REPORT OF THE COMPTROLLER AND AUDITOR GENERAL OF INDIA

FOR THE YEAR ENDED 31 MARCH 1996

NO. 5 OF 1997

UNION GOVERNMENT (SCIENTIFIC DEPARTMENTS)

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Preface

This Report for the year ended 31 March 1996 has been prepared for submission to the President under Article 151 of the Constitution.

This volume covers matters arising from test-audit of the transactions of the Scientific Departments of the Union Government, the autonomous bodies funded by these Departments and some major scientific organisations associated with other Departments.

The Report includes audit reviews on the following, besides 13 paragraphs.

i) National Dairy Research Institute, Karnal
ii) Regional Research Laboratory, Jorhat
iii) Central Electronics Engineering Research Institute, Pilani
iv) Management of Intellectual Property Rights & Technology Transfer

The draft reviews and paragraphs were forwarded to the concerned Ministry/Department/ICAR/CSIR for their comments. They did not, however, furnish their replies in respect of four paragraphs.

The cases mentioned in this Report are those which came to notice in the course of audit during 1995-96 and early part of 1996-97. For the sake of completeness, matters relating to earlier years which could not be covered in the previous Reports are also included. Similarly, results of audit of transactions subsequent to 1995-96 have also been mentioned wherever available and relevant.

OVERVIEW

R&D expenditure of the major Scientific Departments and agencies of Government of India during 1995-96 was Rs 4289 crore, of which, Defence Research and Development Organisation (Rs 1382 crore), Department of Space (Rs 918 crore), Indian Council of Agricultural Research (Rs 522 crore), Department of Atomic Energy (Rs 477 crore), Department of Science and Technology (Rs 306 crore) and Department of Scientific and Industrial Research (Rs 418 crore) accounted for Rs 4023 crore. The share of the private sector in the total R&D expenditure of the country in 1995-96 was around 17 **per cent**. R&D expenditure of the country as percentage of GNP decreased from 0.93 **per cent** in 1989-90 to 0.80 **per cent** in 1995-96.

There was an overall saving of Rs 373 crore against the budget allotment of the Scientific Departments/Institutions. This constituted about six **per cent** of their total allotment. Some of the major departments/institutions where substantial savings occurred were Atomic Energy (Rs 128 crore), Environment and Forests (Rs 62 crore), Non-conventional Energy Sources (Rs 56 crore), Electronics (Rs 39 crore).

6914 utilisation certificates with aggregate value of Rs 541 crore against grants-in-aid provided by the Scientific Departments were awaited. This did not include the utilisation certificates awaited in Ministry of Non-Conventional Energy Sources, where the records were stated to have been destroyed in fire.

Some of the important results of audit of the Scientific Departments and agencies (except DRDO) are set out in this overview.

Department of Atomic Energy

Idle equipment

Failure of BARC to procure canned pump-motor units for five years since purchase of plate type heat exchangers in July 1991 at Rs 7.67 lakh for emergency core cooling system of Dhruva reactor rendered the expenditure infructuous.

(Para 2.1)

Avoidable expenditure due to delay in installation of capacitors

Department of Atomic Energy purchases electricity from the Maharashtra State Electricity Board and the Tata Power Company Ltd. (TPCL). Under the terms of purchase, DAE was required to maintain the minimum monthly power factor as prescribed from time to time. To ensure this, DAE was required to install capacitors within the time frame prescribed by the two agencies. Failure to do so attracted penal charges. DAE failed to instal capacitors within the time frame resulting in payment of penal charges of Rs 73.91 lakh.

(Para 2.2)

Department of Ocean Development

Infructuous expenditure on procurement of Polar Bear II

DOD purchased an all terrain vehicle from a USA based firm at a cost of US $ 344888 equivalent to Rs 112.30 lakh to be used for transportation between ship docking site and Maitri station in Antarctica. The vehicle was shipped to Antarctica via Cape Town where the vehicle was found to have been received in damaged condition. In spite of its damaged condition the vehicle was put into operation resulting in its break down during the first convoy. DOD shipped back the vehicle to the supplier after incurring transportation cost of Rs 2.27 lakh. The supplier did not find the damages covered under the warranty. The repair and transportation of the vehicle is likely to cost at least Rs 28 lakh.

(Para 3.1)

Ministry of Mines
(Geological Survey of India)

Avoidable expenditure on rent of premises

The lease agreement of a premises, hired for five years in September 1987 for housing an office of the Ministry in Bangalore, provided for renewal for two years on the same rent if the lessor was given a month's notice before the expiry of the initial period of the lease. The Ministry, however, did not avail of the stipulation to renew the agreement of 1987 for a further period of two years at the existing monthly rent of Rs 2.07 lakh. This resulted in an avoidable expenditure of Rs 26 lakh.

(Para 4.1)

Indian Council of Agricultural Research
(Department of Agricultural Research and Education)

National Dairy Research Institute, Karnal

Research Advisory Committee, predominantly consisting of outside experts in the field of dairy sciences, for suggesting the thrust areas and for reviewing research activities, to see whether they were consistent with the mandate of NDRI, was not constituted for a decade. Consequently, the process of identification of thrust areas and formulation of research projects, periodical review and evaluation of final results of research projects in NDRI was found to be deficient during 1991-96. 200 research projects were completed without their annual progress review by the Staff Research Council (SRC). 75 research projects were approved by SRC without having basic information like objectives, manpower and financial requirements and duration of projects. Further, out of 170 research projects undertaken during 1991-96, 77 projects did not fall under the thrust areas identified by SRC.

Though technologies were developed during 1991-96 and approved for patenting by the Board of Management, no technology was patented by NDRI. The objectives of full capacity utilisation, self-sufficiency in budgetary requirements and R&D upscaling in respect of experimental dairy plant for which a revolving fund of Rs 85 lakh was sanctioned, were not achieved. Further, delay in establishing model dairy plant deprived NDRI of necessary infrastructure facility for training of the students of dairy technology besides incurring of avoidable interest liability of Rs 2.58 crore. There was sub-optimal utilisation of scientific manpower which resulted in infructuous expenditure of Rs 32.04 lakh.

(Para 5.1)

Unproductive expenditure

Failure on the part of ICAR to take concrete steps for merger/closure of its Goa Research Centre and redeployment of its staff resulted in idling of the manpower for more than six years and unproductive expenditure of Rs 39.29 lakh on salaries etc.

(Para 5.2)

Avoidable expenditure

Delay in issue of instructions by ICAR about implementation of the Employees Provident Fund Act for casual labourers in CRRI, Cuttack led to the institute having to bear arrears of employees' contribution of Rs 15.45 lakh.

(Para 5.3)

Non-installation of equipment

Central Research Institute of Jute and Allied Fibres (CRIJAF) procured two equipment for the World Bank aided "National Seed Project-III'', one in April 1993 and the other in February 1994 for their farm at Bud-Bud. CRIJAF allowed CPWD to complete civil work in 33 months and electrification in 16 months as against the time of eight months and one month respectively contemplated by them and took 11 months to approach CPWD for electrification work after taking over the building on completion of civil work. Though the electrification work was completed in August 1995, CRIJAF could not commission one of the equipment as of November 1996 and the carried over breeder seed continued to be stored under ambient condition resulting in continued loss of viability of the breeder seed. CRIJAF had already spent Rs 15.35 lakh for procurement of equipment and provisioning of infrastructure.

(Para 5.4)

Equipment lying idle

Jute Technological Research Laboratory (JTRL), Calcutta procured an elemental analyser at a cost of Rs 10.68 lakh for determination of carbon, hydrogen, nitrogen, sulphur and oxygen contents in organic samples and plastics for their various projects. JTRL did not take timely action to procure copper wires/gas. Action for replacement of the sample feeder board was also pending as of June 1996. Consequenlty, the equipment is lying idle for over seven years.

(Para 5.5)

Council of Scientific and Industrial Research (Department of Scientific and Industrial Research)

Regional Research Laboratory, Jorhat

Despite setting up a planning, monitoring and evaluation cell (PME) in June 1994 RRL did not maintain project folders for facilitating evaluation of individual projects by PME. It now proposes to prepare project-wise folders from April 1997.

It took up non-viable projects like the ones on development of process know-how for pesticides - Metalaxyl, Anilophos and development of four flow improvers. While the former had to be closed prematurely after incurring expenditure of Rs 41.21 lakh, there were no takers for the technology developed in the latter project at a cost of Rs 36.29 lakh on account of the fact that several manufacturers of the product were already in existence in the market. RRL also incurred unproductive expenditure of Rs 109.79 lakh on account of non-achievement of objectives of the projects on "Drug and drug intermediaries" (Rs 18.35 lakh), 'Phytochemical investigation of a plant under biotechnologically active principals in NE region of India' (Rs 23.50 lakh) and 'Improvement of curing technology for cold bonded pelletization' (Rs 67.94 lakh).

RRL worked on 51 grants-in-aid and eight sponsored projects during 1991-96 but completed only 21 grants-in-aid and four sponsored projects. 17 Out of 21 completed grants-in-aid projects registered time overrun ranging from one to three years and three out of four completed sponsored projects were delayed by one to two years. Except in one case RRL was not aware of sponsor's reaction to the research findings of the completed projects. Inordinate delay in submission of final reports and insufficient data in final reports rendered expenditure of Rs 16.98 lakh on two grants-in-aid projects unproductive. Equipment imported by RRL in July 1992 at a cost of Rs 15.22 lakh for use in a sponsored project remained uninstalled while the project in question was completed in March 1993.

(Para 6.1)

Central Electronics Engineering Research Institute, Pilani

The lone in-house project undertaken during 1991-96 was closed after incurring expenditure of Rs 220.26 lakh without achieving its intended objectives. Of 60 sponsored projects undertaken during this period, including 22 ongoing projects in the beginning of 1991-92, five were dropped midway after incurring expenditure of Rs 38.54 lakh and 29 were completed. Three technologies developed through projects completed at a total cost of Rs 2.79 crore were not transferred to the end-users. In case of two projects completed at a total cost of Rs 3.53 crore, objectives set out were not achieved rendering the expenditure unproductive. Undue benefit in the form of short recovery of Rs 31.29 lakh was extended to a public sector undertaking in a project by ignoring covenants of the Memorandum of Understanding. CSIR guidelines for project costing were not adhered to in 35 projects resulting in non-recovery of intellectual fee amounting to Rs 622.81 lakh and manpower cost of Rs 137.25 lakh. Failure to provide infrastructural requirements and essential accessories well in time resulted in installation of an equipment costing Rs 42.94 lakh

about two years after completion of the project for which it was procured. Stores/non-consumables costing Rs 62.18 lakh were lying unused for periods ranging from three to 19 years.

(Para 6.2)

Management of Intellectual Property Rights and Technology Transfer

The review examines the issues related to management of intellectual property rights and transfer of technologies in respect of 12 CSIR laboratories/institutes dealing in diverse fields of Science and Technology during the period from 1986 to 1996.

Out of 12 laboratories/institutes, six did not maintain project-wise cost relating to in-house projects. Out of 522 IPs generated by 11 laboratories/institutes, 299 patent applications were filed and 89 were sealed. Of these, two laboratories/institutes together accounted for 337 IPs whereas remaining nine generated only 185 IPs during this period. Only 17 per cent of the IPs were transferred to the industry. It was found that three laboratories, which generated 187 IPs, did not transfer even a single IP to the industry. Out of Rs 357.99 lakh realised on account of premium/royalty during 1986-96, three laboratories/institutes realised Rs 331.55 lakh. The contribution of the other laboratories/institutes was negligible. None of the laboratories/institutes except CDRI followed good laboratory practice. Most of the technologies developed by these laboratories/institutes proved to be of little use to the industry.

(Para 6.3)

Unfruitful expenditure on abandoned project

Contrary to instructions of CSIR for sponsored projects, CFRI undertook a project in April 1993 without the approval of the sponsoring agency. After working for about one and a half years, CFRI had to abandon it in October 1994 since the sponsoring agency did not approve their proposal. This resulted in wasteful expenditure of Rs 32 lakh on pay and allowances of the staff engaged on the project.

(Para 6.4)

Failure to instal fatigue testing system

SERC imported Fatigue Testing System and procured its indigenous components in April 1994 at a cost of Rs 34.69 lakh and Rs 5.77 lakh respectively. Due to the failure of SERC to take suitable measures for creating infrastructural facilities, the system remained uninstalled since its procurement in April 1994, rendering the expenditure unproductive.

(Para 6.5)

Delay in commissioning of imported equipment

A foreign equipment Logitech RS-4 system costing Rs 9.61 lakh was procured in August 1991 by National Metallurgical Laboratory (NML), Jamshedpur for a project sponsored by Defence Research and Development Organisation. The equipment was received with some damaged components. NML did not lodge the insurance claim in time due to misplacement of the original insurance policy. No warranty clause was incorporated in the purchase order which could have enabled free replacement of the damaged parts. At the instance of Audit, the defective parts of the equipment were repaired in-house at a cost of Rs 0.44 lakh only and the equipment was commissioned in August 1996 i.e. two and a half years after the completion of the project for which equipment had specifically been imported.

(Para 6.6)

Irregular subsidy

CLRI extended high tension electric supply to its staff quarters when the rates for the high tension electricity were lower than the low tension (domestic) supply rates. Subsequently, when high tension supply rates outpaced low tension (domestic) supply rates, CLRI switched to recovery at the rates applicable for low tension electric supply, while it paid TNEB at the rates prescribed for high tension electric supply. The irregular subsidy on this account during the period from April 1991 to March 1996 aggregated to Rs 28.29 lakh.

(Para 6.7)

List of Acronyms

ASIC	Application Specific Integrated Circuits
A3F	Advance Fuel Fabrication Facility
AC	Academic Council
ACC	Agro Chemicals Committee
AICRP	All India Coordinated Research Projects
AMSE	Airborne Mineral Survey and Exploration
ATN	Action Taken Note
BARC	Bhabha Atomic Research Centre
BEL	Bharat Electronics Limited
BHEL	Bharat Heavy Electricals Limited
BOM	Board of Management
C-DOT	Centre for Development of Telematics
CBRI	Central Building Research Institute
CDRI	Central Drug Research Institute
CEERI	Central Electornics Engineering Research Institute
CFB	Circulating Fluidised Bed
CFRI	Central Fuel Research Institute
CIFT	Central Institute of Fisheries Technology
CIMAP	Central Institute of Medicinal and Aromatic Plants
CLRI	Central Leather Research Institute
CMERI	Central Mechanical Engineering Research Institute
CMFRI	Central Marine Fisheries Research Institute
CPWD	Central Public Works Department
CRIJAF	Central Research Institute for Jute and Allied Fibres
CRRI	Central Rice Research Institute
CRRI	Central Road Research Institute
CSIO	Central Scientific Instruments Organisation
CSIR	Council of Scientific and Industrial Research
DAE	Department of Atomic Energy
DBT	Department of Biotechnology
DCI	Drug Controller of India
DHT	Dynamic-cum Heavy Testing
DOD	Department of Ocean Development
DOE	Department of Electronics
DOS	Department of Space
DPS	Directorate of Purchase and Stores
DRDO	Defence Research and Development Organisation
DSIR	Department of Scientific and Industrial Research
DST	Department of Science and Technology
EC	Executive Council
EPF	Employees Provident Fund
FTS	Fatigue Testing System
GLP	Good Laboratory Practice
GNP	Gross National Product
GOI	Government of India
IARI	Indian Agricultural Research Institute
ICAR	Indian Council of Agricultural Research

ICMR	Indian Council of Medical Research
IIP	Indian Institute of Petroleum
IMPACT	Integrated Management and Project Accounting
IPMD	Intellectual Property Management Division
IP	Intellectual Property
IPR	Intellectual Property Rights
ISRO	Indian Space Research Organisation
ITI	Indian Telephone Industries
ITRC	Industrial Toxicology Research Centre
JTRL	Jute Technology Research Laboratory
LSIC	Large Scale Integrated Circuits
MC	Management Committee
MIT	Multilevel Interconnection Technology
MLC	Marketing and Liaison Cell
MNES	Ministry of Non-Conventional Energy Sources
MOU	Memorandum of Understanding
MSEB	Maharashtra State Electricity Board
MUSCO	Mahindra Ugine Steel Company Limited
NAL	National Aerospace Laboratories
NBRI	National Botanical Research Institute
NDDB	National Dairy Development Board
NEC	North Eastern Council
NER	North Eastern Region
NFC	Nuclear Fuel Complex
NMC	National Microelectronic Council
NML	National Metallurgical Laboratory
NPL	National Physical Laboratory
NRDC	National Research Development Corporation
NSP	National Seed Project
ONGC	Oil and Natural Gas Commission
P&T	Post and Telecommunications
PHEs	Plate-type Heat Exchangers
PME	Project Monitoring & Evaluation
PREFRE	Power Reactor Fuel Reprocessing Plant
PRSG	Project Review and Steering Group
QRT	Quinquennial Review Team
R&D	Research & Development
R&D PBDD	Research and Development Planning and Business Development Division
RAC	Research Advisory Committee
RAG	Research Advisory Group
RC	Research Council
RCC	Research Coordination Committee
RDCIS	Research and Development Centre for Iron & Steel
RPF	Research Project File
RPFC	Regional Provident Fund Commissioner
RPP	Rationalised Purchase Procedure
RRL	Regional Research Laboratory
S&T	Science and Technology
SAIL	Steel Authority of India Limited

SCL	Semiconductor Complex Limited
SERC	Structural Engineering Research Centre
SRC	Staff Research Council
THEPS	Tata Hydro Electric Power Supply
TNEB	Tamil Nadu Electricity Board
TPA	Tonnes Per Annum
TUD	Technology Utilisation Division
TWT	Travelling Wave Tubes
UPRNN	Uttar Pradesh Rajkiya Nirman Nigam
USA	United States of America
VRDE	Vehicle Research Development Establishment

CHAPTER I

1.1 Introduction

1.1.1 In pursuance of the national objective of making scientific and technological progress and attaining self-reliance, Government of India have been making consistent efforts to foster research and development **(R&D)** activities. The Plan allocation for science and technology **(S&T)** increased from Rs 14 crore in the First Plan to Rs 9180 crore in the Eighth Plan.

