpower among all the Central Forensic Science Laboratories, Hyderabad, Kolkata, Chandigarh/ Shimla, new Hi- Tech Central Forensic Institutes, Bhopal, Pune, Guwahati and Directorate of Forensic Science Services, New Delhi under the Ministry of Home Affairs has been considered by the Government and it has been decided to redistribute the available manpower in existing CFSs, Hi-Tech CFIs and DFSS HQ.to strengthen the Forensic Science Services in the Country.

2. It has also been decided on the basis of the recommendations made by the consultants appointed by MHA for preparation of Prospective plan on Forensic Science that the Center of Excellence for Physical Science at CFSL Chandigarh, Chemical Science at CFSL Hyderabad and Biological Science at CFSL Kolkata is abandoned and all the laboratories under DFSS will focus in R&D work.

3. The present sanctioned scientific and ministerial strength of three CFSL and DFSS is as under:-

- i) Scientific Posts-210.
- ii) Ministerial Posts-212

4. With the proposed re-distribution as mentioned above, the sanctioned Scientific and Ministerial manpower resources in six Laboratories and DFSS HQ shall be as under: -

Re-distribution of Scientific Manpower															
Rank & sanctioned strength	CFSL Chd/ Shimla		CFSL HYD		CFSL KOLKATA		CFI BHOPAL		CFI GUHATI		CFI PUNE		DFSS H.Q.		
	Exi stin	Reallo cated	Exi stin	Reallo cated	Exi stin	Reallo cated	Exi stin	Reallo cated	Exi stin	Reallo cated	Exi stin	Reallo cated	Exi stin	Reallo cated	
	Chief Forensic Scientist. HQ-1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Sr. Scientific Officer (FS).HQ-1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Director . CFSs-3	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Deputy Director CFSs -18															
Biology -3	0	1	0	1	3	1	0	0	0	0	0	0	0	0	0
Chemistry -2															
Explosive -3	0	1	9	4	0	1	0	1	0	1	0	1	0	0	0
Toxicology -3															
NAA -1															

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App. D-1

Physics	-3	6	2	0	0	0	1	0	1	0	1	0	1	0	0
Ballistics	-3														
Total	-18	6	4	9	5	3	3	0	2	0	2	0	2	0	0
Asstt. Director CFSLS-17															
Biology	-3	0	0	0	0	3	0	0	1	0	1	0	1	0	0
Chemistry	-2														
Explosive	-3	0	1	9	4	0	1	0	1	0	1	0	1	0	0
Toxicology	-3														
NAA	-1														
Physics	-2	5	3	0	1	0	1	0	0	0	0	0	0	0	0
Ballistics	-3														
Total	-17	5	4	9	5	3	2	0	2	0	2	0	2	0	0
Sr. Scientific Officer CFSLS-28															
Biology	-6	1	1	1	1	4	1	0	1	0	1	0	1	0	0
Chemistry	-5														
Explosive	-3	3	3	9	4	2	3	0	1	0	1	0	2	0	0
Toxicology	-5														
NAA	-1														
Physics	-4	4	3	2	1	2	1	0	1	0	1	0	1	0	0
Ballistics	-4														
Total	-28	8	7	12	6	8	5	0	3	0	3	0	4	0	0
Jr. Scientific Officer, CFSLS-33															
Biology	-5	1	0	1	1	3	1	0	1	0	1	0	1	0	0
Chemistry	-4														
Explosive	-5	3	3	10	4	3	3	0	2	0	2	0	2	0	0
Toxicology	-5														
NAA	-2														
Physics	-6	8	5	2	2	2	2	0	1	0	1	0	1	0	0
Ballistics	-6														
Total	-33	12	8	13	7	8	6	0	4	0	4	0	4	0	0
Sr. Scientific Asstt., CFSLS-20		6	6	7	5	7	6	0	1	0	1	0	1	0	0
Scientific Asstt., CFSLS-18		4	5	5	5	9	5	0	1	0	1	0	1	0	0
Laboratory Asstt.-7		0	0	2	2	5	5	0	0	0	0	0	0	0	0
Manpower in Document Division															
GEQD-3		1	1	1	1	1	1	0	0	0	0	0	0	0	0
Deputy GEQD-12		4	3	4	3	4	3	0	1	0	1	0	1	0	0
AGEQD-21		7	6	7	6	7	6	0	1	0	1	0	1	0	0
ACIO Gr. I-19		6	5	7	6	6	5	0	1	0	1	0	1	0	0
Photographer-6		2	1	2	1	2	1	0	1	0	1	0	1	0	0
Asstt. Photographer-3		1	1	1	1	1	1	0	0	0	0	0	0	0	0
Total	- 210	63	52	80	55	65	50	0	17	0	17	0	18	2	2

