



सत्यमेव जयते

**Report of the
Comptroller and Auditor General
of India**

for the year ended March 1998

**Union Government
(Scientific Departments)
No.5 of 1999**

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OVERVIEW

The expenditure on Scientific Departments during 1997-98 was Rs 7417 crore. This represented an increase of 36 *per cent* over the last two years. Of the total expenditure on Scientific Departments, a major part of Rs 2909 crore related to Department of Atomic Energy followed by Department of Space, which accounted for an expenditure of Rs 1051 crore. With reference to the budget allotment, all the Scientific Departments ended up with an overall unspent balance of Rs 581.69 crore. The Departments of Atomic Energy, Space, Environment and Forest and Non-conventional Energy Resources spent Rs 159.41 crore, Rs 120.61 crore, Rs 140.76 crore and Rs 113.21 crore less than the allocation respectively.

This report contains four performance reviews and thirteen paragraphs. An overview of audit findings contained in the report is given below.

Reviews

Department of Atomic Energy

Nuclear Power Profile

The Nuclear Power Profile envisaged by the Department of Atomic Energy way back in 1984, aimed addition of 7880 MW¹ of nuclear power by the end of year 2000 with an objective of increasing the total nuclear power generation in the country to about 10000 MW.

As per the plan, the plants were to be completed to add generation capacity of 940 MW by 1995-96, gradually increasing every year thereafter to reach the target of 7880 MW by the end of 2000. The sluggish execution of the project by the Department of Atomic Energy and Nuclear Power Corporation has rendered it impossible to achieve the target. Department of Atomic Energy has not been able to complete even a single plant till the end of March 1998. Thus no additional capacity of nuclear power had been added till 1997-98 against the target of 2645 MW. Until 1997-98, even the sanctions for only six plants with aggregate generation capacity of 1940 MW had been given.

Four plants with capacity of 940 MW, which were sanctioned in 1986 and 1987, and were scheduled to be commissioned in 1995-96, had not been completed till March 1998. Two other plants of 500 MW each were sanctioned in 1991. The sanction for remaining 14 plants, with combined total capacity of 5940 MW had not been accorded as of March 1998.

The allotments of funds for the "Profile" were nowhere near the requirement. Up to March 1998, Department of Atomic Energy had provided only Rs 2617 crore against the projection of about Rs 15000 crore.

¹ Megawatt

The manner of execution of the project led to a mismatch between procurement of material and other important inputs such as civil works, equipment and other infrastructure etc. As a result, material procured hastily for Rs 1069.61 crore, much in advance was lying unutilised for the past up to nine years. Of this, the material worth Rs 523.86 crore related to plants, which had not yet been sanctioned. Some of the material had not even been stored properly. Substantial part of this material may have to be disposed of as scrap.

(Paragraph 2.1)

Department of Space

National Remote Sensing Agency, Hyderabad

National Remote Sensing Agency acquires data from Indian and foreign satellites for providing operational resource survey services to users by utilising modern remote sensing techniques.

Though there has been continuous increase in the collection of data year after year, the sale/utilisation of data had not kept pace with the collection. While the NRSA controls the Indian use of the IRS series and no recurring payment is required, it has to pay the accession and distribution fees for use of LANDSAT and ERS satellite. NRSA was unable to recover the annual fee paid to foreign satellite owners from the sale of data collected.

NRSA was unnecessarily maintaining two aircraft for aerial survey, which are carried out on specific requests from the users even though they did not have sufficient demand for utilisation of even one aircraft. One of the aircraft was purchased at Rs 13.84 crore in February 1997 ignoring the decreasing demand during the preceding four years.

Department of Space released grants-in-aid to NRSA, even though it had the large accumulated unspent balances. As a result of unnecessary release of funds by the Department of Space during each of the years between 1992-93 and 1997-98, NRSA held unspent balance of Rs 27 crore to over Rs 49 crore at the end of every year.