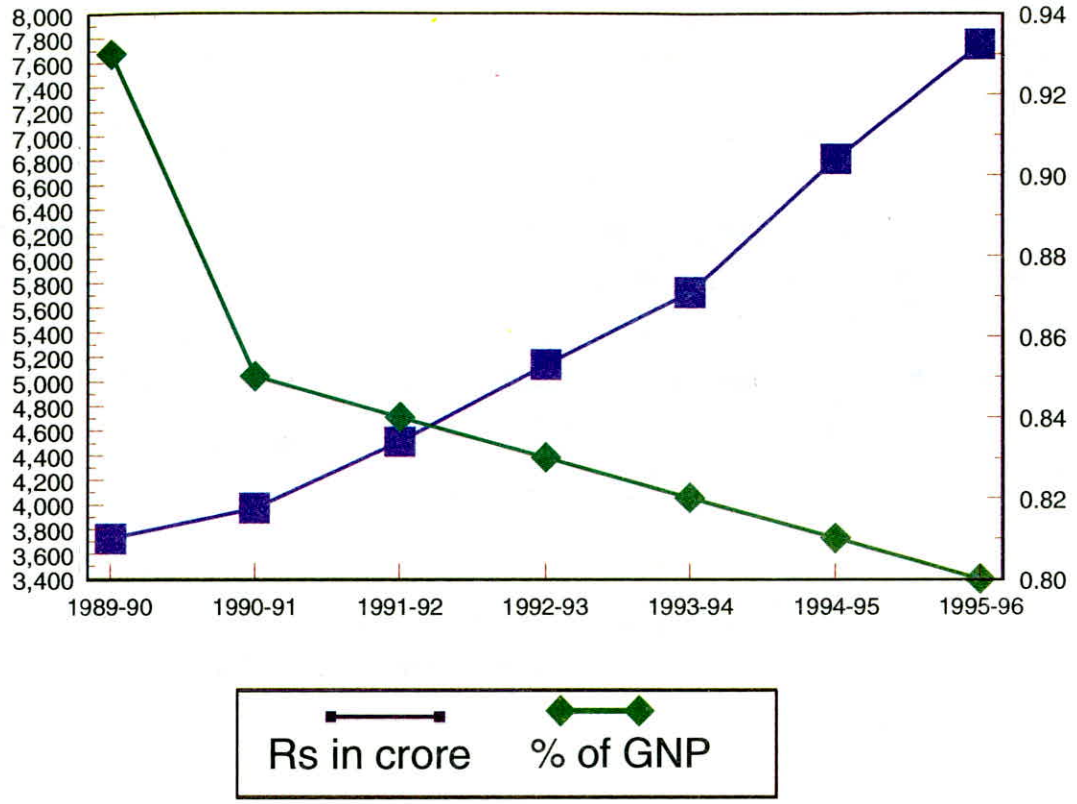
1.1.2 While the allocation for R&D has been increasing every year, the actual expenditure on R&D as a percentage of quick estimates of Gross National Product **(GNP)** has declined marginally over the past few years, as under:

(Rs in crore)

Year	**GNP (at factor cost)**	**R&D expenditure**	**Expenditure on R&D as percentage of GNP**
1989-90	402930	3725.74	0.93
1990-91	468059	3974.17	0.85
1991-92	540143	4512.81	0.84
1992-93	615831	5141.64	0.83
1993-94	695342	5733.43	0.82
1994-95	839504	6821.02	0.81
1995-96	967783	7753.78	0.80

With R&D expenditure at almost one per cent of GNP, India is among the highest spenders on R&D among the developing countries. Developed countries generally spend around 2.5 **per cent** of their GNP on R&D.

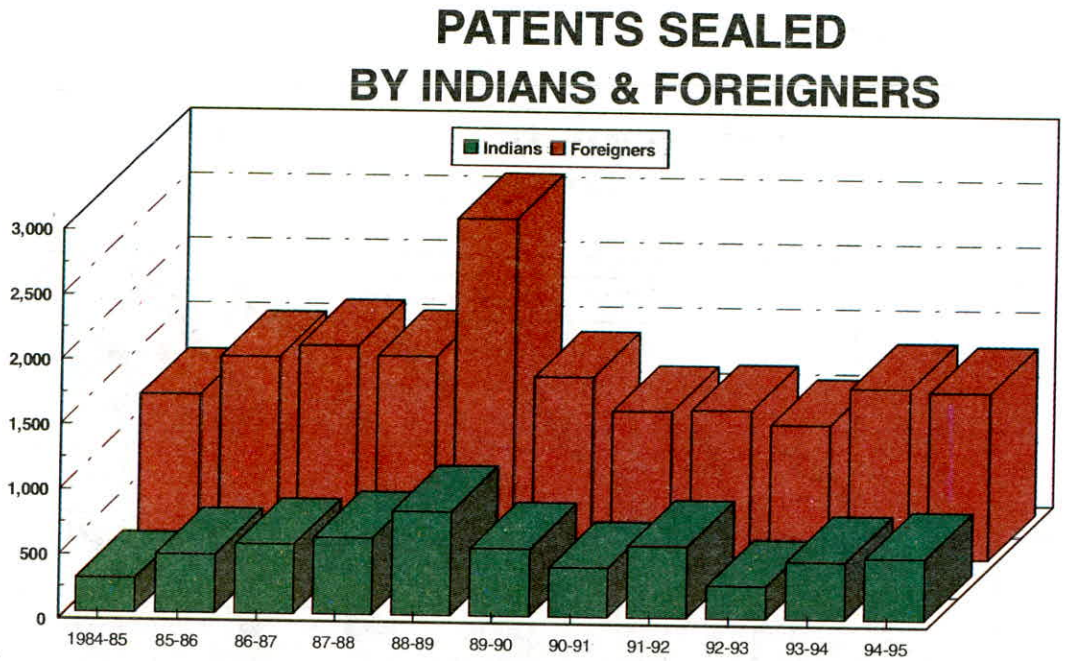
R&D Expenditure
as percentage of GNP



1.1.3 While there were more than 38 lakh people with science and engineering qualifications in India in 1990, which was about 449 per lakh population, the number of scientists and engineers engaged in R&D activities was, however, estimated at only 15 per lakh. It underscores the necessity of further efforts to enlarge the scope of R&D activities in the country and to harness the qualified manpower resources more fruitfully. Number of scientists and engineers engaged in R&D activities is more than 200 per lakh in the developed countries.

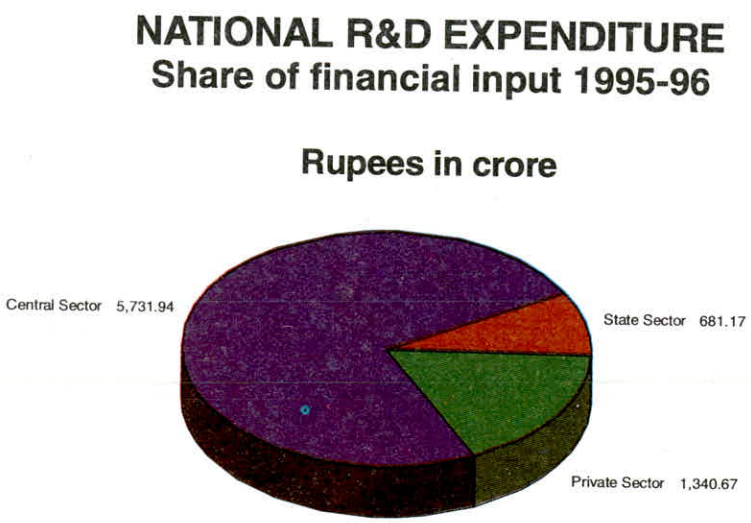
1.1.4 The number of patents sealed in the country, which is a measure of the efficacy of R&D efforts, showed steady increase during 1980s up to 1988-89, after which, there was a decline upto 1990-91. Thereafter it has shown a fluctuating trend. The number of patents sealed in the name of foreigners continued to be much higher than that by Indians throughout the period.

The position is depicted in the bar chart below:

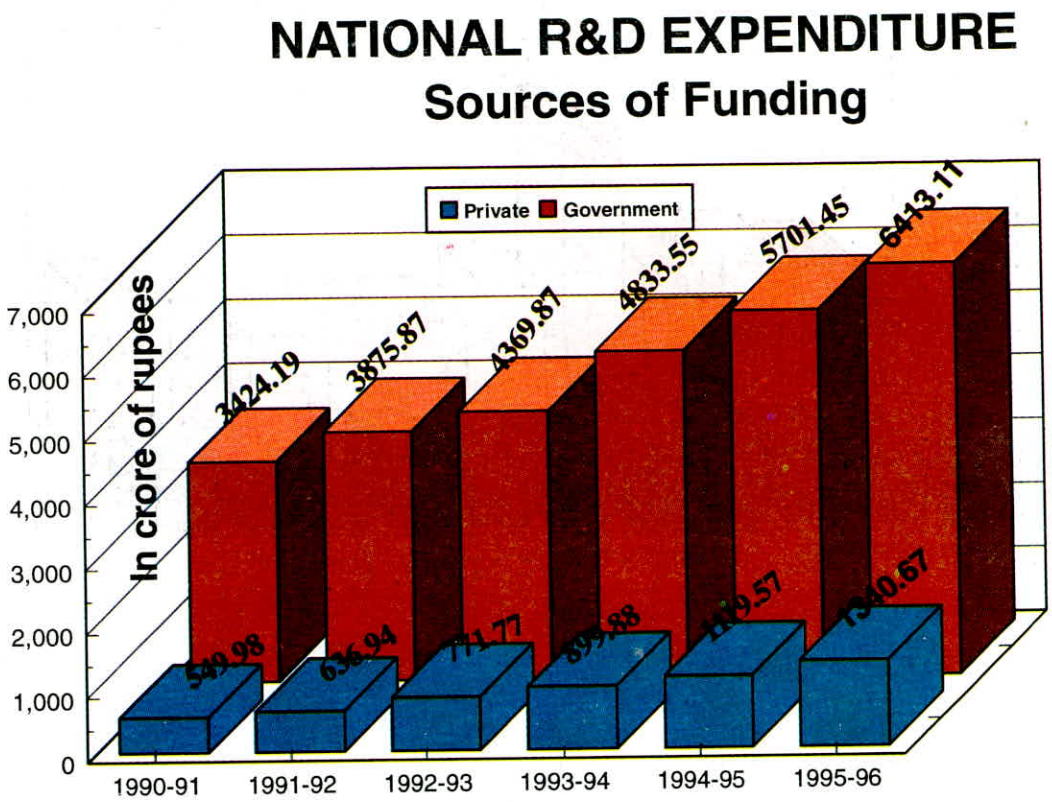


1.1.5 R&D activities

A characteristic feature of India's expenditure on R&D is that most of the R&D funding is in the Government sector, as shown in the graphs below:



Growth of Government and private expenditure on R&D during 1990-91 to 1995-96 is depicted in the bar chart below:



The share of Government R&D expenditure in 1995-96 among the 13 major scientific agencies of Government of India was as follows:

(Rs in crore)

Agency	**Actual**	**Percentage**
Defence Research and Development Organisation **(DRDO)**	1381.53	32.21
Department of Space **(DOS)**	917.88	21.40
Indian Council of Agricultural Research **(ICAR)**	521.88	12.17
Department of Atomic Energy **(DAE)**	476.65	11.11
Department of Science & Technology **(DST)**	305.65	7.13
Department of Scientific and Industrial Research **(DSIR),** including Council of Scientific and Industrial Research	417.81	9.74
Department of Electronics **(DOE)**	53.10	1.24
Ministry of Environment and Forests **(MEF)**	64.69	1.51
Indian Council of Medical Research **(ICMR)**	55.70	1.30
Department of Ocean Development **(DOD)**	51.91	1.21
Department of Biotechnology **(DBT)**	37.01	0.86
Ministry of Non-Conventional Energy Sources **(MNES)**	2.89	0.07
Ministry of Mines-Geological Survey of India **(GSI)**	2.50	0.05
Total	4289.20	100.00

1.1.6 Significant achievements during 1995-96

- INSAT- 2C, incorporating additional features, such as, high power C-band transponders with expanded coverage, S-band mobile satellite service and Kuband transponders, was successfully launched on 7 December 1995.

- Innovative and cost effective CSIR processes for Enalapril and Sultamicillin (antibiotics), Diltiazem (cardiovascular) Gemfibriozil (hypocholesterol) and Fluriprofen (anti-inflammatory) were adopted by the industry.

- Due to the S&T intervention of CSIR (P), production of tea in Himachal Pradesh reached an unprecedented 13.2 lakh Kg.

- M/s Chem Agro International and M/s Bhaskar Agro Chemicals Ltd. commissioned 1200 TPA and 600 TPA plants respectively of monocrotophos based on process and design engineering developed by CSIR.

- GALVASAVE, a passivator developed by CSIR, which imparts a surface conversion protective coating on zinc and galvanised surface was commercialised.

- Central Mechanical Engineering Research Institute of the CSIR developed, fabricated and commissioned a mobile manipulator system for vacuum mopping of heavy water inside the moderator room of Madras Atomic Power Plant.

- National Aerospace Laboratories (NAL) handed over the Light Combat Aircraft Wings made of carbon fibre composites.

- National Remote Sensing Agency transferred 2 technologies, viz., Front End Hardware (FEH) and 3-band Color Browse System to private industries for commercial production and sale.

- IRS-1C, successfully launched on 28 December 1995, provides better spatial resolution and spectral resolution than IRS-1A, IRS-1B & IRS-P2 satellites.

- With PSLV-D3 placing IRS-P3 satellite in the polar orbit on 21 March 1996, India's indigenous capability to place remote sensing satellites in the sun-synchronous orbit was established.

- National Informatics Centre set up a video-conferencing facility as a commercial service, initially connecting 4 cities of Pune, Hyderabad, Mumbai and Calcutta with Delhi, and then extending the facility to 10 more cities using NICNET info highway.

- Department of Atomic Energy successfully rolled turbine with steam generated by the fast breeder test reactor (FBTR) on 12 March 1996.

1.1.7 Coverage under the Report

The position of the expenditure of major scientific departments/organisations, covered in this Report, during the year 1995-96 and in the preceding two years is given below:

(Rs in crore)

Sl. No.	Ministry/Department/ Organisation	1993-94	1994-95	1995-96
1.	Atomic Energy	1804.38	1681.03	1960.22
2.	Space	689.55	757.43	917.88
3.	Indian Council of Agricultural Research	441.99	494.18	521.88
4.	Environment and Forests including Zoological Survey of India and Botanical Survey of India	369.93	387.53	373.20
5.	Department of Scientific and Industrial Research (including grants given to Council of Scientific and Industrial Research)	338.86	374.00	431.61
6.	Science and Technology including Survey of India and India Meteorological Department	331.60	393.28	415.78
7.	Non-Conventional Energy Sources	201.45	202.49	244.11
8.	Geological Survey of India (Ministry of Mines)	116.08	125.36	141.62
9.	Electronics	166.95	123.77	141.39
10.	Biotechnology	81.04	84.12	85.60
11.	National Informatics Centre (Planning Commission)	56.87	77.79	84.55
12.	Indian Council of Medical Research	57.70	59.32	62.52
13.	Ocean Development	47.52	57.63	58.24
14.	Centre for Development of Telematics (C-DOT) (Department of Tele-communications)	39.74	44.11	31.33
Total		4743.66	4862.04	5469.93

Important results of audit of accounts of these agencies and the institution controlled by them which are engaged predominantly in the pursuit of science and technology, have been given in this Report.

1.1.8 Excess and savings in expenditure

A summary of Appropriation Accounts in respect of the scientific departments/major scientific organisations, mentioned above, is given below:

(Rs in crore)

Sl. No	Ministry/Department/ Organisation	Grant/appropria-tion (including supplementary)	Expenditure	(-) Saving (+) Excess
1.	Atomic Energy	2087.97	1960.22	(-) 127.75
2.	Space	944.10	917.88	(-) 26.22
3.	Indian Council of Agricultural Research	529.60	521.88	(-) 7.72
4.	Scientific and Industrial Research (including grants given to Council of Scientific and Industrial Research)	438.90	431.61	(-) 7.29
5.	Environment and Forests, including Zoological Survey of India and Botanical Survey of India	435.41	373.20	(-) 62.21
6.	Science and Technology including Survey of India and India Meteorological Department	435.35	415.78	(-) 19.57
7.	Non-Conventional Energy Sources	300.11	244.11	(-) 56.00
8.	Electronics	180.15	141.39	(-) 38.76
9.	Geological Survey of India (Ministry of Mines)	141.44	141.62	(+) 0.18
10.	Biotechnology	96.52	85.60	(-) 10.92
11.	National Informatics Centre (Planning Commission)	84.20	84.55	(+) 0.35
12.	Indian Council of Medical Research	63.62	62.52	(-) 1.10
13.	Ocean Development	65.94	58.24	(-) 7.70
14.	Centre for Development of Telematics (Department of Tele-communications)	40.00	31.33	(-) 8.67
	Total	5843.31	5469.93	(-) 373.38

It would be seen from the above that there was an overall saving of Rs 373.38 crore, representing 6.39 **per cent** of overall provision of funds.

1.1.9 Adverse balance appearing in the Finance Accounts

`Civil Deposits' head should normally close with credit balances as payments against deposits should not exceed the deposits received. Similarly `Loans and Advances' heads should close with debit balances to show the position of outstanding balances awaiting recovery/adjustment. However, Statement No.13 of the Finance Accounts of the Union Government for the year 1995-96 included the following cases of adverse balances relating to scientific departments:

(Rs in thousand)

1.	Department of Space MH 8443- Civil Deposits	40,70 (Dr)
2.	Department of Ocean Development MH 7610- Loans to Govt. Servants HBA Advances for the purchase of conveyance	 2,40 (Cr) 3 (Cr)

In the case of the Department of Space, adverse balance under Civil Deposits was pointed out in the Reports of the Comptroller and Auditor General of India: Union Government (Scientific Departments) for the year ended 31 March of 1993, 1994 & 1995. The Department stated in November 1996 that out of Rs 41.60 lakh outstanding as on 31 March 1995, a sum of Rs 1.14 lakh had been cleared as on 31.8.96 and action for further clearance was under vigorous pursuance. Department of Ocean Development stated in January 1997 that the matter was under examination.

The above adverse balances, which could be due to misclassification or excess refunds or nonreconciliation of accounts or due to some other reasons, require urgent investigation and rectification.

1.1.10 Audit of accounts of autonomous bodies

Accounts of autonomous bodies which received grants and loans from the Ministries and Departments of the Government are audited by the Comptroller and Auditor General of India under the relevant provisions of the Comptroller and Auditor General's (Duties, Powers and Conditions of Service) Act, 1971.

As on 31 March 1996, there were 52 autonomous bodies receiving recurring grants from the Scientific Departments of Government of India, which were required to submit their accounts for audit by the Comptroller and Auditor General of India. Accounts of 17 autonomous bodies for/or upto the year 1995-96 had not been received for audit as of December 1996.