Redistribution of Ministerial Posts in Outlying Units and DFSS HQ															
Rank	STRENGTH DFSS & CFSLS	CFSL Chd/ Shimla		CFSL HYD		CFSL KOLKATA		CFI BHOPAL		CFI GUHATI		CFI PUNE		DFSS H.Q.	
		Exi stin g	Reallo cated	Exi stin g	Reallo cated	Exi stin g	Reallo cated	Exi stin g	Reallo cated	Exi stin g	Reallo cated	Exi stin g	Reallo cated	Exi stin g	Reallo cated
SECTION OFFICER	7	2	1	2	1	2	1	0	1	0	1	0	1	1	1
ASSISTANT-28, JR-ACCTT-1	29	8	6	8	6	8	6	0	2	0	2	0	2	5	5

UDC-19. DOCM ASST-1	20	7	5	6	5	5	5	0	1	0	1	0	1	2	2
LDC-16 HINDI TYPIST-2	18	4	4	5	4	6	4	0	1	0	1	0	1	3	3
PRIVETE SECRETARY	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1
PA (STENO- GRAPHER Gr-II)	21	7	6	7	6	6	5	0	1	0	1	0	1	1	1
HINDI TRANSLATOR	6	2	1	2	1	2	1	0	1	0	1	0	1	0	0
STENOGRAPH ER Gr-III	17	7	6	5	4	5	4	0	1	0	1	0	1	0	0
STAFF CAR DRIVER-7. DES. RIDER-1	8	3	1	2	1	1	1	0	1	0	1	0	1	2	2
MULTY TASKING STAFF															
LAB ATTENDANT - 54 BESA - 04 CARTON - 02 CARTON - 04 MALI - 01 CHILD CARP - 14 SWEEPER - 16 CONSTATAR - 02	85	32	25	25	24	25	24	0	3	0	3	0	3	3	3
TOTAL	212	72	55	62	52	60	51	0	12	0	12	0	12	18	18

5. It has also been decided that the above arrangement of re-distribution of sanctioned posts will continue till further orders. The position would be reviewed by the Government after creation of regular posts and their filling up for the newly created CFIs at Bhopal, Guwahati, Pune and DFSS HQ. The manpower of NAA Units located in BARC, Mumbai will also be accommodated in CFIs, Pune.

6. The Chief Forensic Scientist, DFSS will deploy the scientific and ministerial manpower in the 3 new CFIs, Pune, Bhopal, Guwahati, DFSS HQ and CFSLs accordingly.


(V.K. Sharma)

Deputy Secretary to the Government of India

Copy to:

1. The Chief Forensic Scientist, Directorate of Forensic Science Services, New Delhi.
2. The Pay and Accounts Officer, DCPW, MHA, New Delhi.
3. The Director, CFSL, Chandigarh, Hyderabad & Kolkata.
4. The Coordinators, CFIs, Bhopal, Guwahati and Pune.
5. Guard file.

App. D-3

15/07/09 15:05

FBI NEW DELHI

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157709

S. J. K.
15/07/09
R. K. Chandra
DD P.
S. J. K.
To
157709
Subject:

No. CFIS/12/1/2001
Government of India
Ministry of Home Affairs
Bureau of Police Research & Development

Block No. 11, 3rd Floor,
CGO Complex, Lodhi Road,
New Delhi-110 003
Dated: November 2002

At Director,
Central/State Forensic Science Laboratories
Revised Work Norms of Forensic Science Laboratories and Government
Examiners of Questioned Documents.

S r,

In continuation of this Bureau's letter of even number dated 12.11.2002 on the subject cited above, the Work Norms in detail is enclosed herewith, for information, and necessary action at your end. While forwarding the Work norms vide our earlier letter dated 12-11-2002, certain important and essential conditions relating to the work norms were inadvertently left due to oversight

Inconvenience caused, if any, in this regard is regretted.

Yours faithfully,

(Signature)

(Sd/- Ravikumar)
Senior Scientific Officer Gr.1 (FS)

Encl: As stated.