NRSA was required to provide action plan for development of 247 areas in different districts under the project "Remote Sensing Application for Management of Natural Resources". It could provide action plan only for 40 *per cent* areas in nine years of its operation.

(Paragraph 3.1)

Council of Scientific and Industrial Research

Central Scientific Instruments Organisation, Chandigarh

Central Scientific Instruments Organisation (CSIO) established to undertake design and development of scientific and industrial instruments and to develop techniques for sophisticated facilities completed only two in-house and 33 grants-in-aid projects in a span of five years during 1993-98. Both the completed in-house projects suffered time over run of 24 and 44 months respectively, while the remaining five in-house projects were also behind their schedule. Completion of many grant-in-aid projects was also delayed.

CSIO filed patents for only three of the 48 technologies developed at Rs 17.60 crore. None of them was sealed. Only 12 technologies developed at Rs 4.86 crore had been transferred for commercial exploitation at a premium of Rs 8.20 lakh. CSIO's main objective of indigenous design and development of sophisticated instruments has not been met since the users did not show interest in the technologies developed by it.

In a UNDP assisted project, aimed at developing and fabrication of seven instruments at \$ 2.5 million, only five instruments were developed at \$ 1.93 million. None of these instruments had been released to the production agencies.

In five of the nine grant-in-aid projects test-checked, the objectives were not achieved. There were delays of 36 to 51 months in completion of on-going six projects.

Although three companies were interested in obtaining the know-how developed under the project of Integrated System for Water Management, the technology had not been transferred. Similarly, CSIO did not transfer the technology developed for Atomic Force Microscope though a manufacturing firm was interested for taking the know-how as early as October 1995.

(Paragraph 4.1)

National Metallurgical Laboratory, Jamshedpur

NML² Jamshedpur carries out research and development works in fundamental and applied metallurgy for their potential application in Indian mineral and metal industries.

NML filed patents in 44 cases only out of 259 projects completed during 1993-98. Prior to this, it had filed 35 patents during 1988-92. NML failed to seal even a single patent out of the total 294 filed by it during 1988-98.

The technology developed by NML was not made available in packages to meet the need of the users. Test-check disclosed that research output of 24 projects completed at Rs 64 lakh during 1993-96 was not transferred to industry.

The technology developed for beneficiation and purification of tungsten at Rs 2.74 crore was not utilised as the economic viability of the technology developed was not ensured.

(Paragraph 4.2)

² National Metallurgical Laboratory

Transaction Audit Findings

Department of Atomic Energy

Undue Benefit to a Joint Sector Company

Department of Atomic Energy revised compensation payable to Southern Petrochemical Industries Corporation Limited for routing Ammonia produced by them through the Heavy Water Plant much beyond the ceiling prescribed in the agreement. While revising the compensation payable to this firm, the Department of Atomic Energy ignored the corresponding revision of the the amount receivable from this company towards Ammonia through additional capacity set up by the Government. This resulted in unintended benefit of Rs 1.22 crore to the company

(Paragraph 2.2)

Retention of an uneconomical motor launch

Department of Atomic Energy did not decide on the issue of retention of an uneconomical motor launch maintained by BARC for more than seven years. Meanwhile, Rs 57.07 lakh had been incurred during 1991-98 on its operations.

(Paragraph 2.3)

Council of Scientific and Industrial Research

Extra expenditure on defective design

National Institute of Oceanography appointed an architect for construction of an auditorium with roof having shell appearance. Due to faulty structural design, the roof of the auditorium developed cracks during construction. As per the estimate Rs 33.69 lakh will be needed for rectification of the defects.

(Paragraph 4.4)

Indian Council of Agricultural Research

Avoidable expenditure on procurement of module

National Bureau of Plant Genetic Resources had ample spare capacity for storage of germplasm of plants. Despite this, the Bureau procured a new cold storage module at Rs 29.98 lakh for a project, the requirement of which could be managed within existing storage capacity.