Under Sections 19 (2) and 20 (1) of this Act, Separate Audit Reports are prepared on the accounts of six autonomous bodies viz. Indian Council of Medical Research, Wild Life Institute of India, Central Zoo Authority, Sree Chitra Tirunal Institute of Medical Sciences and Technology, Council of Scientific and Industrial Research and Indian Council of Agricultural Research.

1.2 Outstanding Utilisation Certificates

Certificates of utilisation of grants are required to be obtained by the Ministries and Departments from the grantees i.e. statutory bodies, non-government institutions etc. indicating that the grants had been utilised for the purpose for which they were sanctioned and that, where the grants were conditional, the prescribed conditions had been fulfilled. Utilisation certificates for grants aggregating to Rs 541.02 crore were outstanding (details given in **Appendix I**) in the Ministries and Departments other than the Ministry of Non-Conventional Energy Sources where the relevant records prior to 1995-96 were reportedly destroyed in a fire.

Utilisation certificates in 5216 cases aggregating to Rs 351.28 crore were outstanding for more than three years. The Departments would need to look into this at the highest level and obtain the certificates or recover the amounts.

CHAPTER II

Department of Atomic Energy

2.1 Idle equipment

Failure of BARC to procure canned pump-motor units led to their failure to install and commission plate type heat exchangers for emergency core cooling system of Dhruva reactor since July 1991.

Directorate of Purchase and Stores **(DPS)** procured plate type heat exchangers **(PHEs)** at a cost of Rs 7.67 lakh in July 1991 for emergency core cooling system of Dhruva reactor of Bhabha Atomic Research Centre **(BARC)** to enhance the operational reliability of the system. As BARC has not been able to procure canned pump-motor units during the past seven years, which are essential for installation and working of PHEs, functional test of heat exchangers has not been conducted as of October 1996. BARC stated, in October 1996, that due to embargo on supply by the exporting countries and exorbitantly high rates quoted by the sole indigenous tenderer, the procurement had become difficult. Therefore, the Department decided to procure standard centrifugal pump-motor units indigenously and the procurement action was likely to be completed in about one and a half years.

Besides, BARC also failed to make the PHEs foundation ready. DPS stated, in September 1995, that two more years would be needed for completion of PHEs foundation platform.

Thus, failure of BARC to take timely action for procurement of alternative pump-motor units and inability to complete the civil works, rendered expenditure of Rs 7.67 lakh unfruitful on procurement of PHEs for over five years.

2.2 Avoidable expenditure due to delay in installation of capacitors

Failure to install capacitors within time frame for raising the power factor to prescribed level resulted in payment of penalty of Rs 73.91 lakh.

Department of Atomic Energy **(DAE)** purchases electricity from Maharashtra State Electricity Board **(MSEB)** and Tata Power Company Ltd. **(TPCL)** for its units, namely, Advanced Fuel Fabrication Facility **(A3F)**, Tarapur, Power Reactor Fuel Reprocessing Plant **(PREFRE),** Tarapur, Bhabha Atomic Research Centre (BARC) Colony at Tarapur and BARC, Trombay.

The terms and conditions for supply of power by MSEB and TPCL, interalia, stipulated that the consumer would maintain minimum monthly power factor of 0.85, which was revised to 0.92 in August 1990 by TPCL and 0.90 in May 1991 by MSEB. In the event of the actual power factor being less than the prescribed standard, a penalty at the rate of 2.5 per cent of maximum demand charges for each such one per cent fall in power factor was leviable for the power supplied by TPCL. Penal charges at 1.11 per cent of the monthly average bill for every 0.01 fall in power factor was leviable by MSEB.

Non-installation of capacitors resulted in failure of the Department to maintain the contracted power factor and consequential payment of penal charges in respect of the following units during the period indicated against each:

(Rs in lakh)

Name of the Unit	**Period**	**Amount**
A3 F Plant, Tarapur	April 1991-August 1993	14.30
PREFRE Plant,	1991-96	38.84
BARC Plant Colony, Tarapur	June 1993-June 1994	1.45
BARC Trombay	August 1990-May 1993	19.32
	Total	73.91

Despite being fully aware of the fact that failure to install capacitors within the time frame provided by MSEB and TPCL would attract penal provision, DAE initiated action to install capacitors after four months of MSEB's directive and took another two years to get the capacitors installed at A3F Plant. The capacitors at BARC Colony at Tarapur were installed in June 1994, after a delay of one year, while at BARC in Bombay an interim arrangement to install two capacitors was made in May 1993 though the sanction for installation of capacitors was obtained in April 1991 itself. Thus, failure of the department to take timely action for installation of capacitors at A3F Plant, BARC Colony, Tarapur and BARC, Bombay and non-installation of capacitors in PREFRE Plant, resulted in nugatory expenditure of Rs 73.91 lakh.

DAE stated, in January 1997, that the capacitors were not off the shelf items but were custom made units based on design parameters calculated by the users after detailed and time consuming drills. The stand of DAE is not acceptable since custom built shunt capacitors would not require five years to procure and instal. Incidentally, DAE was able to borrow shunt capacitors from other units as interim measure. The reason for the delay by DAE, attributed to the equipment being custom made, therefore, does not hold good.

CHAPTER III

Department of Ocean Development

3.1 Infructuous expenditure on procurement of Polar Bear II

DOD used an all terrain vehicle purchased at Rs 112.30 lakh for Antarctica expedition which was received in damaged condition at Cape Town from the US supplier. The use of damaged vehicle led to its break-down, the repair cost of which is likely to be at least Rs 28 lakh.

The Department of Ocean Development **(DOD)** placed a purchase order on Spandeck, a USA based firm for supply of an all-terrain vehicle (Polar Bear II) in June 1993 at a cost of US $ 344888 equivalent to Rs 112.30 lakh to be used for transportation between ship docking site and Maitri station during Antarctica expedition. The vehicle, which formed part of the entourage for the XIIIth Antarctica expedition, was shipped direct to Cape Town on FOB basis in January 1994. On arrival at Cape Town it was found to be in a damaged condition. Notwithstanding this, DOD transported the vehicle to Antarctica on board a Russian Vessel in February 1994.

In spite of the damaged condition of vehicle, DOD put it into operation. The vehicle broke down during the first convoy from ice-shelf to Maitri station. DOD shipped back the vehicle to the supplier in March 1995 for warranty repair after incurring transportation cost of Rs 2.27 lakh. The supplier held that the damage to the axle was a result of tremendous dynamic overload, which initiated a primary crack in the axle leading to a catastrophic failure under subsequent loading. The firm added that none of the damages to the vehicle was warrantable by them and estimated the minimum cost of repair at US $ 65000 equivalent to Rs 23.40 lakh. The matter has not yet been resolved.

Thus, use of the vehicle which was received at Cape Town in a damaged condition without first getting it repaired, led to further damage of the vehicle. The repair and transportation is likely to cost at least Rs 28 lakh.

The Department stated, in November 1996, that they were awaiting the advice of Vehicle Research and Development Establishment about the damage to the vehicle.

CHAPTER IV

MINISTRY OF MINES

(Geological Survey of India)

4.1 Avoidable expenditure on rent of premises

Failure of the Ministry to invoke the provision of the clause for renewal of the lease agreement, resulted in an avoidable expenditure of Rs 26 lakh on rent of premises.

The Ministry renewed the lease to hire a premises, in September 1987, in Bangalore, on a monthly rent of Rs 2.07 lakh to accommodate the office of the Deputy Director General, Airborne Mineral Survey and Exploration **(AMSE)**, initially for a period of five years with a stipulation in clause 14 of the lease agreement that the lease could be renewed for a further period of two years at the same rent, convenants, agreement, provided a notice of not less than one month before the expiration of the term was given to the lessor.

While on one hand, the Ministry of Mines directed AMSE, in May 1992, that the agreement need not be continued due to economic reasons and appropriate premises at a lower rent should be located, on the other, it approved, in February 1994, lease of this building at a monthly rent of Rs 3.15 lakh for three years from September 1992. The Geological Survey of India **(GSI)** continued to occupy the premises beyond September 1992 in spite of the direction of the Ministry to look for alternative cheaper accommodation and forwarded a proposal for continued leasing of the building at the CPWD fixed fair rent of Rs 3.15 lakh from September 1992 to the Ministry in February 1994. By not availing of the advantage of renewal of agreement as envisaged under Clause 14 of the agreement, the department incurred an avoidable expenditure of Rs 26 lakh during the period of two years from September 1992 to August 1994. Strangely, the Department continued to occupy the building and entered into fresh agreement at enhanced rate even when a case filed in the court by the owners for enhancement of rent and eviction was pending since 1985.

GSI stated, in April 1996, that the lease was not renewed as, acting on a petition from the lessor, the Honourable Minister of Mines, Government of India had directed the Department to vacate the premises. The contention of the Department is not acceptable since the Department did not even vacate the premises, but continued to occupy it at a higher rate of Rs 3.15 lakh per month, while it had the option to retain the premises for at least two years from September 1992 at a much lower rate of Rs 2.07 lakh per month. Besides, retrospective approval of higher rate of rent infringes the propriety of expenditure.

The matter was referred to the Ministry in May 1996; their reply was awaited as of January 1997.

CHAPTER V

Indian Council of Agricultural Research

5.1 National Dairy Research Institute

5.1.1 Introduction

National Dairy Research Institute **(NDRI)**, Karnal, a constituent unit of Indian Council of Agricultural Research **(ICAR)**, was conferred the status of a deemed university in March 1989 under the University Grants Commission Act, 1956. It conducts basic and applied research in all branches of dairy science and technology. It also organises courses at graduate and post-graduate levels, national and international training programmes, undertakes extension activities and transfers technology.

5.1.2 Scope of Audit

Audit of NDRI is conducted under Section 20(1) of the Comptroller & Auditor General's (Duties, Powers and Conditions of Service) Act, 1971. Present review covers research and financial management in NDRI during 1991-96.

5.1.3 Organisational set up

NDRI is headed by a Director and has ten divisions. Besides, it has two regional stations - at Bangalore in Karnataka and Kalyani in West Bengal. The task regarding broad policy matters and decision making in various specific area activities of NDRI is managed by the Board of Management **(BOM)** which is assisted by Executive Council, Academic Council, Research Advisory Committee **(RAC)**, Staff Research Council **(SRC)** and Extension Council.

Executive Council deals with administrative matters and Academic Council deals with matters relating to education and training. While RAC is responsible for suggesting research programmes and reviewing research achievements as well as any other function assigned by ICAR, SRC is responsible for consideration of research

proposals, review of annual progress of ongoing research projects and monitoring the action taken by NDRI on the recommendations of Quinquennial Review Team **(QRT)**. The Extension Council is responsible for extension programmes.

The strength of scientific, technical and other staff of NDRI as on 1 April 1996 was 247, 510 and 1751 against the sanctioned strength of 259, 551 and 1825 respectively.

5.1.4 Highlights

- **NDRI did not constitute RAC for a decade. 77 out of 170 projects undertaken did not fall under the thrust areas identified by SRC. SRC did not review the annual progress of 200 completed projects.**

  Failure to achieve the objectives and non-scaling up of research findings in 37 in-house research projects resulted in sub-optimal benefit from expenditure of Rs 37.24 lakh.

  Abrupt closure of a sponsored project on development of methodology for progeny testing of young crossbred bulls under field conditions resulted in infructuous expenditure of Rs 6.36 lakh.

  (Para 5.1.6)

- **NDRI did not charge fees approved by its Consultancy Board for consultancy services to private parties, resulting in financial loss to NDRI.**

  (Para 5.1.7)

- **NDRI did not patent any technology after 1987.**

  (Para 5.1.8)

- **Sub-optimal utilisation of scientific manpower resulted in infructuous expenditure of Rs 32.04 lakh.**

  (Para 5.1.9)

- **Objectives of full capacity utilisation, self-sufficiency in budgetary requirements and R&D upscaling in respect of experimental dairy plant, for which revolving fund of Rs 85 lakh was sanctioned, were not achieved.**

Delay in establishing model dairy plant deprived NDRI of necessary infrastructure for training facility besides avoidable interest liability of Rs 2.58 crore.

(Para 5.1.10)

Acceptance of sub-standard construction work by NDRI resulted in non-utilisation of Artificial Breeding Complex constructed at a cost of Rs 77.26 lakh.

(Para 5.1.11)

5.1.5 Budget and expenditure

NDRI is financed mainly through grants released by ICAR, which in turn is funded by the grants from the Department of Agricultural Research and Education. It also receives funds from the Agricultural Produce Cess Fund, foreign agencies and other departments/ ministries for specific schemes.

Non-Plan expenditure exceeded the budget estimates provided by ICAR during 1991-95 as indicated below:

(Rupees in lakh)

Year	Budget Estimates	Actual Expenditure	Excess Expenditure
1991-92	945.00	950.88	5.88
1992-93	943.00	1034.00	91.00
1993-94	948.00	1255.86	307.86
1994-95	1070.00	1226.00	156.00

NDRI did not furnish the reasons for and source from which the excess expenditure was met.

5.1.6 Research projects

Planning, monitoring and evaluation

In NDRI, Research & Development (R&D) activities are carried out through in-house projects funded by ICAR and sponsored projects funded by other departments, ministries and external agencies.

A mention about failure of NDRI to constitute RAC was made in Paragraph 19.6.1 of the Report of the Comptroller & Auditor General of India, Union Government (Scientific Departments) for the year ended 31 March 1990. ICAR had stated in their action taken note that in April 1992 the Board of Management of NDRI had approved the constitution of RAC consisting of experts from all segments of the dairy industry to provide necessary direction and support to NDRI to undertake industry oriented research. However, NDRI did not constitute RAC till September 1995. Consequently, 185 research projects were formulated by SRC during 1991-96 but NDRI did not consult outside experts to determine the research areas/project. The QRT's report 1986-92 revealed that, in the absence of RAC, the research project proposals which came up before the SRC lacked critical scrutiny with respect to the potential impact of the results, adequacy of infrastructure, human resource competence needed, budgetary requirement, time frame for completion of work and utilisation of results through upgradation of technologies for field applications. The report also disclosed that there was no mechanism in NDRI to ensure formulation of thrust area research projects.

Test check by Audit revealed that out of 170 projects undertaken during 1991-96, 77 projects did not fall under the thrust areas identified by SRC. 75 new projects were approved by SRC in December 1995 based on the proposals without containing basic information like objectives, time period, manpower requirement and financial input which were required to be kept in the research project files for approval of projects by SRC. Out of this, SRC approved 41 projects in December 1995 post-facto, since they were already taken up in January 1995. Further, the SRC did not review the annual progress of 200 research projects completed during 1991-96. NDRI stated, in June 1996, that research project files containing basic information for all the 75 projects were under preparation.

BOM in its meeting held in June 1993 accepted the QRT recommendations and decided to constitute a committee consisting of three creative scientists of NDRI and three scientists from outside to implement the recommendations of QRT. The proceedings of four SRC meetings held between January 1991 to December 1995 revealed that SRC did not monitor whether any action was taken by NDRI on the recommendations of QRT. Thus, important recommendations of the QRT relating to lack of focus for solving the problems of the farmers or the industry, absence of mechanism for transforming the output of R&D into viable technologies, lack of research management and monitoring system, course correction and budget optimisation mechanism were not acted upon by NDRI. NDRI did not furnish reasons for not implementing the recommendations of QRT.

In-house projects

The position of in-house projects during the period 1991-96 is depicted below:

Particulars	1991-92	1992-93	1993-94	1994-95	1995-96
Carried forward	106	113	124	100	56
Taken up	45	38	27	41	34
Completed	38	27	50	85	Nil
Dropped in middle/Kept in abeyance/ merged	Nil	Nil	1	Nil	Nil

Out of 200 in-house projects completed during 1991-96, test check of 54 projects revelaed that the objectives were achieved only in 17 cases and were achieved only partially in 15 cases. In 22 projects, recommendations of SRC for scaling up the research findings were not followed. The expenditure of Rs 37.24 lakh incurred on these 37 projects remained largely unfruitful.

Sponsored projects

Out of 20 sponsored projects, two were test-checked in Audit. The audit examination revealed the following:

(i) Abrupt closure of project

NDRI undertook a project on development of methodology for progeny testing of young crossbred bulls under field condition in collaboration with National Dairy Development Board **(NDDB)** to be completed during 1987-92 at an estimated cost of Rs 40 lakh which was to be contributed by NDDB. Out of the first instalment of Rs 7.25 lakh released by NDDB in May 1989, Rs 3.53 lakh was transferred by NDRI to its regional station at Bangalore where the project was to be implemented. The balance amount of Rs 3.72 lakh was diverted for importing certain equipment not connected with this project. The project had to be closed by NDDB abruptly after two years in July 1991, as the same was found to have been ill-conceived and improperly structured by NDRI. The amount of Rs 3.72 lakh was refunded by NDRI to NDDB after seven years in April 1996. The amount of Rs 6.36 lakh including salary component of Rs 2.83 lakh spent by NDRI on the project was, thus, rendered infructuous.

(ii) Non-achievement of objectives

NDRI undertook a project sponsored by the Ministry of Non-Conventional Energy Sources **(MNES)** in June 1989 for three years from June 1989 to May 1992 aimed, inter alia, at improving the process for maximum recovery of methane and its pilot-scale operation to improve cost-benefit ratio to make it economically viable. Against the sanctioned cost of Rs 16.27 lakh, NDRI received Rs 10 lakh from MNES and spent Rs 8.56 lakh on procurement of equipment and other expenditure relating to the project. The final report of the project disclosed that due to delay in procurement of stores for scaling up of bioreactors and failure to appoint research associates and technical persons on regular basis, the stated objective could not be achieved.

5.1.7 Consultancy services

NDRI offers consultancy services to government/public sector/co-operative organisations as well as private sector. For private sector, the Consultancy Board of NDRI prescribed consultancy fee for technology transfer, engineering designs and problem solving with reference to the annual turnover of the product/ process for which consultancy was sought. Like-wise, for techno-economic feasibility reports, consultancy fee ranging from two to five percent was fixed on a sliding scale linked to the cost of the project. However, private sector organisations were charged

consultancy fee on actual cost or fixed rate basis and not in accordance with the prescribed formula. This is evident from the agenda notes of the sixth meeting of the Consultancy Board held on 26 September 1995 in which consultancy charges for 21 firms were calculated on actual cost or fixed rate basis. Further, NDRI rendered consultancy service to M/s J. K. Industries for the production of demineralised powder from whey and charged Rs 2.50 lakh on actual cost basis. BOM in its meeting held in April 1992, observed that the consultancy fee of Rs 2.50 lakh was too meagre and therefore decided to revise the estimate and to recover the differential amount from the firm. However, no follow up action was taken by NDRI to recover the amount short-charged. Similarly, technical advice and assistance relating to 'Fattening of growing male buffalo calves for quality meat production' was rendered by NDRI to M/s Al-Kabeer Exports Limited, a Bombay based firm charging Rs 3.10 lakh on actual cost basis. The loss suffered by NDRI as a result of effecting recoveries at the rates other than the prescribed by the Consultancy Board could not be ascertained since NDRI did not furnish the relevant information about annual turnover and project cost of the firms to which consultancy services were rendered.