WORK NORMS OF FORENSIC SCIENCE LABORATORIES AND GOVERNMENT EXAMINERS OF QUESTIONED DOCUMENTS

The number of cases/exhibits to be examined per year (200 working days) by each unit of the Division and scope as prescribed by the BPR&D for Forensic Science Laboratories and Government Examiners of Questioned Documents are shown in the enclosed Annexure.

2. Each unit of the Division of Forensic Science Laboratory shall consist of one SSO/SO/JSO, two SSA/SA, One Laboratory Assistant and one Attendant. In Toxicology Division one additional Laboratory Attendant shall be provided for viscera cutting. The work of two Units of the same division will be supervised by one Assistant Director who will also have one working hand/SA. In case the number of units in any division exceeds two, one additional post of Assistant Director will be created. Similarly, the Questioned Document Unit will consist one officer of Class-I level and two officers of Class-II level. An officer of senior Class-I officer will supervise the work of such two units. The Director or Head of the Laboratory would provide the supporting staff to the Questioned Document Unit as and when required depending upon the work load.

3. In case of requirement for quantitative analysis of the exhibits in any unit of the laboratory, the concerned Director reserves the right of reviewing the work norms depending upon the frequency of getting such case exhibits.


4. There will be a group wise Deputy Director for each of the three main groups i.e. Chemical Science, Biological Science and Physical Science who will supervise the work of respective Assistant Directors and technical work of all the divisions of his group. Joint Director will assist the Director and will also supervise over all technical and Administration work of the main, regional and district level laboratories, R&D and other developmental work. The Regional Laboratory is to be headed by Joint Director and the District Laboratory by a Gazetted officer. The District Laboratory must have one SSO/SO/JSO, one SSA/SA, one Photographer, one Fingerprint expert and one Constable (on deputation)/one Poon and one Driver (for the mobile unit).

5. The Laboratory should have sufficient supporting Admn. Staff so that the technical staff do not waste their time in Admn. Work.

6. The officers of the Laboratory will impart training to Police Officers, Judiciary and Forensic Scientists as per the need in addition to the normal case examination.

7. The Officers of the laboratory will themselves carry out Research and Developmental work on forensic problems and will also collaborate with Universities and other R&D institutions in addition to case examination as per need of such work from time to time.

8. The position of the staff strength on the basis of these work norms shall be reviewed after every three years depending upon the load of case work and other activities in the laboratory.


Dr. M. S. Rao)
Chief Forensic Scientist

WORKS LOADS OF FORENSIC SCIENCE LABORATORIES AND GOVERNMENT EXAMINERS OF QUESTIONED DOCUMENTS

Division	No. of cases/exhibits to be examined per year.(200 working days by each unit of the Division.	Scope
Pathology	150 cases with 4500 exhibits	Stain examination routine microscopic examination. Hair examination. Drug residue examination etc.
Chemistry	700 cases with 3500 exhibits	Origin, Facultie blood grouping, Iso-enzyme typing etc.
DNA	150 cases with 750 exhibits	DNA Analysis, superimposition, anthropological examination food poisoning etc.
Toxicology	400 cases with 1200 exhibits	Extraction, detection and identification of poisoning in body tissues, detection and estimation of blood drug level in clinical toxicological cases, detection and identification of poisons in suspected poisonous samples
Chemistry	300 cases with 900 exhibits	Arson, Petroleum products, General Analysis of Chemical substances
Chemistry	400 cases with 3000 exhibits	Chemical/instrumental Analysis of Liquor samples with respect to qualitative and quantitative estimation of ethyl alcohol and all other related substances
Chemistry	400 cases with 1200 exhibits	Analysis of narcotics and psychotropic substances
Explosives	300 cases with 1200 exhibits	Analysis of Post Blast explosive residues, unexploded explosive material, identification of pyro-techniques etc.
Firearms	200 cases with 750 exhibits	Firearm and ammunition identification, bullet examination, Fingerprint, Line of firing, ISSR residue analysis etc.
Physics	200 cases with 750 exhibits	Physical examination of trace elements like physical measurements, trace element profile, tool marks, de-pinning, building materials, fiber and plastic, glass/plastics, voice analysis, fake currency, counterfeit coins, broken objects.
Questioned Documents	240 cases with 12000 exhibits	Forensic Examination of documents including examination of signatures, writings, stamp impression, typewriting, printed matter, etc. studies, additional/obliteration, currency notes, lottery tickets etc.
Photography	20,000 prints.	In-door and outdoor photography, micro and macro photography, video-graphy, digital photography, invisible photography, development of films etc. In addition to this other supporting photography techniques will also be handled.
Psychology	200 subjects/exhibits	Lie detection examination, psychoanalysis examination, psychological assessment, Narco analysis and voice stress analysis etc.