(Paragraph 5.1)

Indian Council of Medical Research

Failure to prepare nutrition profile

Indecisiveness of National Institute of Nutrition and Department of Women and Child Welfare for over four years led to delay in preparation of nutrition profile, which could be prepared for only one state by 1997 against the target of ten states. In the intervening period, the estimated cost of preparation of ten profiles increased from Rs 50 lakh to Rs 1.26 crore.

(Paragraph 6.1)

Ministry of Environment and Forests

Failure to conserve rare species of plants

Indian Botanical Garden, Howrah did not take effective action under a project sanctioned in September 1993 for conservation of bio-diversity. Only 10 of the 2000 species of flowering plants, that are likely to become rare or threatened by 2000 AD, were preserved by it.

(Paragraph 8.1)

Non-utilisation of training facility

The number of candidates provided training in the three State Forest Service Colleges at Coimbtore, Dehradun and Burnihat, set-up by the Ministry for providing training to the in-service officers of the Indian Forest Service was far less than their capacity. The Ministry did not take effective measures to attract the sponsorship from the states or review the need for continuance of all of them to avoid waste of resources.

(Paragraph 8.2)

Ministry of Mines (Geological Survey of India)

Residential quarters lying vacant

Due to inaccurate assessment of the requirement of residential accommodation, 260 of the 428 quarters constructed by Geological Survey of India at Hyderabad in 1985 had never been occupied as of March 1998. The Ministry did not take action for their alternative use nor did it fix the responsibility for gross over-assessment of requirement.

(Paragraph 9.1)

CHAPTER 1 : FINANCIAL MANAGEMENT

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 investment in research and development has increased from a paltry Rs 20 crore in the First Five Year Plan to about Rs 20,000 crore in the Eighth Five Year Plan.

1.1.2 Significant achievements during 1997-98

The Scientific Departments reported significant achievements during 1997-98; some of which are :

- Polar Satellite Launch Vehicle (PSLV) - C1 launched IRS-1D from Sriharikota in September 1997 and IRS-1D was injected into an elliptical orbit. IRS-1D was the first operational satellite launched by an indigenous launch vehicle. The successful launch of IRS-1D has proved the capability of indigenous launch vehicle PSLV to launch 1200 kg class remote sensing operation satellites in Polar sun-synchronous orbit.
- Rajasthan Atomic Power Station - 1 recommenced commercial operations after successful repair of its Over Pressure Relief Device. Enmasse coolant channel replacement work on Rajasthan Atomic Power Station - 2 was also completed successfully.
- The fast breeder Test Reactor at Kalpakkam was synchronised with the Southern grid.
- Atomic Minerals Divison (AMD) located sizable uranium deposits at Lambapur-Yellapur and Tummalapalle in Andhra Pradesh. About 2500 tonnes of additional uranium resources were estimated by AMD in inferred category.
- The neutron source reactor, Kamini, set up by BARC at Kalpakkam, attained full power level of 30 KW.
- An eco-friendly biological method to control aphids, a pest which attacks mustard plants, was developed by Central Institute of Medicinal and Aromatic Plants (CIMAP). The method involved an oil bearing species of spice plant known as Fennel which minimises the multiplication of aphids thereby eliminating a major bottleneck in increasing edible oil production in the country.

- E-MAL, an anti-malaria drug developed by CIMAP and Central Drug Research Institute was introduced in the Indian market for the first time.
- NICNET Video conferencing facility was dedicated to the nation on 22 August 1997.
- XVII Indian Antarctic expedition was launched by Department of Ocean Development in December 1997 from the Antarctic Study Centre, Goa.