5.1.8 Patenting and transfer of technology

On examining the issues relating to development, patenting and transfer of technology, it was found that NDRI did not have details of a number of projects. Out of 200 projects completed during 1991-96, in which technology was developed, no technology was got patented by NDRI after 1987. It was found that out of the seven cases approved by BOM in June 1993 and June 1994 for obtaining patents, application to Patent Office was submitted by NDRI only in one case. Out of the remaining six, in five cases no action was taken by NDRI for submitting applications to the Patent Office whereas in one case approval of ICAR was awaited.

QRT report submitted in June 1993 revealed that there was no effective mechanism in NDRI for transferring technology due to non-involvement of users in the development of new technologies. NDRI did not take any action in this regard.

5.1.9 Under-utilisation of scientific manpower

In response to paragraph 19.6.2 of the Report of the Comptroller & Auditor General of India, Union Government (Scientific Departments) for the year ended 31 March 1990 about the under-utilisation of scientific manpower, ICAR assured effective

utilisation of scientific manpower. However, NDRI did not utilise the scientific manpower in full during 1991-96 as discussed below:

In Dairy Technology Division out of 26 scientists, six were not assigned any research project for period ranging from 12 to 27 months. In reply, NDRI stated that one scientist was engaged in one project during January 1991 to December 1993 and in teaching Ph.D students during 1994. The details of deployment of the remaining five scientists were not furnished by NDRI. In Dairy Cattle Nutrition Division, nine out of 23 scientists were not assigned any research project for period ranging from 12 to 15 months. NDRI stated that during the entire year 1991-92 and three months from January to March 1996, the scientists were engaged in preparation of final reports on the concluded projects and in the process of initiating new projects. The reply is not tenable inasmuch as the names of these scientists did not figure in any of the projects. In the case of Dairy Cattle Breeding Division, 10 out of 27 scientists were found under-utilised to the extent of 10 to 100 per cent in one or two projects.

Thus, NDRI did not have effective mechanism to ensure optimum utilisation of scientists. The expenditure of Rs 32.04 lakh on pay and allowances of scientists whose services were not utilised optimally was unproductive.

5.1.10 Other activities

Experimental Dairy Plant

ICAR sanctioned a revolving fund of Rs 85 lakh in July 1989 for the existing experimental dairy plant with the objective of full capacity utilisation, to generate revenue to be self-sufficient in budgetary needs and for scaling up the R&D activities. The scheme was to be operated till 31 March 1995.

In response to the audit observation in paragraph 19.8.1 of the Report of the Comptroller & Auditor General of India, Union Government (Scientific Departments) for the year ended 31 March 1990, ICAR assured profitable utilisation of the plant. However, it continued to operate much below the rated capacity. It processed 5,800 to 7,000 litres milk per day against the rated capacity of 10,000 litres per day during the period 1991-96. The total number of days of operation of the plant also declined from 194 days in 1991 to 67 days in 1995. The objective of attaining self-sufficiency in budgetary requirement was not achieved. This was evident from the fact that the

plant had a liability of Rs 115.87 lakh as of 31 March 1995 towards the cost of milk supplied from NDRI dairies, water charges and salary of staff etc. Thus, the objectives of the revolving fund scheme were not achieved. Abnormal delay was also observed in procurement of spray drier costing Rs 32 lakh to reduce operational cost. Though approval for its procurement was given by ICAR in March 1992, the order for spray drier was placed by NDRI only in October 1995 at a cost of Rs 35.65 lakh. The equipment was yet to be received as of July 1996. Further, the audit certificate issued by the Chartered Accountants indicated that the accounts of the revolving fund did not represent true and correct state of the plant.

NDRI stated, in June 1996, that sufficient milk was not available as milk yield varied during different seasons. The reply of NDRI is not tenable. If milk produced internally was not sufficient, procurement of milk from the external sources could have been increased to ensure full capacity utilisation of the plant. As regards the accounts of the revolving fund, NDRI assured in June 1996 that necessary action would be taken to follow correct accounting procedure.

Utilisation of Biogas Plant

The biogas plant constructed by NDRI in June 1994 at a cost of Rs 23.20 lakh to use the gas for firing the boilers of their experimental dairy plant did not yield desired results as out of the two boilers planned to be connected with the biogas plant, only one was connected and that too was under repair intermittently. Due to this, the gas produced in the biogas plant was utilised only for nine months out of 21 months since its installation in June 1994 resulting in avoidable expenditure of Rs 4.23 lakh on purchase of light diesel oil. NDRI stated, in May 1996, that attempt was being made to connect the second boiler with the biogas plant and that the economic viability of utilisation of biogas plant would be established in the next two years.

Delay in establishing Model Dairy Plant

In pursuance of a Memorandum of Understanding (MOU) signed between ICAR and NDDB in June 1989, a model dairy plant with a capacity of processing 60,000 litres milk per day was to be established by NDDB at a cost of Rs 10.82 crore at NDRI, Karnal to provide infrastructure for in-plant training of the students of dairy technology of NDRI for imparting experience in managing a modern commercial dairy plant, to instil confidence in handling real life problems in production management and

to provide infrastructure facilities to the scientists of NDRI for scaling up R&D concepts developed in the research laboratories on the bench-top scale to the industrial scale and test the technologies developed under commercial environment. While NDRI allotted 19.83 acres of land for the project, NDDB was responsible for financing and completing the scheme on turn-key basis. The project was to be completed by September 1993. However, the progress report indicated that only 70 per cent work was completed upto March 1996. Apart from depriving NDRI of the infrastructural facility in the form of model dairy plant, the delay of more than two and a half years as of July 1996 has also caused interest liability of the model dairy plant to escalate by Rs 2.58 crore on the loan component of Rs 7.57 crore.

NDRI stated , in September 1996, that model dairy plant, which is an autonomous unit of ICAR, would be liable to pay interest only after commissioning of the plant and that no financial liability would be attracted by ICAR or NDRI. The reply is not acceptable since in the approved budget of model dairy plant for 1996-97, a sum of Rs 90.90 lakh has been provided as interest on the loan amount of Rs 7.57 crore.

5.1.11 Other points of interest

Outstanding advances

As on 31 March 1996, accumulated balance of Rs 136.93 lakh against advances given to the employees towards TA/LTC/ Contingency and to various Government departments for procurement of equipment etc. was pending for adjustment/recovery. Some of the outstanding advances remained unsettled since 1972-73. NDRI stated in May 1996 that periodical reminders were issued to the concerned officers to adjust these advances. The reply is not tenable as action for the recovery of advances is to be taken by NDRI.

Bank reconciliation

It was observed that amounts aggregating to Rs 90.83 lakh (out of which Rs 21.95 lakh is more than three year old) credited by the bank in NDRI's account were not taken in the cash book. Further, amounts aggregating to Rs 122.11 lakh debited by the bank on account of foreign drafts and letters of credit were not accounted for by NDRI in its cash book. Some of the debit entries pertained to the period prior to 1987.

Acceptance of sub-standard work

The construction of Artificial Breeding Complex entrusted by NDRI to Central Public Works Department **(CPWD)** at a cost of Rs 60 lakh in March 1985 and scheduled to be completed by 1987-88, was completed by the latter in 1994 at a cost of Rs 77.26 lakh. NDRI observed defects in water supply system and leakage in sewage system in the building. The quality of work and material used were also not found satisfactory by NDRI. Despite this, NDRI took over the possession of the building from CPWD in July 1994 with a condition, as decided in a meeting with CPWD in the same month, that CPWD would rectify the defects in the building within three months. As no action was taken by CPWD to rectify the defects, NDRI intimated ICAR in December 1995 that the building could not be utilised fully. ICAR, in turn, reported the matter to the Chief Engineer, New Delhi in January 1996 for necessary action. However, the position remained unchanged as of June 1996. As a result of accepting possession of the building constructed with unsatisfactory material and having construction defects, NDRI is not in a position to use the building fully. The response of ICAR to this Audit Review sent to them in November 1996 was awaited as of February 1997. The matter needs investigation by ICAR and CPWD.

5.2 Unproductive expenditure

Delay in working out the modalities of merger of Goa Research Centre with another Centre resulted in an unproductive expenditure of Rs 39.29 lakh.

The Goa Research Centre (Centre), a sub-centre of Central Institute of Fisheries Technology Cochin **(CIFT)**, was established in 1964 with a view to promoting growth of the fishing industry by providing improved design of fishing gear for exploitation of fishery in the region.

The Quinquennial Review Team **(QRT)** of the Indian Council of Agricultural Research (ICAR) observed in October 1988 that there was little justification in continuing the Centre in view of non-availability of a suitable vessel and appropriate location close to the waterfront as also on account of similar research carried out by other centres on the Western Coast.

The Management Committee **(MC)** of CIFT considered the report of QRT and recommended to ICAR in December 1988 to close down the Centre since it had outlived its purpose. ICAR, however, took eighteen months and approved in May 1990 the merger of the Centre alongwith its staff and infrastructure with ICAR Research Complex, Goa. The Research Complex, however, did not accept the merger on account of non-availability of sanctioned posts, unsuitability of the personnel, problem in adjustment of different categories of staff and non-availability of funds. ICAR failed to resolve these issues for six years to ensure implementation of its own orders.

CIFT finally issued transfer orders of the staff of Goa Research Centre only in May-June 1996 to Karwar Research Centre of the Central Marine Fisheries Research Institute **(CMFRI)** and CIFT, Cochin alongwith posts. The Centre was finally closed with effect from 30 September 1996.

Thus, the failure of ICAR to take effective action for transfer of personnel of the Centre for six years resulted in unproductive expenditure of Rs 39.29 lakh during June 1990 to September 1996 on retention of idle staff and rent of premises.

ICAR stated, in November 1996, that during the interregnum when its closure was under consideration, the Centre was actively engaged in training, education and extension activities related to fishing technology. The reply is not convincing in view of the constraints which prompted QRT in October 1988 to recommend closure of the Centre.

5.3 Avoidable expenditure

Delay in complying with the provisions of the EPF Act, 1952 by ICAR and CRRI resulted in an avoidable payment of employees' share of Rs 15.45 lakh to the Provident Fund accounts which cannot be recovered from them.

The Central Rice Research Institute **(CRRI)**, Cuttack was brought under the Employees Provident Fund and Miscellaneous Provision Act, 1952 (Act) from August 1976 under the schedule industry "Agricultural Farm". It was required to comply with the provisions of the EPF scheme in respect of eligible casual labourers from

September 1976 onwards. While pursuing with the management for securing compliance, the Indian Council for Agricultural Research (ICAR) filed a Civil Writ Petition in 1978 in the High Court of Delhi challenging the Government Notification. In their judgement of November 1980, the Hon'ble High Court ruled that ICAR was covered by it. However, the Ministry of Labour issued Gazette Notification in February 1981 bringing Educational, Scientific Research and Training institutes under the aforesaid Act with effect from March 1982. Yet, ICAR issued a circular to this effect only in July 1991, after a delay of nine years.

In spite of instructions of ICAR, CRRI did not implement the provisions of the Act for their casual labourers till October 1993. CRRI paid Rs 28.00 lakh to the Regional Provident Fund Commissioner Bhubaneswar in March 1994 representing employer's share as well as employees share for the period March 1982 to October 1993. Of this, the employees' contribution amounted to Rs 15.45 lakh.

In terms of the Employees' Provident Fund Scheme, recovery of arrears of employees' contribution from the casual labourers was not permissible. Thus, the amount of Rs 15.45 lakh could not be recovered from the concerned casual labourers.

Failure of ICAR to issue instructions promptly for implementing the provisions of the Act; compounded by further delay of two years by CRRI to implement them; resulted in an avoidable payment of Rs 15.45 lakh.

The Council stated, in November 1996, that the Regional Provident Fund Commissioner Bhubaneswar insisted on implementation of the Act with effect from August 1976 itself. The Council added that after several discussions by CRRI, he agreed in March 1993 for its provisional implementation from March 1982, forwarding relevant forms and guidelines in June 1993.

The fact, however, remains that because of belated action in ICAR, the matter was not resolved with RPFC in time so as to facilitate provisional recovery since March 1982, which resulted in the CRRI having to bear the employees share of Rs 15.45 lakh.

5.4 Non-installation of equipment

Delay in completion of infrastructural facilities leading to non-installation of equipment resulted in loss of viability of carry over stock of breeder seed on account of its storage under humid condition despite expenditure of Rs.15.35 lakh.

Central Research Institute of Jute and Allied Fibres **(CRIJAF)**, Barrackpore placed orders on two separate firms in March 1993 for supply of one "Walk-in-Cooler" and one "Dehumidifier" for their Central Nucleus Jute Seed Multiplication farm at Bud Bud in Burdwan district. The equipment were required for the World Bank aided "National Seed Project - III" for strengthening of breeder seed production of jute and allied fibres. The duration of the project was six and a half years from October 1990. The walk-in-cooler controls the temperature and the dehumidifier controls humidity in the walk-in-cooler for the purpose of long term storage of seed.

The farm received the dehumidifier in April 1993 and the walk-in-cooler in February 1994 at a cost Rs 4.27 lakh and Rs 4.88 lakh respectively.

Construction of the building, in which the two equipment were to be installed, was entrusted to the Central Public Works Department (CPWD). Against a preliminary estimate of Rs. 12.19 lakh, CRIJAF deposited only a sum of Rs 5.04 lakh in March 1990, due to paucity of funds. Consequently, the building, which was expected to be ready within eight months, took 33 months for completion, and was handed over to CRIJAF in January 1993. After lapse of a further period of eleven months, CRIJAF approached CPWD in December 1993 for electrification of the building. On receipt of preliminary estimate for electrification, Rs 0.97 lakh was deposited with CPWD in March 1994. Against the original time-frame of just one month for completion of work, from the date of deposit, CPWD took 16 months to complete the work. CRIJAF did not effectively pursue the matter with CPWD for timely completion of work.

After completion of civil and electrical works in August 1995, the walk-in-cooler was installed in August 1996. The dehumidifier had not been commissioned as of November 1996.

CRIJAF stated, in August 1996, that due to non-commissioning of the equipment, the carry over stock of breeder seed could not be stored properly due to high humidity in West Bengal and the viability of the seeds was usually lost under ambient storage conditions.

Failure of CRIJAF to ensure timely completion of infrastructure required for installation of equipment led to delay of more than three and a half years in commissioning of equipment despite expenditure of Rs 15.35 lakh on the procurement and provisioning of infrastructure etc. for dehumidifier and walk-in-cooler. Consequently, carry over stock of breeder seed continued to be stored under ambient humid storage condition which resulted in continued loss of viability of the seed.

The Council stated, in August 1996, that the dehumidifier was expected to be installed and commissioned in September 1996 alongwith ducting and electrical connection. This had not been done till November 1996.

5.5 Equipment lying idle

Failure to take timely action for rectification of defects and procurement of required material resulted in the equipment costing Rs 10.68 lakh lying in disuse for over seven years.

Jute Technological Research Laboratory **(JTRL)**, Calcutta imported in July 1989 one elemental analyser at a total cost of Rs 10.68 lakh to be used for determination of carbon, hydrogen, nitrogen, sulphur and oxygen contents in organic samples and plastics in their various projects. The instrument was installed in February 1990. During the visit of service engineer in May 1990, demonstration was held with the gases provided by JTRL but it did not show good results. Meanwhile the guarantee period of the instrument expired in October 1990.

JTRL tried to run the equipment several times till February 1992, but got erroneous results. During the visit of service engineer in January - February 1992, the transformer and microbalance of the equipment were found burnt. They rewound the transformer locally in September 1992 and intimated that the microbalance was required to be repaired at manufacturer's end. The microbalance was not sent to the

manufacturer due to principals not agreeing to bear the freight cost. After a lapse of nine months, JTRL decided in June 1993 to use the microbalance available elsewhere in the Laboratory.

The service engineer stated in December 1993 that re-installation of the instrument was not possible due to non-availability of copper wires/gas. The sample feeder board in the instrument was also found defective and needed to be replaced. JTRL placed order in June 1994 only for copper wire/turning and did not order the sample feeder board. These were received by JTRL in November 1994. The service engineer again reminded JTRL in January 1995 for sample feeder board and submitted a quotation. Till June 1996, procurement action for purchase of sample feeder was not taken by JTRL. Failure to ensure timely supply of requisite materials and timely action for rectification of defects, resulted in the equipment costing Rs 10.68 lakh lying in disuse for over seven years.

ICAR stated, in October 1996, that procurement of the sample feeder board was taken up and repair was expected to be carried out shortly.

CHAPTER VI

Council of Scientific and Industrial Research

(Department of Scientific and Industrial Research)

6.1 Regional Research Laboratory, Jorhat

6.1.1 Introduction

The Regional Research Laboratory **(RRL)** Jorhat was established in 1961 to put to effective use the immense material resources of the north eastern region **(NER)** by providing scientific and technological inputs and to provide research and development (R&D) inputs in the field of organic/inorganic/biochemicals and develop the economy of the NER in particular, and the country in general, utilising mineral, agricultural, forest and energy resources and products.

6.1.2 Scope of Audit

Audit of RRL is conducted under Section 20 (1) of the Comptroller and Auditor General's (Duties, Powers and Conditions of Service) Act, 1971. The present review is based on test-check in Audit of transactions of RRL pertaining to the period 1991-96.

6.1.3 Organisational set up

RRL is headed by a Director who is assisted by a Research Council **(RC)** and a Management Council **(MC)**.

The RC is to advise and recommend on the formulation of research programmes, conduct periodic reviews of research activities, assess progress of projects and advise on fostering linkages between RRL and other research organisations, industry and potential clients. MC is responsible for managing the day to day affairs of the RRL.

RRL has a branch laboratory at Itanagar (Arunachal Pradesh) and two sub-stations located at Imphal (Manipur) and Yaongyimsen (Nagaland).

RRL had 107 scientists, 334 technical and 118 administrative personnel on its rolls as on 1 April 1996 against the sanctioned posts of 132, 326 and 132 respectively.