CASE ACCEPTANCE FORM

(A)		General Information				
	(1)	Service Seeker's Address			Letter Reference Number	
					Dated	
	(2)	Case / DDR / RC / FIR No. U / s	Dated		P.S.	
	(3)	Mode of Receipt : By Hand/By Post				
	(4)	Name of the Messenger	Designation		Identity No.	
			Road Certificate No.		Dated	
	(5)	Date of Receipt at CFSL				
	(6)	No. of Parcels Received				
(B)		Checking of Documents				
	(1)	Request Letter / Note				Yes/No
	(2)	Whether by Competent Authority (DCP / SP and above / Judiciary)				Yes/No
	(3)	Case History				Yes/No
	(4)	Copy of FIR / DDR No.				Yes/No
	(5)	Copy of PM Report / MLC / Sketch / Photograph etc.				Yes/No
	(6)	Specimen Seal(s)				Yes/No
		Comments / Remarks / Suggestions if any				
		Date :	Signature of Receptionist / For Admn. Officer / Assistant			
		Forwarded to TM				

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(C)	Checking by TM	
	(1)	Referred case
		Unexamined / Examined
		If examined, referred by
	(2)	Nature of examination
		As per Service Request Letter

	(3)	Whether under the scope of Quality System	
	(4)	Concerned Divisions	Ball / Bio /Chem /Doc / Expl / Phy / Tox
		Remarks of the TM	
			Signature of the TM
		Director (in case not acceptable as per Sl.No.3)	Remarks and Signature of the Director
(D)		<u>HOD</u>	
	(1)	Whether documents fulfill the technical requirements	
	(2)	If yes, mention additional requirements, if any	
	(3)	If no, state the deficiencies	
	(4)	Checking of parcels	
	(5)	Checking of seals (intact and tallied)	
		Remarks	
			Checked & verified by : (Sign & Designation)
(E)		HOD	
		Acceptable / Not Acceptable	
		Remarks, if any	
			Sign. of HOD
(F)		TM	
		Admn. Officer	

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CENTRAL FORENSIC SCIENCE LABORATORY, Chandigarh / Hyderabad / Kolkata

Central Case Receipt Register

Annual Sr. No.	Name(s) of the Division(s) Concerned	Division Case No.	Date of Receipt	Service Seeker's Address	Service Seeker's Letter No. and Date	Name and Designation of Messenger (or) Details of Postal / Courier Input	Number and Description of Parcels	Revenue Received if any; D.D. No. and Date	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

CENTRAL FORENSIC SCIENCE LABORATORY, Chandigarh / Hyderabad / Kolkata

.....Division's Case Register

Division's Annual Sr.No.	Division's Case No.	Date of Receipt at the Division	Service Seeker's Address	Service Seeker's Letter No. and Date	Revenue Received if any; D.D. No. and Date	Date of Commencing Examination	Number of		Date on the Report	Names of Report - Signatories	Date of Handing Over (or) Despatch, of Report & Exhibit Remnant	Signature (with Date, and Name and Designation in Capitals) of the Messenger Receiving Lab Report etc (or) Details of Post Office Receipt	Remarks
							Parcels Received	Exhibits on Opening					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)

FORENSIC SERVICE USER'S FEEDBACK FORM

Please respond by filling and returning this Form to Laboratory. That will help us serve you better.

Lab No: CFSL (C)/...../Ball/...../2011

Report Dated:

Reporting Scientist:

1. How was the SERVICE the Laboratory provided in this case?

Very Good	<input type="checkbox"/>	Good	<input type="checkbox"/>	Fair	<input type="checkbox"/>	Poor	<input type="checkbox"/>	<input type="checkbox"/>
Very Poor	<input type="checkbox"/>							

2. Your level of satisfaction with the TIME taken by the Laboratory to furnish Opinion / Report in this case.

Very satisfied	<input type="checkbox"/>	Satisfied	<input type="checkbox"/>	Fairly satisfied	<input type="checkbox"/>	Not satisfied	<input type="checkbox"/>	<input type="checkbox"/>
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3. Were you satisfied with the Laboratory REPORT in this case?

Very satisfied	<input type="checkbox"/>	Satisfied	<input type="checkbox"/>	Fairly satisfied	<input type="checkbox"/>	Not satisfied	<input type="checkbox"/>	<input type="checkbox"/>
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Thank you.