1.1.3 Coverage under the Report

The comparative position of the expenditure of major Scientific Departments/organisations, covered under this Report during 1997-98 and in the preceding two years was as follows:

Sl. No.	Ministry/Department/Organisation	(Rupees in crore)		
		1995-96	1996-97	1997-98
1.	Atomic Energy	1960.22	2264.11	2908.80
2.	Space	917.88	1065.32	1050.50
3.	Indian Council of Agricultural Research	521.88	589.28	681.03
4.	Environment and Forests (including Zoological Survey of India and Botanical Survey of India)	373.20	520.04	497.83
5.	Science and Technology including Survey of India and India Meteorological Department	415.78	469.56	592.12
6.	Department of Scientific and Industrial Research (including grants given to Council of Scientific and Industrial Research)	431.61	466.11	602.85
7.	Non-Conventional Energy Sources	244.11	282.70	228.68
8.	Geological Survey of India (Ministry of Mines)	141.62	247.69	211.47
9.	Electronics	141.39	134.40	164.99
10.	National Informatics Centre (Planning Commission)	84.55	96.27	126.89
11.	Biotechnology	85.60	91.39	95.50
12.	Indian Council of Medical Research	62.52	66.95	70.49
13.	Ocean Development	58.24	64.05	100.66
14.	Centre for Development of Telematics (Department of Telecommunications)	31.33	46.53	84.99
	Total	5469.93	6404.40	7416.80

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

1.1.4 Excess and savings in expenditure

A summary of Appropriation Accounts for 1997-98 in respect of the scientific departments/major scientific organisations, mentioned in para 1.1.3 above, is given below:

(Rupees in crore)				
Sl. No.	Ministry/Departments/ Organisation	Grant/ Appropriation (including supplementary)	Expenditure	(-) Saving (+) Excess
1.	Atomic Energy	3068.21	2908.80	(-) 159.41
2.	Space	1171.11	1050.50	(-) 120.61
3.	Indian Council of Agricultural Research	681.07	681.03	(-) 0.04
4.	Scientific and Industrial Research (including grants given to Council of Scientific and Industrial Research)	607.03	602.85	(-) 4.18
5.	Environment and Forests, including Zoological Survey of India and Botanical Survey of India	638.59	497.83	(-) 140.76
6.	Science and Technology including Survey of India and India Meteorological Department	630.71	592.12	(-) 38.59
7.	Non-Conventional Energy Sources	341.89	228.68	(-) 113.21
8.	Electronics	168.23	164.99	(-) 3.24
9.	Geological Survey of India (Ministry of Mines)	219.33	211.47	(-) 7.86
10.	Biotechnology	113.87	95.50	(-) 18.37
11.	National Informatics Centre (Planning Commission)	129.25	126.89	(-) 2.36
12.	Indian Council of Medical Research	68.25	70.49	(+)2.24
13.	Ocean Development	105.95	100.66	(-) 5.29
14.	Centre for Development of Telematics (Department of Telecommunications)	55.00	84.99	(+)29.99
	Total	7998.49	7416.80	(-) 581.69

It would be seen from the above that there was a net saving of Rs 581.69 crore, representing 7.27 per cent of net provision of funds.

1.1.5 Adverse balances appearing in the Finance Accounts

'Civil Deposits' head should normally close with credit balance as payments against deposits should not exceed the deposits received. Similarly, 'Loans and Advances' heads should close with debit balance 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 1997-98 revealed the following cases of adverse balances:

1.	Department of Space MH 8443- Civil Deposits 106 - Personal Deposits	Rs 38,67,000 (Dr.)
2.	Ministry of Science & Technology J-Reserve fund	Rs 34,20,000 (Dr)
3.	Department of Ocean Development MH 7610- Loans to Govt. Servants 203-Advance for the Purchase of conveyance	Rs 3,000 (Cr.)
4.	Ministry of Environment MH 8443 - Civil deposits	Rs 90,31,000 (Dr.)

Note : MH refers to Major Head of account

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, 1996 and 1997. The Department stated in September 1998 that action was being taken to analyse the details of personal deposits of the preceding year by the PAO's concerned and clear the adverse balances.

The adverse balance in the Ministry of Science and Technology was continuing since the previous year (March 1997). There has been no improvement despite pointing it out in the Report of the Comptroller and Auditor General of India (No. 5 of 1998).