6.1.4 Highlights

- **Despite being aware of the harmful aspects of synthesized chemical pesticides and also of the open general licence policy of the Government of India under which import of pesticides had become easy, RRL took up a project for development of process know-how for synthesizing pesticides in April 1990 with the objective of developing competitive and cost effective process for these synthetic pesticides. The project was, however, closed prematurely in September 1993 on account of global concern for harmful effects of residues of synthetic pesticides and lack of interest from the industry for these processes. The expenditure of Rs 41.21 lakh on the project was thus rendered infructuous.**

  (Para 6.1.6)

- **Of 51 grants-in-aid projects taken up by RRL during 1991-96 only 21 could be completed. There was time overrun ranging from one to three years in 17 of the 21 completed projects. Test check of some of the completed projects revealed inordinate delays in the submission of completion reports as also lack of sufficient data for meaingful use of the project reports. The expenditure of Rs 16.98 lakh on two such projects was thus rendered infructuous.**

  (Para 6.1.7)

- **RRL imported an equipment in July 1992 at a cost of Rs 15.22 lakh for use in a sponsored project. Although the project was completed in March 1993, the equipment had not been installed as of January 1997.**

  (Para 6.1.9)

6.1.5 Receipts and expenditure

RRL is financed mainly through funds provided by CSIR. The receipts and expenditure of RRL for the years 1991-92 to 1995-96, other than on sponsored projects, were as under:

(Rupees in lakh)

Year	Funds from CSIR	Other Receipts	Total Receipts	Expenditure		
				Capital	Revenue	Total
1991-92	435.00	10.15	445.15	71.79	371.00	442.79
1992-93	553.00	32.92	585.92	118.26	440.81	559.07
1993-94	573.00	45.93	618.93	133.56	466.93	600.50
1994-95	814.00	25.07	839.07	227.62	550.13	777.74
1995-96	782.00	30.54	812.54	190.38	665.01	855.40

Generation of resources

As per directive of CSIR, RRL was required to generate cash flow of one third of its expenditure on R&D by the year 1992-93 from sources other than CSIR. Information furnished by RRL revealed that the revenue generated on this account during 1992-95 ranged between 11.93 and 17.68 percent of R&D expenditure for the concerned years and the position improved to 56.15 percent in 1995-96 reportedly due to special efforts initiated for external funding since 1992. CSIR stated, in January 1997, that RRL could not generate the expected level of cash flow due to geographical remoteness and local socio-economic conditions. The contention is not tenable in view of the generation of higher resources during 1995-96.

6.1.6 Research activities

R & D activities of RRL are conducted through in-house, sponsored, grants-in-aid and consultancy projects.

Project planning, monitoring and evaluation

RRL set up planning, monitoring and evaluation **(PME)** Cell in June 1994 for budgeting and costing of projects and maintenance of project folders with all relevant details including recommendations of RC in respect of each project. Due to PME's failure to maintain project folders, the actual expenditure incurred on each in-house project could not be ascertained in Audit. RRL stated, in May 1996, that project costing could not be undertaken owing to non-recruitment of a cost accountant. The reply is not tenable because the composition of PME Cell, as laid down by CSIR, did

not provide for a cost accountant. CSIR stated, in January 1997, that costing of projects and maintenance of projects folders containing the requisite details could not be undertaken due to shortage of staff and has proposed to take up the same from April 1997.

Audit scrutiny of minutes of the RC meetings held during 1991-96 disclosed that project review and assessment of individual projects was not conducted by RC. As a result, projects were continuing for a considerable length of time without any appraisal of the progress. Follow up action on decisions/recommendations of the RC were not reflected in minutes of the subsequent meetings. As a result, the reaction/further directions of the RC in such cases could not be examined in Audit. In a number of cases it was observed that decisions of the RC were not communicated to the concerned scientists. RRL stated, in June 1996, that follow up action would be included as an item in the agenda in future.

It was seen in Audit that the RC had advised in November 1995 that the evaluation and appraisal system of the RRL should be modified and fitted into a performance matrix alongwith a progress curve of time versus achievement details for easy evaluation. The action taken on the recommendation was not communicated to Audit.

CSIR stated, in January 1997, that the internal project review process had been started from July 1996 and would be .reported to the RC in its next meeting.

In-house projects

In-house projects are wholly financed out of funds received from CSIR. Examination of some of these projects revealed as under:

(a) Process know-how for pesticides-Metalaxyl, Anilophos

RRL took up in April 1990 a project titled "Development of process know-how for pesticides - Metalaxyl Anilophos" at an estimated cost of Rs 37.12 lakh with the scheduled date of completion in March 1997. The objective of the project was to develop process know-how for indigenous production of the pesticides and transfer of processes at semi-commercial scale with back-up at commercial scale. The project was, however, prematurely closed in September 1993, after incurring expenditure of Rs 41.21 lakh on synthesizing both the pesticides and their intermediates and

studying parameters for their synthesis. The project was terminated (i) on account of global concern for harmful effects of residues of synthetic pesticides; and (ii) open general licence policy of Government of India in late eighties under which import of pesticides having become easy, no party came forward to show interest in synthetic pesticides under development in RRL.

Thus, RRL formulated the project without visualising the impact of Government policy already in vogue. The unimaginative formulation of project resulted in infructuous expenditure of Rs 41.21 lakh. CSIR stated, in January 1997, that the laboratory was aware of the harmful aspects of synthesized chemicals pesticides and also of Government's OGL policy but took up the project with the objectives of developing competitive and cost effective processes for these synthetic pesticides and closed it when the industry did not evince much interest in these processes.

(b) Circulating fluidized bed combustion system

In April 1990 RRL undertook a project on "Development of circulating fluidized bed **(CFB)** combustion system", at a cost of Rs 42.30 lakh. The project was to be carried out in two phases, and scheduled to be completed by March 1997 in collaboration with Central Mechanical Engineering Research Institute **(CMERI)**, Durgapur and Central Fuel Research Institute **(CFRI)**, Dhanbad. The objective of the project was to generate capability for design and development of CFB commercial size unit. RC expressed its support in September 1992 to the work, provided external funding was available. RC observed again in March 1993 that the scientists working in the area might work in other projects till any external funding was forthcoming. The project was, however, continued by RRL without external funding. Reasons for continuing the project despite RC's recommendations to the contrary could not be furnished by RRL. In March 1994 the RC directed that the project be completed by the end of that month.

RRL discontinued the project in March 1994. It stated in May 1996 that full objective of the project could not be attained because of various constraints like manpower, equipment, industrial collaboration etc.

Failure to follow RC's recommendations resulted in unjustifiable deployment of scientific manpower on a project which was foreclosed without attainment of

objectives. CSIR stated in January 1997, that RRL continued with the project expecting external fundings.

(c) Work on Suprofen

Three scientists of RRL started work on Suprofen in 1990 as a new drug under a project " Drug and drug intermediates ". The work was scheduled to be completed by December 1996. In the meeting of the RC held in October 1990, it was noted that Technical Advisory Board **(TAB)** had suggested to stop work on Suprofen and divert activities to synthesis of Chiral molecules. RRL, however, continued to work on Suprofen.

Preliminary experiments were carried out at the laboratory scale of different intermediates and stages and their final route selected at grammes quantity only during 1993-94. The work was discontinued in April 1994.

Explaining the reasons for discontinuance RRL stated in May 1996 that, of the three scientists engaged on the work, one went abroad in 1993-94 and the other two were shifted to other groups. Further, pilot plant work could not be initiated as long as routes to the product had not been tried at the desired level in the laboratory. This was not done due to expenses involved. It was also stated that better molecules had since come into the market. The reply reflects the casual approach of RRL to such projects. Closure of the project rendered the expenditure of Rs 18.35 lakh unproductive. CSIR stated, in January 1997, that three papers relating to this project were published in reputed journals.

(d) Phyto-chemical investigation of clerodendron colebrookianum walp

A seven year project for phytochemical investigation of a plant under 'Biotechnologically active principals in NE region of India" was undertaken in 1990 without ensuring facility of pharmacological evaluation in a reputed institution. The objective of the project was to isolate and characterise the constituent actually responsible for the hypersensitive activity of the plant. In the absence of any institute willing to conduct pharmacological evaluation, RRL had to abandon the project midway in 1994-95 after spending Rs 23.50 lakh. CSIR stated, in January 1997, that

the work was reviewed by the Technical Advisory Board of CSIR and was carried out under CSIR network programme on their recommendation.

(e) Cold bonded pelletization

A project "Improvement in curing technology for cold bonded pelletization" was taken up in 1981 at an estimated cost of Rs 51.39 lakh. The project was scheduled to be completed by 1989. Research & Development Centre for Iron & Steel **(RDCIS)**/ SAIL, Ranchi showed interest in the laboratory process and signed (February 1988) a Memorandum of Understanding **(MOU)** with RRL. As per MOU while RRL was to supply details of the work carried out to RDCIS/SAIL and to carry out improvement/modification of the work; RRL/CSIR were to collaborate with RDCIS/SAIL in scaling up investigations of the curing technology RDCIS/SAIL was to undertake upscaling/pilot investigation of the curing technology, modify work, if necessary, and carry out blast furnace trials involving the pellets produced.

RRL handed over the details of the process parameters to RDCIS/SAIL in 1989 and thereafter started work on a related second project - "Scale up study and evaluation of cold bonded pelletization " in April 1990 at a cost of Rs 16.56 lakh. The project was scheduled to be completed in December 1994. The project was kept in abeyance in 1991-92 due to change of priority in RRL during that year and deployment of staff elsewhere. SAIL conducted (1992) several blast furnace trials with the cold bonded pellets prepared by them. RRL revived the proejct in 1993-94. As the coke rate in trial results at SAIL did not come down as anticipated, trials of the RRL modified processes did not proceed further. The project was closed in December 1994. RRL stated, in May 1996, that one of the reasons for getting unexpected result during trials may be use of sub-standard material.

CSIR stated, in January 1997, that the infrastructure, expertise etc. developed during the study was utilised for developing other agglomeration processes. The fact, however, remains that despite the expenditure of Rs 67.94 lakh, the validity of technology developed by RRL between 1981 and 1994 could not be estabilished.

(f) Marketability of four flow improvers

Between 1987 and 1989 RRL developed four flow improvers in laboratory scale from its in-house project "Additives for petroleum and petroleum products". The total

cost of development of four flow improvers was Rs 36.29 lakh. RRL stated, in May 1996, that several parties had shown interest in the technology for the flow improvers developed in the laboratory but none of the negotiations had materialised because of marketing difficulties envisaged by the prospective entrepreneurs. RRL further stated that there were already several manufacturers covering major share of the existing market for flow improvers. Thus, RRL had taken up these projects without assessing the marketability of the technology sought to be developed by it. Consequently, the expenditure of Rs 36.29 lakh was rendered infructuous.

6.1.7 Grants-in-aid projects

Grants-in-aid projects are funded by Government departments/agencies. RRL had 20 grants-in-aid projects on 31 March 1991. It took up 31 new projects during 1991-96 and completed 21 projects during this period.

RRL did not produce list of grants-in-aid projects undertaken during 1991-96. Only a list of 21 projects completed during this period was furnished to Audit, which also did not contain information on expenditure incurred on the individual projects. Consequently, cost overrun, if any, could not be ascertained. However, there was time overrun ranging from one to three years in 17 of the 21 completed projects. The extent of usefulness of the findings to the end users and feed back were not available in respect of any of the 21 completed projects. Test check of some of the completed projects revealed as follows :

(a) North Eastern Council **(NEC)** approved in May 1989 the scheme "Radon monitoring as an earthquake precursors at selective sites in NE India" to be implemented by RRL during the remaining period of the Seventh Five Year Plan at a cost of Rs 10.50 lakh. The scheme, inter alia, envisaged identification of radon emanation pattern as an earthquake precursor and ultimately its contributional aspects towards developing suitable approach for earthquake prediction in the North Eastern region. RRL was to submit status report on the work actually done and was responsible for operation and maintenance of the stations beyond 7th Plan period also. NEC found that the preliminary report of January 1992 from RRL contained data covering the period May 1989-June 1990 only, which was insufficient to arrive at any confident conclusion and requested RRL in May 1992 to continue the studies and send a rectified report. RRL stated in May 1996 that no further work was taken up under the scheme beyond the Seventh Five Year Plan. The final report submitted in

June 1993 to NEC too contained data covering the period May 1989-June 1990 only. Due to incorporation of insufficient data in the final report, NEC was unable to conduct indepth analysis of the data to arrive at conclusive stage. The expenditure of Rs. 10.50 lakh on the project thus remained unfruitful.

(b) RRL undertook in October 1987 a three year project "Desulphurisation of flue gas generated in beehive coke-ovens" at a cost of Rs 6.48 lakh to be shared with the NEC. The objective of the scheme was to investigate an appropriate method for desulphurisation of the flue gas generated in beehive coke-oven during the production of coke for VSK mini cement plant. RRL completed the project in 1991 but submitted reports to NEC only in May -August 1995 due to delay in replacing an imported equipment. On perusal of the report, NEC observed in July 1995 that the applicability of the findings received after five years from the anticipated date of completion of the project needed verification . RRL was thus asked to clarify certain aspects of the project and its findings. NEC was not satisfied with the findings in the updated report also and desired in December 1995 a more meaningful report. RRL agreed to take up the work only on receipt of additional grant. Further developments were not on record. NEC's dissatisfaction with the RRL's report reflects on the latter's failure to conduct useful research under the project, rendering the expenditure of Rs 6.48 lakh unfruitful.

6.1.8 Sponsored projects

Sponsored projects are wholly funded by sponsoring agencies. The position of the sponsored projects undertaken by RRL during the year 1991-96 is indicated below:

	1991-92	1992-93	1993-94	1994-95	1995-96
Opening balance	4	4	4	5	4
Taken up	1	-	1	1	1
Completed	1	-	-	2	1
Closing balance	4	4	5	4	4

Audit scrutiny of four completed projects revealed that three of them were completed after time overrun of one to two years. RRL was not aware of the reaction of the

research findings of the completed projects except in one case. RRL was also not aware whether the result of their research proved useful to the sponsors. CSIR stated, in January 1997, that the time overrun in two cases were due to delay in receipt of final payment. In case of one project, the survey work could not be continued for two years because of the prevailing condition in the area.

6.1.9 Purchase and stores

(a) Microbial identification system

RRL imported in July 1992 a microbial identification system with accessories at a total cost of Rs 15.22 lakh for use in a sponsored project funded by the Oil & Natural Gas Commission. The supplier's service engineer visited RRL in September 1992 and July 1993 but could not install the equipment on account of non-provision of requisite gases and due to some snag in the computer software. RRL pursued the matter till September 1994. No further action in the matter was taken thereafter. RRL stated in June 1996, that no action was taken for two years because the user scientist could not give any information and left the laboratory. In the meantime, RRL had already completed the project in March 1993; the equipment is still lying idle. The expenditure of Rs 15.22 lakh was, therefore, rendered wasteful. CSIR stated, in January 1997, that the matter had since been taken up with the supplier for commissioning the equipment.

(b) Demurrage and terminal charges

In terms of CSIR instructions RRL had to report to CSIR the expenditure on demurrage and terminal charges exceeding Rs 250. RRL incurred expenditure of Rs 5.50 lakh on demurrage for clearance of 59 imported consignments during 1991-96. RRL neither reported the matter to CSIR nor got the expenditure regularised by the MC. RRL stated, in May 1996, that action was being taken to issue necessary instructions to the clearing agent for early clearance and to regularise the expenditure already incurred on demurrage charges. CSIR stated, in January 1997, that all cases requiring approval of MC would be put up before it.

6.1.10 Physical verification of stores

Physical verification of the stores is required to be done every year. It was, however, observed that RRL had not conducted physical verification in respect of non-consumable stores of the main laboratory since 1988-89. Physical verification of stores comprising non-consumable, consumable and dead stock items of its branch laboratory at Itanagar and both its sub-stations in Manipur and Nagaland had not been conducted since their inception. CSIR stated, in January 1997, that the physical verification was being initiated.

6.1.11 Outstanding advances

As of 31 March 1996 advances to officials, private parties, government departments/organisations etc. amounting to Rs 61.82 lakh were pending adjustment/recovery. Out of this, advances amounting to Rs 31.13 lakh were outstanding for more than one year. CSIR stated, in January 1997, that an amount of Rs 24.73 lakh had since been cleared and further efforts were continuing to clear/adjust pending advances.

6.1.12 Bank reconciliation

Bank reconciliation for March 1996 revealed following major discrepancies:

(i) In 43 cases pertaining to the period from January 1991 to March 1996 receipts totalling Rs 39.10 lakh were entered in the cash book but did not appear in bank account. Of these, 19 items aggregating to Rs 3.45 lakh were more than one year old.

(ii) Rs 152.03 lakh were debited to RRL account by the bank but corresponding entries were not available in the cash book. Of these, Rs 5.42 lakh pertain to the period 1993-95.

RRL stated, in June 1996, that action was being taken to reduce the differences. CSIR stated, in January 1997, that RRL was making efforts to obtain necessary details from the bank to clear the outstanding debits/credits.

6.2 Central Electronics Engineering Research Institute, Pilani

6.2.1 Introduction

Central Electronics Engineering Research Institute **(CEERI)**, Pilani was set up in 1957 as a national laboratory of the Council of Scientific and Industrial Research (CSIR) to undertake research and development work in electronics. The objectives of CEERI are:

(i) to carry out research and development (R&D) in electronic devices and systems; (ii) to assist industry in technology absorption, upgradation and diversification; (iii) to provide R&D services to industry and users in design, fabrication and testing; and (iv) to provide technical services for specific needs towards product development, precision and quality.

6.2.2 Scope of Audit

The accounts of CEERI are audited under Section 20(1) of the Comptroller and Auditor General's (Duties, Powers and Conditions of Service) Act, 1971. This Audit review is based on test check of records of CEERI for the period 1991-96 and highlights the Audit findings on planning, implementation and monitoring of projects as also on purchase and management of stores.

6.2.3 Organisational set up

CEERI is headed by a Director who is assisted by a Research Council (RC) to advise and recommend formulation of research programmes, conduct periodic review of research activities, assess their progress and give advice on fostering linkage between CEERI and project sponsoring agencies, industry and potential clients. The Management Council assists the Director to manage the affairs of CEERI.

The Institute had 178 scientific, 373 technical and 115 administrative personnel in April 1995 against the sanctioned strength of 206, 394 and 155 respectively. It is financed mainly through funds released by CSIR. Besides, funds in the form of deposits for sponsored/consultancy projects are also received. Against a total receipt of Rs 5186.37 lakh during the period 1991-96, the expenditure was Rs 5063.58 lakh.

6.2.4 Highlights

- **The lone in-house project undertaken in five years during 1991-96 was closed without achieving objectives, after incurring expenditure of Rs 220.26 lakh.**

  CEERI failed to transfer three technologies developed at an aggregate cost of Rs 278.94 lakh to the end-users.