The adverse balances which could be due to misclassification, excess refunds, non reconciliation of accounts or some other reasons require investigation and rectification urgently.

1.1.6 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.

The Comptroller and Auditor General of India is the sole auditor of seven autonomous bodies under the Scientific Departments. Separate Audit Reports are prepared on their accounts under sections 19 (2) and 20 (1) of the Comptroller and Auditor General's (Duties, Powers and Conditions of Service) Act, 1971. The position of receipt of the accounts of these autonomous bodies and certification is indicated in Appendix I.

In addition, the Comptroller and Auditor General of India may conduct supplementary/super-imposed audit of any of 54 other autonomous bodies, which are substantially funded by the Government of India and whose primary audit is conducted by Chartered Accountants. The position of grants paid to these autonomous bodies is indicated in Appendix II.

1.2 Outstanding utilisation certificates

7343 utilisation certificates for grants aggregating Rs 548.52 crore paid to various statutory bodies, non-government institutions, etc. were outstanding as on 31 March 1998.

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Ministries and Departments are required to obtain certificates of utilisation of grants 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 these were sanctioned and that, where the grants were conditional, the prescribed conditions had been fulfilled. 7343 utilisation certificates for grants aggregating Rs 548.52 crore were outstanding as given in Appendix III. Main defaulting Ministries/Departments were (i) Environment and Forests (Rs 223.76 crore), (ii) Electronics (Rs 170.67 crore), (iii) Non-Conventional Energy Sources (Rs 109.97 crore) and (iv) Ocean Development (Rs 37.13 crore).

Utilisation certificates in 5577 cases aggregating Rs 341.01 crore were outstanding for more than three years. The Departments need to look into this at the highest level and obtain the certificates or recover the amounts.

1.3 Follow up on Audit Reports

Despite repeated instructions/recommendations of the PAC, the Departments did not submit remedial Action Taken Note on seven Audit Paragraphs.

In its Ninth Report (Eleventh Lok Sabha) presented to the Parliament on 22 April 1997, PAC recommended that ATNs on all paragraphs pertaining to the Audit Reports for the year ended 31 March 1996 onwards be submitted to

them duly vetted by Audit within four months from the laying of the Reports in Parliament.

ATNs are to be submitted within four months of placing the Reports in Parliament

Review of outstanding ATNs on paragraphs included in the Reports of the Comptroller and Auditor General of India, Union Government (Scientific Departments) as of December 1998 revealed as under :

Ministry/Department/ Council	No. of Paragraphs for which ATNs were awaited	Audit Reports to which Paragraphs indicated in column 2 pertain
CSIR	2	No. 5 of 1998
DBT	1	-do-
DOS	2	-do-
DST	2	-do-

ATNs on the above seven paragraphs were outstanding in disregard to general instructions issued by the Lok Sabha Secretariat and the Ministry of Finance, in pursuance of PAC's recommendations, for prompt submission of ATNs. Details are given in Appendix IV.

The position of pending ATNs was reported to the Ministries/ Departments/Council in September 1998; their replies were awaited as of December 1998.

CHAPTER 2 : DEPARTMENT OF ATOMIC ENERGY

2.1 Nuclear Power Profile

Highlights

- Against a nuclear power profile with projection of achieving additional capacity of 7880 megawatt of nuclear power by 2000 AD, the Department of Atomic Energy has not been able to generate any nuclear power under this profile in spite of having spent Rs 5291.48 crore as of March 1998.
- Rather than taking co-ordinated action for all components of the project, procurement of material was given precedence. All other related factors like creation of infrastructure, execution of civil works etc. without which the material procured could not be utilised, were not given the matching importance.
- While the availability of funds was a constraint, no effort was made to reduce the number of plants and their capacity to match with the available funds. As a result, the material had been procured for 10 plants whereas, civil works had not commenced for any of them. Consequently, the material worth Rs 1069.61 crore were lying unutilised for up to 10 years, part of which was not even properly stored.
- Finished/semi-finished material and components worth Rs 523.86 crore procured for the eight plants, which have not yet been sanctioned, have been rendered unfruitful as their market value is not likely to be more than the scrap value.
- Expenditure of Rs 50.12 crore was incurred on design and consultancy for 12 plants whereas expenditure on site was confined to only two plants resulting in burden of consultancy at the rate of Rs 25.06 crore per plant in stead of mere Rs 4.18 crore per plant.
- Despite its inability in successfully implementing the Nuclear Power Profile due to resource crunch, DAE has embarked on another programme to launch two Pressurised Water Reactors of 1000 MW each at Kundankulam.