  CEERI failed to realise the objectives set out for two projects costing Rs 353.05 lakh, rendering the expenditure unproductive.

  Additional expenditure of Rs 31.29 lakh incurred on a sponsored project could not be recovered.

  Intellectual fee of Rs 622.81 lakh in respect of 32 projects and manpower cost of Rs 137.25 lakh in respect of three projects were not recovered.

  (Para 6.2.5)

- **Equipment costing Rs 42.94 lakh was installed after completion of the project for which it was procured.**

  20 items of stores costing Rs 62.18 lakh were procured in excess of actual requirement.

  (Para 6.2.7)

6.2.5 Research and development activities

Research & development (R&D) activities of CEERI are carried out through in-house, sponsored, consultancy, grants-in-aid and collaborative projects.

In-house projects

In-house projects, financed entirely by CSIR, are approved by the RC keeping the objectives of CEERI in view. During the period 1991-96, CEERI undertook only one

such project which was a sub-project under the National Superconductivity Programme of the Department of Science & Technology **(DST)**. Phase I of the in-house project envisaged development of transistor like microelectronic superconductivity devices. An expenditure of Rs 162.24 lakh was incurred during Phase I. Phase II of the project envisaged development of thin film, squid electronics, terminal HTSC devices, micro-wave microstrip components and technology of sub-micron/nanometric structures in HTSC films with a proposed outlay of Rs 299.00 lakh during 1992-97. Against the proposed outlay only an amount of Rs 58.00 lakh was provided in the budget by CSIR.

Inadequacy of funds was discussed in the meetings, of various laboratories which had undertaken projects under the programme, held in July 1992 and February 1994 and it emerged from the meetings that though considerable facilities had been added to the laboratories and expertise also developed, the results of activities taken up were far from the stage of exploitation. As such, there was little scope of getting financial support from industry. Consequently, it was felt that DST should be approached for some special funding to supplement the CSIR core funding to continue the in-house project. However, DST closed the programme in September 1995. Following closure of the main programme of DST, the in-house sub-project undertaken by CEERI had also to be prematurely closed.

CEERI stated, in June 1996, that owing to drastic cut in funds and non-availability of required manpower, the planned objectives of project could not be achieved. Consequently, the in-house project did not serve the intended purpose, although a sum of Rs 220.26 lakh had been spent on the project.

CSIR stated, in January 1997, that although the stage of technology transfer had not so far been reached in this area, three-terminal superconducting devices were fabricated and demonstrated and by continuing research with own resources, CEERI has been successful in finding a new application of high Tc films in the field of sensors which is likely to be patented in Germany and India. Besides, some research papers were also published in leading journals. However, the fact remains that in spite of expenditure of Rs 220.26 lakh the intended objectives of the project could not be achieved and it was closed midway.

Sponsored projects

CSIR guidelines provide for classification of externally aided projects into four categories of sponsored, grants-in-aid, collaborative and consultancy projects on the basis of financing pattern, arrangement for ownership, maintenance and sharing of intellectual property rights. Contrary to CSIR's guidelines, CEERI was classifying all projects other than in-house projects as sponsored projects.

In the beginning of 1991-92, CEERI had 22 projects in hand. During the period 1991-96, 38 new projects were undertaken. Of these, while five projects were dropped midway after incurring expenditure of Rs 38.54 lakh, 29 were completed. Remaining 26 projects were in progress at the end of March 1996.

Test check of records of some of the completed projects disclosed the following:

(i) Unproductive expenditure

(a) A Project on "Development of Multilevel Interconnection Technology **(MIT)** for Large Scale Integrated Circuits **(LSIC)**/Very Large Scale Integrated Circuits **(VLSIC)**" estimated to cost Rs 204.68 lakh and financed by the Department of Electronics (DOE) as grants-in-aid was undertaken in March 1988 for completion in three years. The project was aimed at development of multilevel metallisation process suitable for VLSI circuits for stimulating the evolution of complex integrated electronic systems. M/s Semiconductor Complex Ltd **(SCL)** and Indian Telephone Industries **(ITI)** were identified as potential users of the technology. The Project Review and Steering Group **(PRSG)** observed in September 1989 that gate array wafers, required for fabrication of application specific integrated circuits **(ASIC)** using MIT process, were not available from the known source i.e. SCL and suggested that efforts be made to explore their supply from foreign sources. Meanwhile, the project activities were continued as the same did not require any gate array wafer. The project was completed in March 1994 at a total expenditure of Rs 208.90 lakh involving a time overrun of three years. As per completion report, results obtained were satisfactory but the MIT process could not be implemented due to non-availability of gate array wafers. However, PRSG noted in the meeting held in April 1994 that there were some gaps between the work suggested by SCL and the work actually done by CEERI and it directed that the latter should continue to interact closely with Bharat Electronics Limited **(BEL)**/SCL/ITI for effective utilisation of

facility created and expertise generated. But none of the identified users of the process could be pursued to utilise the technology so generated. No patent was filed. CEERI stated, in June 1996, that the technology developed could be utilised on gate array wafers. CEERI's efforts, thus, did not yield the desired results rendering the expenditure of Rs 208.90 lakh infructuous.

CSIR stated, in January 1997, that development of MIT process at CEERI has produced a state-of-art of this technology in India but there is no industry in India for this advanced technology. Although the MIT process was further modified as suggested by SCL but owing to damage to their facility in a fire accident SCL was not in a position to take the know how for device fabrication. The contention of CSIR is not correct inasmuch as the project proposal itself was based on the requirements of Indian industry; SCL and ITI were identified as production agencies after holding discussions with them and as per project completion report also SCL, ITI and BEL could use this process for fabrication of ASICs. Apparently, either the project did not cater to the requirement of Indian industry or the results achieved were not useful enough to attract it. Consequently, the expenditure on project remained unproductive. If SCL was the only user of this technology the project would have been dropped/postponed soon after damage to their facility in 1989.

(b) DOE approved a project on "Development of Technology for BU205/BU208 TV Deflection Transistors" for a period of 18 months at a cost of Rs 31.62 lakh. The project, inter alia, aimed at design and development of technology of producing high voltage and high current transistors for television circuits. The project was started in January 1992 and completed in September 1994 after time overrun of 15 months with a total expenditure of Rs 29.00 lakh.

During the meetings in February 1994 and August 1994 PRSG noted that the leakage current in the devices developed by CEERI was high and needed to be reduced. The compatibility of the process used in the development of this technology with the infrastructural facility available in the country was also discussed and it was noted that BEL, who had shown clear interest for the manufacture of these devices, did not have the facility for TCE oxidation, an essential process involved in CEERI's technology. Besides, the back grinding process before aluminium deposition and drive-in, could create problems like wafer breakage etc. As such, it was felt that it would be more appropriate if the devices were developed with processes that are compatible with the available BEL process line.

CEERI was advised to send the required number of packaged devices and chips of planar type alongwith details of materials used to BEL for further measurement of various parameters of the device and evaluation. CEERI was also advised to send details of the various materials used alongwith their cost to BEL so that the latter could calculate the cost effectiveness of the technology developed. Comments of BEL in the matter were not made available to Audit by CEERI. However, neither any patent for the technology developed had been filed nor the technology could be transferred to any industry as of June 1996. Thus, the benefit from the expenditure of Rs 29.00 lakh on the project was not derived.

CSIR stated, in January 1997, that the devices sent to BEL for testing and evaluation passed all the tests, but for fabrication of these devices BEL required additional facilities requiring additional investment and a decision for such investment depends on them. This contention of CSIR is untenable as the planned device was an import substitute product and the industry, especially in public sector, would always welcome a technically acceptable and cost competitive import substitute product. BEL representative had, in fact, already pointed out in the PRSG meeting in August 1994 that the leakage current was higher than in the devices available in international market and back grinding process before aluminium deposition and drive-in could also create problems and, therefore, impressed upon CEERI that it would be more appropriate if the devices compatible with the BEL process line could be developed. Besides, CEERI also failed to pursuade other public sector undertakings like BHEL, CDIL, MELTRON etc. to commercialise the technology developed by them.

(c) A project on "Development of a photomask information system" with an estimated cost of Rs 48.76 lakh, which aimed to computerise a mask making facility for fabrication of low defect density and high quality masks needed for VLSI and intended to be productionised through SCL, ITI, BEL and other private organisations, was completed in December 1990 with DOE's contribution of Rs 25.00 lakh and CEERI's contribution of Rs 16.04 lakh. The systems developed were demonstrated to pre-identified users for transfer of technology but all of them showed their inability to use the software either due to inadequate computer facility or their inability to spend time in modifying these programs to suit their facility.

Thus, an expenditure of Rs 25.00 lakh, excluding CEERI's contribution of Rs 16.04 lakh for which no separate accounts were maintained, incurred on development of know-how proved unproductive. CEERI stated, in June 1996, that the programs were

used in-house and provided to University of Pune. The primary objective of computerising the mask making facility for fabrication of low defect density and high quality masks could not, however, be achieved.

CSIR stated, in January 1997, that the programs developed were used in-house at CEERI and also transferred to institutional users for academic utilisation and projects. It further stated that SCL was unable to use the programs due to fire accident at their facility and BEL could not install this package due to non-availability of hardware platform at their site. However, the fact remains that the programs developed at a cost of Rs 41.04 lakh could not be used by any of the pre-identified users for production of quality masks needed for VLSI, as envisaged.

(ii) Non-achievement of objectives

(a) A grants-in-aid project on "Design, verification and prototype fabrication of Application Specific Integrated Circuits (ASIC)" estimated to cost Rs 363.42 lakh including DOE's financial support of Rs 241.42 lakh, was undertaken by CEERI in February 1990 for a duration of three years with the objective of developing a facility for prototyping ASIC. SCL was identified as a potential user of the technology. Before approval by DOE, CEERI had clarified that a profile of various ASIC needs had been arrived at by them after discussions with various users in the country. CEERI also committed in August 1989 to establish interaction with SCL for taking up large scale production of ASICs so developed. It further committed itself to serve as an ASIC foundry house by giving atleast 40 percent of its services to outside users and to finalise the exact ASICs to be made for each user within first six months of the commencement of the project.

During a users' meeting organised in September 1992, most of the technology users felt that CEERI's choice of developing "N-well technology" would be incompatible with the SCL's "P-well technology" and any ASIC optimisation/prototyping at CEERI would be difficult to be upscaled for large scale production with SCL's facility using a different process. Consequently, CEERI's efforts at best would turn out to be stepping stone for evolving a technology base and spreading ASIC culture rather than realisation of specific ASIC products. The principal user, SCL, indicated that they were unlikely to use 1.5-3.0 micron CMOS technologies being developed at CEERI as these were already under development/realisation at SCL.

As a result of these deliberations it emerged that the first ASIC data acquisition chip generated under the project would not have much utility to the users present in the meeting and unless CEERI undertook periodic and extensive interactions with ASIC users in the country together with comprehensive market research/survey of the Indian scenario, it would not be possible to realise adequate return on the major investments made to attain viable levels of foundry utilisation. The National Microelectronics Council(NMC) Working Group in their meeting held in April 1993 observed that the scope and objectives set for the project were too exhaustive and most of them had not been achieved. Consequently, there was a need for redefining the objectives. Accordingly, scope of the project was restricted and CEERI was advised to interact with Indian Space Research Organisation (ISRO) and arrive at a mutually agreed specifications of about four circuits of CD-4000 series for space application needed by them. Extension of one year was also granted for completion of the project.

Based on the interaction with ISRO, two chips namely CD 4001 and CD 4050 were designed and one 3 micron CMOS process run was also completed for fabrication of these chips but the yield was found to be extremely low with high defect density. Meanwhile, ISRO expressed their inability to use the technology as BEL had already been coordinating with them for the use of latter's technology. In spite of ISRO's lack of interest PRSG advised CEERI, in the meeting held in April 1994, to supply the two chips developed to ISRO to establish confidence of the user as also the 3 micron prototype fabrication line and to submit the project completion report. After examining the completion report the Chairman of PRSG observed in May 1996 that the chip was not functional but advised CEERI that the concluding remark should indicate that the project had helped CEERI to build up infrastructure and standardise certain process steps which might be useful in ASIC processing. The project was treated as completed in March 1994 with a total expenditure of Rs 221.80 lakh. However, neither the envisaged objectives of the project nor the redefined ones were achieved rendering the expenditure of Rs 221.80 lakh unfruitful.

CSIR stated, in January 1997, that as per ISRO requirement CEERI fabricated two chips and the testing was shown to engineers from ISRO but because of poor yield, these chips could not be packaged and supplied to ISRO. Meanwhile, ISRO indicated that they had tied up with BEL for the supply of these chips. It further stated that the development of this technology has established a base in CEERI laboratory for undertaking future projects in related fields and the facilities are being used for

providing training to students in IC process technology. However, the fact remains that in spite of CEERI's commitment to establish interaction with SCL for taking up large scale production of ASICs, finalise the exact ASICs to be made for each user within first six months of commencement of project and to serve as an ASIC foundry house by giving atleast 40 per cent of its services to outside users, not a single design could be developed and prototyped to the users satisfaction rendering the expenditure of Rs 221.80 lakh infructuous.

(b) A project for the establishment of "VLSI Design Centre for Industrial ASICs" estimated to cost Rs 138.90 lakh was undertaken in January 1987, with financial support of Rs 107.40 lakh from DOE for completion in three years. The balance amount of Rs 31.50 lakh was to be contributed by CEERI. The major technology fallouts from the project envisaged, *inter alia,* a number of production worthy ASIC designs and other VLSI designs that would have an assured user interest for the development of competitive state of the art electronic equipment and systems in the country based on VLSI microchips. SCL and BEL were identified as the production agencies for ASIC chips and BHEL, Defence and P&T as the users for systems incorporating the chips. Besides, a pilot plant production facility at CEERI was also proposed. The project was completed in March 1993 with a time overrun of 38 months and total expenditure of Rs 99.75 lakh, excluding CEERI's contribution of Rs 31.50 lakh for which no separate accounts were kept. Out of the four designs developed by the Centre only one design on "Serial Data Communication Controller" was transferred to the end user i.e. C-DOT. One of the main objectives of setting up the Centre was commercial exploitation of the technology developed by it through pre-identified production agencies. However, it was seen in Audit that the Centre could transfer just one out of four technologies developed by it.

CSIR stated, in January 1997, that though SCL and BEL were identified as production agencies, they were not capable of carrying out the production as SCL facility became non-operational due to a fire accident and BEL's plans for setting up the required fabrication process line did not materialise. The reply of CSIR is not acceptable as the project proposal envisaged not only the development of a number of production worthy ASIC designs and other VLSI designs of assured user interest but also the availability of pilot plant production facility at CEERI itself. Besides, another project for "design, verification and prototype fabrication of ASICs" with estimated cost of Rs 363.42 lakh was also sanctioned in February 1990. Apparently, therefore, CEERI failed to develop a good number of ASIC/VLSI designs of assured user

interest in the country resulting in non-achievement of planned objectives of the project.

(iii) Undue financial benefit

Under a Memorandum of Understanding (MOU) agreed upon between CEERI and BEL in May 1983 for a period of five years, BEL proposed in May 1985 development of an S-band 30 W Travelling Wave Tube **(TWT)** for replacement of imported type TH-9121A in a specific type defence radar system by CEERI As per the project proposal, the project was to be completed in three years at an estimated cost of Rs 58.51 lakh with BEL funding of Rs 29.15 lakh. Under the MOU the direct cost of additional requirement of equipment/instruments, components, materials, travel, salaries of scientific/technical staff and contingencies etc. was to be borne by BEL. Though the direct cost that was to be borne by BEL in accordance with the MOU worked out to Rs 45.29 lakh, CEERI sought a contribution of Rs 22.15 lakh from BEL. BEL, however, agreed to contribute Rs 14.00 lakh only.

The project was completed at the end of 1994. Know-how for fabrication of these tubes was transferred to BEL during May-June 1993. As a result of the failure of CEERI to recover the full amount of direct cost, in terms of MOU, CEERI had to bear the additional cost of Rs 31.29 lakh on the project. In response to an Audit query to intimate the reason for CEERI contributing Rs 44.15 lakh out of the total expenditure of Rs 58.51 lakh towards a project undertaken on a specific request of a commercial organisation, CEERI stated, in May 1996, that as soon as the production would commence the benefits flowing from production would be shared by BEL with CEERI. The contention was not tenable as the MOU did not provide for payment of royalty to CEERI.

CSIR stated, in January 1997, that BEL did not agree to the original proposal and approved final budget of project was Rs 19.00 lakh with BEL share of Rs 14.00 lakh excluding cost of equipment already available in CEERI The contention of CSIR was not tenable as the project proposal included a sum of Rs 19 75 lakh only towards additional capital equipment, excluding the equipment already available in CEERI. Even after excluding the cost of additional equipment, the project cost worked out to Rs 38.76 lakh. The project completion report showed the total project cost as Rs 58.50 lakh including CEERI's contribution of Rs 44.50 lakh. It is, therefore, evident

that by ignoring the terms of the MOU governing cost of the project, CEERI extended undue benefit of Rs 31.29 lakh to BEL.

(iv) Non-recovery of intellectual fee and manpower cost

As per CSIR guidelines issued in August 1989, the charges for all sponsored/collaborative/grants-in-aid projects should include the cost of man-days of staff deployed, consumables/raw materials/components with 25 percent overheads, physical inputs/services/utilities with 25 percent overheads, new equipment/equipment usage cost, external payments, travel, contingencies and the intellectual fee subject to a minimum of 33.3 percent of total expenses. Test check of cases in Audit revealed that these guidelines were not followed while working out the amount to be recovered from the sponsors. In case of 32 projects intellectual fee aggregating to Rs 622.81 lakh was not charged/recovered. It was also found that in three cases manpower cost of Rs 137.25 lakh was not recovered from the concerned sponsors.

CEERI stated, in June 1996, that in spite of their best efforts no government department pays them intellectual fees. Consequently they have to either execute the project without receiving intellectual fee or drop the project. The reply is not convincing as non realisation of intellectual fees from sponsors amounts to non adherence of CSIR's guidelines.

6.2.6 Marketing and liaison

CEERI constituted a Marketing and Liaison Cell **(MLC)** in July 1994 with one scientist, three technical officers and two technicians. The objectives of the MLC were to publicise the infrastructure facilities and the expertise available at CEERI among the entrepreneur and small scale industrial sector to encourage them to approach CEERI for solving their industrial problems and to fetch business activities in the form of technology incubation, product development and services.

During test check of related records it came to notice that of the 20 proposals procured by MLC during October 1994 to March 1996, which were circulated to the scientists of CEERI, only three were approved because of poor response from the scientists. Of these, two could not be executed because of delayed response to the proposers. CEERI stated, in June 1996, that technical services of the value of Rs 0.61 lakh were completed during this period and work for the two orders procured in

January 1996 was in progress. Besides, a consultancy project worth Rs 0.80 lakh was also procured. Considering, however, the expenditure of Rs 8.50 lakh on the salaries of staff deployed for the MLC during July 1994 to March 1996 in addition to travelling and other expenses and the poor response from within CEERI, the objectives of creation of MLC could not be achieved and the venture proved to be economically unviable.

CSIR stated, in January 1997, that linkage with the industry to offer the infrastructure available at CEERI is one of the many activities of MLC assigned to only one staff member. The contention was not acceptable as the primary objective of creation of MLC was to focus the capabilities of CEERI and the expertise available there to the entrepreneurs for fetching business activities and other activities were related to this very object. Failure of CEERI to achieve this objective resulted in unfruitful expenditure.

6.2.7 Purchase and stores

(i) Against an indent received in August 1990 CEERI placed an order only in January 1993 on a foreign firm for supply of Reactive Ion Etch System costing Rs 42.94 lakh. The equipment, required for a project on "Multilevel Interconnection Technology", was received in November 1993. In the absence of infrastructural requirements, the installation was deferred till September 1994. At that time it was discovered that some chemicals and accessories had not been received with the equipment. The installation eventually took place in February 1996 while the project for which the equipment was indented had already been completed in March 1994.

CSIR stated, in January 1997, that the equipment would be used for R&D work. However, the fact remains that failure of CEERI to arrange infrastructural requirements and essential accessories well in time resulted in non-utilisation of the equipment for the project for which it was procured.

(ii) In 12 cases, there were delays in installation of equipment ranging from 6 months to 49 months. Delay in installation of project specific equipment interfered with the progress of projects causing corresponding delay in their completion. Besides, it also reflected ineffective follow-up action on the part of CEERI.

(iii) CEERI held equipment valuing Rs 19.22 crore, besides equipment procured out of project funds which had not been accounted for in the asset register, as of March 1996. However, no log books in respect of major and costly equipment were maintained. In the absence of log books, the extent of utilisation of these equipment could not be ascertained in Audit.

(iv) Test check of the stock registers of CEERI's Delhi Centre revealed that 20 items having book value of Rs 62.18 lakh had never been issued for periods ranging from three to 19 years which indicated that the procurements were made much in excess of the actual requirement. Similarly, 37 items having book value of Rs 15.81 lakh procured during the period 1956 to 1984 were lying unused in the main store.

CSIR stated, in January 1997, that all these items are non-consumables. However, the fact remains that these non-consumables are lying unused for a long time.

(v) Test check of demurrage charges register revealed that demurrage charges/storage charges amounting to Rs 6.50 lakh had been paid during 1991-96 excluding 1994-95.

6.3 Management of Intellectual Property Rights and Technology Transfer

6.3.1 Introduction

The Council of Scientific and Industrial Research **(CSIR)** was established in 1942 to promote, guide and co-ordinate scientific and industrial research, collection and dissemination of information on research and industry etc., and exploitation of industrial research results for development of industry etc.

6.3.2 Scope of Audit

The audit of CSIR laboratories and institutes is conducted under Section 20(1) of the Comptroller and Auditor General's (Duties, Powers and Conditions of Service) Act, 1971. The present review seeks to examine the issues relating to management of Intellectual Property Rights **(IPRs)** and transfer of technology by CSIR during the period 1986 to 1996 in the context of one of its main objectives of translating scientific research to economic exploitation of the R&D efforts. For this purpose, 12 out of

40 laboratories of CSIR, dealing with scientific research in diverse fields covering fuel, buildings, roads, drugs, aromatic and medicinal plants, experimental medicine and toxicology and scientific instruments were selected for Audit. The role of laboratories, in general, and their Research Council **(RC)** in particular, in overseeing that scientific exploration was leading to commercial exploitation of any discovery or invention, which has the potential for being patented, for its eventual transfer to the industry is sought to be examined in this review.

6.3.3 Organisational set up

CSIR is headed by a Director General who is assisted by a secretariat consisting of technical and administrative divisions and units, viz., Planning, S&T Personnel, Technology Utilization, Extramural Research, International Collaboration, Information & Public Relations, Administration and Finance. At the apex level, CSIR Society has the powers of an autonomous organisation. It is fully funded by Department of Scientific and Industrial Research of Ministry of Science and Technology.

CSIR has 40 laboratories/institutes. Each laboratory/institute has a Research Council and a Management Council (MC). RC is to advise and recommend the formulation of research programmes, conduct periodic reviews of the research activities, assess progress of the research programmes, advise on future directions and fostering linkages between the laboratory and academic institutions, other research organisation, industry and potential clients. RC also serves as a professional vehicle for monitoring of resource allocation and their utilisation in each laboratory. The functions of the Technology Utilization Division and the Patent Unit are briefly discussed hereunder:

Technology Utilisation Division

The Technology Utilisation Division **(TUD)** is concerned with (i) promoting the market and utilisation of CSIR's knowledge base, expertise and facilities through enhanced linkages with industrial organisations, consulting and designing organisations, financial institutions and other potential users; (ii) co-ordinating with CSIR laboratories and interfacing the National Research and Development Corporation and other agencies for commercialising CSIR's know-how; (iii) seeking protection for CSIR's know-how vis-a-vis import of technology; (iv) ensuring legal protection to CSIR's intellectual property through legal instruments and drafting of legal agreements for contract research; (v) maintaining information system on CSIR's

research output and its utilisation; and (vi) preparing documentation pertaining to CSIR's research results - their utilisation and impact on various sectors of economy.

Patent Unit

The Patent Unit of TUD, established prior to 1947, secures for CSIR's R&D output, intellectual property rights through obtaining Indian and foreign letters of patents, registration of designs, etc., and guards against infringement of the rights secured. In July 1995 CSIR integrated its 'Planning' and 'TUD' into a single composite entity styled "Research and Development Planning and Business Development Division" (R&D PBDD). Patent Unit was also renamed as "Intellectual Property Management Division" **(IPMD)** in August 1995. All matters relating to management of IPR are dealt with by IPMD.

6.3.4 Highlights

- **Despite creation of Project Monitoring and Evaluation Cells and introduction of Integrated Management and Project Accounting, six laboratories/institutes out of 12 test checked did not maintain project-wise cost relating to in-house projects. NPL did not furnish information in respect of number of in-house, contract/grants-in-aid projects undertaken, completed and expenditure incurred during 1986-96.**

  (Para 6.3.6)

- **Out of 522 Intellectual Properties (IPs) generated by 11 laboratories/ institutes, the contribution of RRL and CDRI was 337, while the generation of IPs by nine laboratories/institutes stood at only 185.**

  (Para 6.3.7)

- **Out of 522 IPs generated by 11 laboratories/institutes, 299 patent applications were filed and 89 were sealed.**

  (Para 6.3.8)

- **During 1986-96, out of 365 IPs generated by 10 laboratories, only 62 (17 per cent) could be transferred to industries and remaining 303 IPs (83 per cent) were yet to be transferred. Out of 187 IPs generated by NBRI, RRL and SERC, not even a single was transferred to industry. While CBRI, CIMAP, CRRI, CSIO,ITRC and IIP developed 150 IPs, 48 IPs (33 per cent) were transferred to industries.**

  (Para 6.3.9)

- **Out of the total realisation of Rs 357.99 lakh on account of premium and royalty during the period 1986-96, CDRI , NPL and CBRI realised Rs 331.55 lakh. The realisation of other laboratories was a negligible component.**

(Para 6.3.10)

- **None of the laboratories/institutes except CDRI followed Good Laboratory Practice.**

(Para 6.3.11)

6.3.5 Identification of research projects

One of the main functions of research establishments is to carry out research directed towards effective utilisation of India's natural resources for economic development of the country. Investigations are undertaken with a view to developing new products, processes and techniques to suit indigenous raw materials. Successful laboratory investigations are carried to the pilot plant stage to establish the feasibility of large-scale manufacture of products and to assess the economics of production.

6.3.6 The position of in-house, contract and grants-in-aid **(GIA)** projects undertaken and completed during 1986-96 is given below :

(Rs in lakh)

Name of Laboratory/ Institute	In- house projects				Contract and GIA projects			
	Undertaken		Completed		Undertaken		Completed	
	No.	Cost	No.	Cost	No.	Cost	No.	Cost
CBRI	139	2158	100	1981	79	451	56	135
CDRI	12	4343	LT	-	53	2263	15	336
CEERI	NA	NA	LT	NA	72	3181	40	1255
CIMAP	57	1548	LT	-	22	248	8	44
CRRI	24	NA	LT	-	42	4644	12	85
CSIO	28	7407	18	362	61	8085	23	330
IIP	72	NA	10	416	324	NA	253	663
ITRC	9	3457	LT	-	99	565	80	458
NBRI	52	NA	14	NA	23	NA	14	139
NPL	NA	NA	NA	NA	NA	NA	NA	NA
RRL	14	NA	2	NA	NA	NA	111	186
SERC	36	NA	15	NA	10	NA	5	41

LT = Long Term, NA = Not Available

This discloses the following position:

- while no in-house project was completed during 1986-96 in CDRI,CEERI, CIMAP, CRRI, and ITRC as these projects were stated to be long term/on-going in-house projects, CBRI, CSIO, IIP, NBRI, RRL and SERC had completed 159 in-house projects during the same period.

- CEERI, CRRI, IIP, NBRI, RRL and SERC did not furnish year-wise expenditure incurred on in-house projects as project-wise costing in respect of in-house projects was not done in these laboratories/institutes in spite of constitution of Project Monitoring and Evaluation **(PME)** Cells in each laboratory/institute in pursuance of CSIR instructions of 1984 and introduction of IT software "Integrated Management and Project Accounting" **(IMPACT)** by CSIR since 1994.

- NPL did not furnish information in respect of the number of in-house , contract and GIA projects undertaken, completed and expenditure incurred during 1986-96.

CSIR, however, modified the figures furnished earlier by CSIO and supplied the following figures, in February 1997:

(Rs in lakh)

Name of Laboratory/ Institute	In- house projects				Contract and GIA projects			
	Undertaken		Completed		Undertaken		Completed	
	No.	Cost	No.	Cost	No.	Cost	No.	Cost
CSIO	28	1701	18	362	61	1819	23	330

6.3.7 Results of research & development projects

The position of IPs expected to be generated and actually generated out of completed and ongoing in-house, contract and GIA projects during 1986-96 is given below:

(Expenditure: Rs in lakh)

Name of Laboratory/ Institute	In-house projects			Contract and GIA projects		
	Number of			Number of		
	Projects/ Expenditure	IPs expected	IPs actually generated	Projects/ Expenditure	IPs expected	IPs actually generated
CBRI	13	21	21	-	-	-
	650			-		
CDRI	10	157	157	-	-	-
	2256			-		
CEERI	NA	NA	7	14	NA	21
	-			238		
CIMAP	24	60	60	-	-	-
	276			-		
CRRI	7	7	7	2	2	2
	NA			10		
CSIO	17	24	14	22	17	17
	342			353		
IIP	5	5	-	15	20	20
	386			110		
ITRC	7	7	7	3	2	2
	6			11		
NBRI	8	8	3	4	4	2
	207			59		
NPL	NA	NA	NA	NA	NA	NA
	-			-		
RRL	14	NA	96	96	96	84
	NA			NA		
SERC	2	2	2	-	-	-
	NA			-		

NA = Not Available

It would be seen from the above table that:

- only 522 IPs were generated/developed by 11 laboratories/institutes during 1986-96. Out of these, 337 IPs were developed by RRL and CDRI only.

- NPL did not furnish particulars of projects out of which IPs were expected and actually generated/developed.

- out of nine laboratories/institutes, four could develop only two to nine IPs, another four developed 20 to 31 IPs and remaining one developed 60 IPs.

- though CBRI, CDRI, CIMAP and SERC completed 56,15,8 and 5 contract projects including GIA projects respectively during 1986-96, these did not generate even a single IP.

CSIR stated, in February 1997, that it was not necessary to develop IPs per se under GIA projects. The reply of CSIR is not convincing as IPs were developed under GIA Projects by CEERI, CRRI, CSIO, IIP, ITRC, NBRI and RRL.

The following four laboratories/institutes generated less than the expected number of IPs as indicated below:

(IPs in number)

Name of lab/instt.	**Type of projects**	**IPs expected**	**IPs actually developed**
CSIO	In-house	24	14
IIP	In-house	5	NIL
NBRI	In-house	8	3
	Contract/GIA	4	2
RRL	Contract/GIA	96	84

- IIP stated that the five technologies at laboratory scale had been generated in 1994-95 but development of full technology would be considered if and when a sponsor industry came forward for accepting the technology. The reply of IIP is suggestive of the fact that either the projects are taken up without examining whether there were any takers of the technology being developed by the institute or their interface with the industry is weak. Failure to attract any sponsor for development of full technology raises a question mark on the actual utility of the results of their research findings.

CSIR stated, in February 1997, that out of five technologies developed, three technologies, namely, naphtha hydrotreater, anti-oxidants and polymethyl methacrylate had since been licensed by IIP and efforts to commercialise other technologies were underway. CSIR, however, did not indicate whether IIP had received any premium/licence fee/royalty as a result of transferring the technologies to the users.

- CDRI generated 157 IPs out of ten long term in-house projects by incurring expenditure of Rs 2256 lakh. Out of these, nine process/technology/know-how of new drugs had been developed by CDRI during 1986-96.

Explaining that development of a new drug is a complex and time consuming pursuit, CDRI stated in June 1996 that internationally one out of 10,000 compounds and 100 patents has the prospect of becoming a new drug. Out of 27,000 compounds synthesised and 4,000 plant extracts screened by CDRI, 340 patents had been filed (157 filed during 1986-96). Of these, five compounds and four plant extracts were in different phases of clinical development. Two compounds viz. Centchroman and Centburidine and one plant product called Gugulipid have been approved for marketing as drugs. It was further clarified that the time taken for development of a new drug could take from 10 to 15 years.

- It was observed in Audit that one GIA project "Use of liposome encapsulated chelating drugs for metal detoxification" was undertaken from November 1989 to October 1991 by ITRC. Though the project resulted in the development of a new process, it was not regarded as IP by ITRC and, consequently no steps were taken for filing patent application. ITRC stated, in July 1996, that the generation of IP under GIA project was not envisaged and, hence, no IP was mentioned as expected/generated. ITRC further stated that, as the results of the project had since been made public, patent application cannot be filed. The reply is not entirely convincing in asmuch as it is suggestive of the fact that patentability of the IP had not been considered by the Centre before making the research findings public.

6.3.8 Year-wise position of patent application filed and sealed by each laboratory/institute during 1986-96 is given below :

Name of lab./institute	Number of		
	IPs generated	Patent application filed	Patent granted/ sealed
CBRI	21	14	2
CDRI	157	157	57
CEERI	28	17	3
CIMAP	60	22	18
CRRI	9	8	1
CSIO	31	5	2
IIP	20	16	2
ITRC	9	8	NIL
NBRI	5	NIL	NIL
NPL	NA	34	6
RRL	180	51	4
SERC	2	1	NIL
TOTAL	522	333	95

NA = Not Available

The following position emerges from an analysis of the statement:

- During 1986-96, out of 522 IPs generated by 11 laboratories/institutes (excluding NPL), 299 patent applications were filed and 89 sealed.

Reasons for non-filing the patent application were furnished only by CIMAP, CEERI and NBRI. CIMAP and NBRI stated that plant/agro based IPs were not patentable under Patent's Act, 1970. CEERI stated, in August 1996, that it was not possible to file patent application in each case. CEERI, however, did not explain why most of their research findings regarded by them as IP were not worthy of being patented for commercialisation of their R&D efforts.

- CSIO, RRL and CEERI had generated 31, 180 and 28 IPs but the patent applications were filed in 5, 51 and 17 cases only. An extremely small number of IPs qualifying even for patent application reflects on the efficacy of their R&D efforts.

- CSIR issued guidelines in 1984, which, *inter alia,* stipulate forming of a Executive Committee to decide/consider filing of patent application. However, the Committee was not formed till March 1996. Laboratories/Institutes stated that IPR Committee had since been constituted in pursuance of recent instructions issued by IPMD, CSIR in April 1996.

CSIR guidelines also provide for filing of patent application as soon as an idea or the nature of invention is conceived. But no patent application with provisional specification had been filed by the laboratories/institutes except CBRI, CDRI, CEERI, CSIO, IIP and NPL.

6.3.9 Development of technology

The position of IPs generated/developed and transferred/ released to industries by the various laboratories/institutes, directly or through National Research and Development Corporation **(NRDC)** during 1986-96 is indicated below:

Name of lab./institute	Number of IPs				
		Transferred to Industries			
	Developed	Directly	Through NRDC	Total	Not transferred
CBRI	21	5	2	7	14
CDRI	157(9drugs)	9	-	9	-
CEERI	28	13	1	14	14
CIMAP	60	19	-	19	41
CRRI	9	2	-	2	7
CSIO	31	9	2	11	20
IIP	20	6	-	6	14
ITRC	9	3	-	3	6
NBRI	5	-	-	-	5
NPL	NA	NA	NA	22	NA
RRL	180	-	-	-	180
SERC	2	-	-	-	2
TOTAL	522	66	5	93	303

NA = Not Available

- Out of 365 of IPs developed by ten laboratories/institutes (excluding CDRI and NPL), only 62 could be transferred/released to Industries etc. during 1986-96 rendering the bulk of IPs of little use to the industry. Thus 17 per cent of the total

generated IPs could be commercialised and used by industries/public and remaining 83 per cent were still lying idle with concerned laboratories/institutes. While 57 IPs were transferred directly by laboratories/institutes, only 5 were transferred through NRDC.

- NBRI, RRL and SERC had developed five, 180 and two IPs respectively but could not transfer even a single IP during 1986-96 to industry.

- CBRI transferred only seven out of 21 IPs generated by it during 1986-96. Explaining the reasons for not transferring most of their IPs, CBRI stated that while transfer of technology was under process in some cases, pilot study was being conducted in some others. In other cases non-transfer was attributed to lack of enough publicity and pendency of the patent application before the competent authority.

The reply of CBRI is not tenable since CBRI had already transferred the IPs for commercialisation even before obtaining patent rights from the Patent Office.

- As regards CEERI, of 28 IPs generated by the institute, only 14 could be transferred during 1986-96. CEERI stated that in six cases spinoff processes were isolated. It was further contended CEERI that the institute was expected to provide assistance to small scale sector industries to which the cost of patenting cannot be transferred. No reason for their inability to transfer the remaining eight IPs was furnished.

- CIMAP transferred only 19 out of 60 IPs generated during 1986-96. Bulk of these 19 IPs were transferred to ordinary farmers in the form of sale of seeds and plants at fixed rates. While 3 IPs were stated to be awaiting clearance from the Drug Controller of India (DCI), efforts were on for transfer of 9 IPs developed during 1991-96. No reasons for their inability to transfer the rest of IPs for commercial exploitation was furnished by the organisation.

- In the case of CRRI only two of the nine IPs generated during 1986-96 could be transferred. CRRI stated, in July 1996, that no party had shown interest to buy the remaining seven IPs.

- Of the nine IPs generated by ITRC during the decade only three had been transferred. It was stated by the organisation that while one IP was not found to be commercially viable, action was afoot in some others for patenting through NRDC.

- It was seen in Audit that, in the absence of proper monitoring by RCs in most of the laboratories/institutes, while the projects had been consuming resources - both financial and human - the utility of IPs sufferred from lack of critical assessment of the RCs from the point of view of their commercial exploitation.

- CSIO,IIP, NBRI and SERC did not explain their failure to transfer the IPs for commercial use.

From analysis of the responses received from the various laboratories/institutes it is quite apparent that the failure of most of them to transfer technology to the industry was mainly attributable to the fact that their clients perceived these technologies as uneconomical, obsolete or unviable.

CSIR stated, in February 1997, that commercialisation of a technology depended, inter alia, on market/demand conditions which are liable to change with time and with government policies. CSIR, however, conceded that the most of the technologies developed and transferred to the sponsors could not be commercially exploited by them due to reasons such as changed market conditions, financial difficulties etc. CSIR's response, thus, corroborates the Audit observation that most of the technologies developed by these laboratories could not be translated into business.

6.3.10 Licence fee, premium and royalty

i) During the period 1986-96, only a sum of Rs 357.99 lakh was realised by eight laboratories/institutes on account of premium and royalty. Out of this CDRI alone realised Rs 281.35 lakh, while NPL and CBRI recovered Rs 50.20 lakh, five laboratories/institutes earned premium and royalty ranging from Rs 2.30 lakh to Rs 8.16 lakh only. NBRI, RRL and SERC drew a complete blank. No information about the amount realised was made available by CEERI.

Rs 24.25 lakh (CDRI - Rs 7.50 lakh, IIP - Rs 6.75 lakh, ITRC - Rs 5 lakh and NPL - Rs 5 lakh) was outstanding as on 31 March 1996 on account of licence fee/premium

against the industries to which the IPs, comprising technical know-how or process, had been transferred by the various laboratories/institutes.

ii) Non - receipt of licence fee

a) ITRC transferred know-how relating to "Electronic Controlled Device for Uninterrupted Supply on Conventional and Non-conventional Sources of Electrical Energy" (Mobile Lab) to two firms/industries during 1990-91. But no bank guarantees were obtained, though there was a clause in the agreement. Failure of ITRC to obtain bank guarantee resulted in non realisation of deferred payments of Rs five lakh from 1991-96.

While accepting the facts, ITRC stated, in July 1996, that reminders had been issued to the concerned industries/firms for depositing the outstanding premium/licence fee and royalty.

b) NPL did not furnish satisfactory reply to explain their inability to recover Rs 5 lakh representing the outstanding amount of premium.

c) CDRI did not recover the outstanding royalties in respect of six drugs transferred to industry. CDRI stated, in August 1996, that in three cases the firms/parties had dropped their idea or were not interested to start the commercial production. In one case the government had controlled the price as the drug had been included in the National Family and Welfare Programme and therefore royalty was not being received from the firm. CDRI stated, in August 1996, that reminders had been issued to concerned three industries/firms for depositing the outstanding premium/licence fee and royalty.

iii) Review of IPs licensed

As per guidelines issued by CSIR, annual review of IP licensed including follow-up with the licensee, is required to be conducted by each laboratory/institute (in association with the NRDC/Technology Transfer Agency) for assessment of their utilisation status. This exercise is intended to review whether any technological modification or further development was necessary and to consider change in terms and conditions of its licensing to the beneficiaries.

It was observed in audit that the prescribed annual review was not being conducted in the various laboratories/institutes. Consequently, no mechanism existed to follow up the transfer of technology with licensee and getting feed back from industry/end users/public.

CSIR stated, in February 1997, that the laboratories had since established Business Development and Marketing Groups with functions and responsibilities which include collection of premium/royalty and reviewing of licensed IPs. CSIR added that collection of royalty/premium was expected to improve when these groups become fully operational.

6.3.11 Absence of good laboratory practice

Good laboratory practice (GLP) envisage proper documentation of all activities of a research project. CSIR issued guidelines in 1984 prescribing clear and proper records of daily work done by all scientists engaged in R&D work. Proper documentation of R&D work facilitates the establishing of the approximate date of conception of an invention and enables the scientist in exercising his own right for inclusion of his name as an inventor if and when the invention is granted patent. This also could assist in determining the ownership of the technology in the event of any dispute.

It was observed that no such documentation was being done by any of the scientists in all the laboratories/institutes reviewed in Audit except CDRI.

CSIR stated, in February 1997, that it had initiated action to establish GLP in selected laboratories dealing with biological and chemical sciences. CSIR also stated that consultants are being identified to assist in establishing GLP in these laboratories.

Conclusion

To sum up, failure of laboratories/institutes to ascertain the state of art of the relevant R&D programmes, before the commencement of R&D projects, both in respect of Indian and foreign patents, and lack of effective interface with industry resulted in considerably low generation of IPs and a miniscule number of patents were secured during the last decade and very few of these patents proved to be of any commercial value to the economy.

CSIR stated, in February 1997, that it has been and continues to be the largest filers of patents in India and attributed the low utilisation of IP outputs to the weakness of the Indian industry to exploit the IPRs developed by CSIR laboratories.

6.4 Unfruitful expenditure on abandoned project

CFRI suo moto undertook a project on the presumption that it would be sponsored by the Department of Power. By the time the Department said `no', CFRI had already incurred wasteful expenditure of Rs 32 lakh before abandoning the project.

The Central Fuel Research Institute **(CFRI)**, Dhanbad, submitted a project to Council of Scientific and Industrial Research (CSIR) in February 1993 under National Mission Project "Pithead Beneficiation, Hydraulic Transport and Slurry Combustion for Power Generation" under clean coal technology programme of the Department of Power, involving multi organisational participation between CSIR laboratories and other organisations for onward transmission to the Department of Power.

As per the extant instructions, the CSIR laboratories can undertake sponsored projects only after approval of the sponsoring agency.

Notwithstanding this, CFRI undertook the project in April 1993 without the approval of the sponsoring agency i.e. Department of Power and without specific approval by CSIR . 34 scientists were engaged on this project, who worked on it for about one and a half years, when the CFRI abandoned it in October 1994 since the Department of Power did not approve their proposal. During this period, CFRI spent Rs 32 lakh on pay and allowances of the scientists engaged on this project.

Thus, undertaking of the project by CFRI in disregard of the established procedure in CSIR rendered most of the expenditure of Rs 32 lakh on the pay and allowances of the scientists unproductive.

The case was referred to the Council in August 1996; their reply was awaited as of December 1996.

6.5 Failure to instal Fatigue Testing System

Failure to take effective action to provide infrastructure for installation of Fatigue Testing System resulted in non installation of the equipment imported in April 1994 at an expenditure of Rs 40.46 lakh

Structural Engineering Research Centre **(SERC)**, Ghaziabad placed purchase order on a foreign firm to import Fatigue Testing System **(FTS)** in March 1992 at a cost of Pound Sterling 74100 equivalent to Rs 34.80 lakh for setting up a facility for Dynamic-cum-Heavy Testing **(DHT)** Laboratory at SERC. The system was received in April 1994 at a cost of Rs 34.69 lakh. SERC also procured indigenous components of FTS in March/April 1994 at a cost of Rs 5.77 lakh.

The system was to be installed in the DHT Laboratory building. The construction of this building was awarded to Uttar Pradesh Rajkiya Nirman Nigam **(UPRNN)** in February 1989 and was to be completed by May 1992. However, the construction of the building could not be completed as envisaged due to delays in finalisation of designs and in release of advance payments to UPRNN by SERC for about two years. SERC allowed extensions for completion of work by August 1994. Even though UPRNN failed to complete the work as of October 1996, SERC neither took effective action to get the work completed from other agency nor terminated the contract with UPRNN. Thus, failure of SERC to take suitable measures resulted in non-installation of FTS costing Rs 40.46 lakh since April 1994, rendering expenditure unproductive.

The case was referred to Council in August 1996; their reply was awaited as of January 1997.

6.6 Delay in commissioning of imported equipment

Equipment imported for a specific project was not commissioned during its execution due to non-replacement of damaged parts.

National Metallurgical Laboratory **(NML)**, Jamshedpur placed an order on a foreign firm in March 1991 for supply of a system (Logitech RS-4) at a cost of Rs 9.61 lakh. The system was intended for use in a research project "Benefication and purification of

tungsten ores" sponsored by the Defence Research and Development Organisation (DRDO).

The equipment arrived at Calcutta Port in August 1991 and was cleared in February 1992 after a joint survey was conducted by representative of NML with the agent of supplier and the insurance company. The steamer agent rejected the request for survey as time-barred. The delay resulted primarily from NML's failure to send complete documents in time to facilitate customs clearance.

The survey revealed that some components valued approximately at Rs 2.18 lakh were received in damaged condition. The equipment was transported to NML in February 1992. NML did not lodge an insurance claim since the original insurance policy was missing from their Calcutta office.

NML approached the supplier in June 1993 for replacement of the damaged parts. The supplier declined free replacement on the ground that the cost of items was too high and advised NML to lodge a claim with the insurance company. There was no warranty clause in the supplier's quotation or in the purchase order eventhough in the technical literature supplied with the quotation there was a clause that every Logitech machine system purchased had a twelve months warranty and during the warranty period, should the need arise, replacement parts would be provided and repairs carried out free of charge. The project for which the equipment was procured was completed in the meantime in December 1993 with the available manually operated equipment.

To get the machine operational, NML decided in September 1994 to procure the damaged item at a cost of Rs 2.20 lakh from the supplier out of its Laboratory Reserve but no purchase order was issued. After a lapse of 34 months from the date of survey, NML lodged an insurance claim in December 1994 for Rs 2.50 lakh with the duplicate Insurance Certificate. The claim had remained unsettled as of November 1996.

Pursuant to the Audit observation, Director, NML ordered in-house repair of the equipment in August 1996. The in-house repair cost NML Rs 0.44 lakh representing mainly man power cost and the equipment was commissioned in August 1996.

The Council stated, in December 1996, that delay in clearance occurred on account of protracted correspondence for obtaining the Customs Duty Exemption Certificate. The Council further stated that the agency commission of Rs 0.39 lakh had not been

paid to the Indian agent. However, withholding of agency commission was a small compensation in the context of the unproductive expenditure of Rs 9.61 lakh. The Council was also vague about future use of the equipment.

Thus, NML's failure to lodge claim with the insurance company in time and inaction in getting the repair work carried out, the equipment purchased at a cost of Rs 9.61 lakh lay in damged condition for nearly five years. Moreover, owing to its damaged condition, the equipment could not be utilized in the project for which it had specifically been imported, the project having been completed two and a half years ago.

6.7 Irregular subsidy

Failure to get a separate low tension supply for the staff quarters resulted in irregular subsidy to the employees.

Central Leather Research Institute **(CLRI)**, Chennai gets high tension electricity from Tamil Nadu Electricity Board **(TNEB)** for its office premises. Initially, when the rates for the high tension supply were lower than the domestic rates, CLRI extended the supply to the staff quarters also and occupants were charged at the same rates as applicable for the high tension supply. TNEB raised, from time to time during 1980-96, the rates for high tension and low tension (domestic) supply. The average rate per unit for high tension supply thus increased from Rs 0.70 in 1980 to Rs 2.85 in 1996 and that for domestic supply from Rs 0.65 in 1980 to Rs 1.40 in 1996. However, during this period CLRI had been recovering electricity charges from occupants of the staff quarters at the rates applicable to low tension supply while paying TNEB at the rates applicable to high tension supply. The Institute has, thus, been unnecessarily subsidising the employees for their domestic use of electricity by not obtaining low tension domestic supply line for the staff quarters. The irregular subsidy on the account during the period from April 1991 to March 1996 itself aggregated to Rs 28.29 lakh.

The Council stated, in January 1997, that CLRI has since taken up the matter with TNEB to get a separate low tension supply for staff quarters.

6.8 Recovery at the instance of Audit

National Aerospace Laboratories recovered Rs 13.25 lakh in two cases after being pointed out by Audit.

National Aerospace Laboratories included estimated charges for freight and insurance in the Letter of Credit opened in December 1993 for import of a computer system. However, scrutiny by Audit in September 1994 revealed that as per the terms and conditions of supply order, actual cost of freight and insurance was payable by the Laboratory. Upon being pointed out by Audit, the Laboratory ascertained the actual cost of freight from the supplier and got a refund of US $ 14859.53 equivalent to Rs 5.16 lakh towards excess payment made to them in December 1995.

In another case, scrutiny by Audit disclosed that the Laboratory charged concessional licence fee from the State Bank of India for accommodation allotted in its campus since April 1984 in contravention of policy of CSIR to charge market rent from banks which cater to the banking needs of the general public also in addition to those of the Laboratory and its employees. Upon being pointed out by Audit in August 1992 Laboratory levied market rent from April 1984 and realised arrears of Rs 8.09 lakh on account of difference between market and concessional rent for the period April 1984 to December 1994.

Chapter VII

7.1 Follow up on Audit Reports

Lok Sabha Secretariat issued instructions in April 1982 to all Ministries requesting them to furnish notes, indicating remedial/corrective action taken by them, to the Ministry of Finance (Department of Expenditure) on various paragraphs, contained in the Audit Reports, as soon as they were laid on the table of the House duly vetted by Audit. The Public Accounts Committee reviewed the position of submission of Action Taken Notes **(ATNs)** during 1995-96 and expressed concern over the inordinate delay in submission of ATNs by various Ministries. The Committee, in their One Hundred Fifth Report of 1995-96, inter alia, recommended that in future the ATNs should be submitted within three months from the date of communication of selection of subjects.

A review of the position regarding receipt of ATNs on paragraphs included in the various Audit Reports upto the period ended 31 March 1995 revealed that, as of February 1997, the Ministries of Mines and Non-Conventional Energy Sources had not submitted the remedial/corrective ATNs on following four paragraphs:

Ministry	**No. of Paragraphs for which ATNs are awaited**	**Audit Reports to which Paragraphs indicated in column 2 pertain**
Mines (Geological Survey of India)	1	1993-94
Non-conventional Energy Sources	2	1994-95
Indian Council of Agricultural Research	1	1994-95

ATNs on the above paragraphs were outstanding in disregard to general instructions issued by the Lok Sabha Secretariat and the Ministry of Finance for prompt submission of the ATNs.

(T. K. SANYAL)
Principal Director of Audit
Scientific Departments

New Delhi
The 4 APR 1997

Countersigned

(V. K. SHUNGLU)
Comptroller and Auditor
General of India

New Delhi
The 4 APR 1997

APPENDICES

Appendix I

Outstanding Utilisation Certificates

(Reference - Paragraph No. 1.2)

(Rs in lakh)

Ministry/Department	Period to which grant relates	Number of utilisation certificates outstanding at the end of March 1996	Amount
Atomic Energy	1985-86	1	1.50
	1987-88	1	0.86
	1989-90	2	0.57
	1990-91	2	1.14
	1991-92	2	3.51
	1992-93	3	1.82
	1993-94	8	7.84
	1994-95	15	22.38
	Total	34	39.62
Environment and Forests	1980-81	25	33.90
	1981-82	85	48.31
	1982-83	92	165.75
	1983-84	256	271.53
	1984-85	250	422.76
	1985-86	281	795.65
	1986-87	268	1967.04
	1987-88	610	11683.23
	1988-89	589	3772.23
	1989-90	776	483.16
	1990-91	176	303.11
	1991-92	112	1748.64

	1992-93	297	3471.44
	1993-94	140	192.96
	1994-95	308	1687.32
	Total	4265	27047.03
Ocean Development	1983-84	26	250.97
	1984-85	30	25.61
	1985-86	66	53.40
	1986-87	51	85.91
	1987-88	39	398.45
	1988-89	92	195.45
	1989-90	170	828.89
	1990-91	56	512.58
	1991-92	117	1570.71
	1992-93	18	13.91
	1993-94	84	1258.67
	1994-95	115	924.19
	Total	864	6118.74
Space	1976-77	1	0.05
	1977-78	1	0.15
	1978-79	2	0.08
	1979-80	2	0.21
	1980-81	5	0.72
	1981-82	7	4.63
	1982-83	21	7.33
	1983-84	13	3.77
	1984-85	29	7.73
	1985-86	15	3.28
	1986-87	17	5.73
	1987-88	16	7.79
	1988-89	11	10.73
	1989-90	5	3.33
	1990-91	7	7.84
	1991-92	10	12.95

	1992-93	13	22.59
	1993-94	30	40.15
	1994-95	47	247.72
	Total	252	386.78
Geological Survey of India Ministry of Mines	1991-92	3	0.30
	1992-93	3	0.20
	1993-94	2	0.10
	1994-95	3	0.30
	Total	11	0.90
Electronics	1983-84	22	61.21
	1984-85	55	152.50
	1985-86	33	85.54
	1986-87	46	218.17
	1987-88	46	279.04
	1988-89	78	922.61
	1989-90	174	2552.24
	1990-91	148	2319.61
	1991-92	206	2835.68
	1992-93	181	3156.37
	1993-94	228	2851.02
	1994-95	271	5074.87
	Total	1488	20508.86
	Grand Total	**6914**	**54101.93**

Appendix II

Outstanding Action Taken Notes

(Reference - paragraph No. 7.1)

Sl. No.	Report No. and years	Chapter of the Report	Para No.	Pertains to	Brief Subject
1.	6 of 1995	VII	6.1	Geological Survey of India	Avoidable Payment of Customs duty
2.	6 of 1996	III	3.1	Ministry of Non-conventional Energy Sources	Audit review on National Programmes on Improved chulhas
3.	6 of 1996	III	3.2	- do -	Wasteful expenditure
4.	6 of 1996	IV	4.1	Indian Council of Agricultural Research	Audit review on Indian Agricultural Research Institute