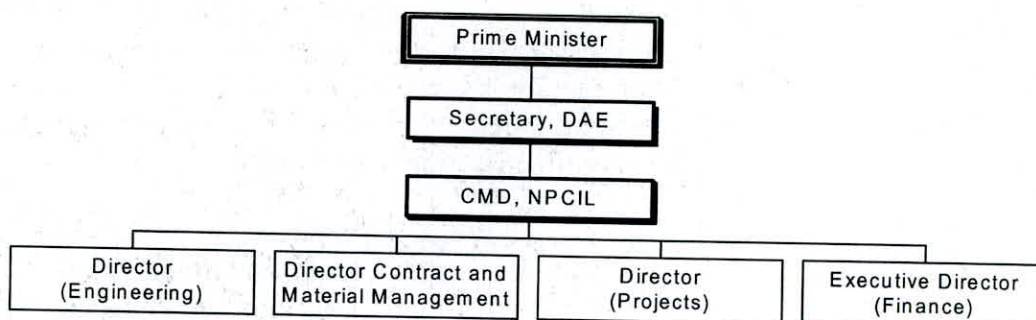
2.1.1 Introduction

In order to increase the nuclear power capacity to 10000 megawatt (MW) approximately by 2000 AD, DAE drew up a nuclear power profile for

establishment of additional nuclear power capacity of 7820 MW in 1984 revised to 7880 MW in 1989. This was in addition to 1840 MW envisaged to be generated from other existing/on-going plants outside the 'Profile'. Nuclear Power Board (NPB), a unit of DAE, was responsible for execution of the programme. It was incorporated as a Public Sector Undertaking in September 1987 by the name 'Nuclear Power Corporation of India Limited' (NPCIL).

2.1.2 Organisational set up

Secretary DAE is the Chairman for Atomic Energy Commission. The execution of Nuclear Power Plants is entrusted to NPCIL, which is headed by a Chairman-cum-Managing Director. The organisational chart of DAE relating to the 'Profile' was as under :



2.1.3 Scope of audit

The records of DAE and NPCIL pertaining to period 1989-98, relating to the 'Profile', were examined at DAE secretariat at Mumbai, NPCIL corporate office and its branch office at Mumbai. To provide an overall picture of the 'Profile' related information prior to 1989 was also collected, wherever necessary.

2.1.4 Planning

The 'Nuclear Power Profile' of 1984 envisaged installation of twelve 235 MW and ten 500 MW Pressurised Heavy Water Reactor units (plants) to be implemented during 1985-2000. DAE appointed a Committee in July 1988 for updating the 'Profile' and making recommendations on schedule of setting up of plant and inputs required for scheduled construction of plants. The Committee was also to focus attention on capital investment required for reactors, fuel cycle facilities and other infrastructure etc.

Consequent upon review of the progress of the implementation of the 'Profile', the Committee came to the conclusion in November 1989 that the overall target of establishing an installed capacity of 10000 MW by 2000 AD continued to be feasible. In view of the advantages of going in for larger sizes of units, the Committee also decided to replace four 235 MW plants in respect of which no action had been taken, by two 500 MW plants. As action for

Nuclear Power Profile of 1984 envisaged installation of twelve 235 MW and ten 500 MW plants

advance procurement of material etc. had already been initiated in case of other eight 235 MW plants, no recommendation for change in those cases was made.

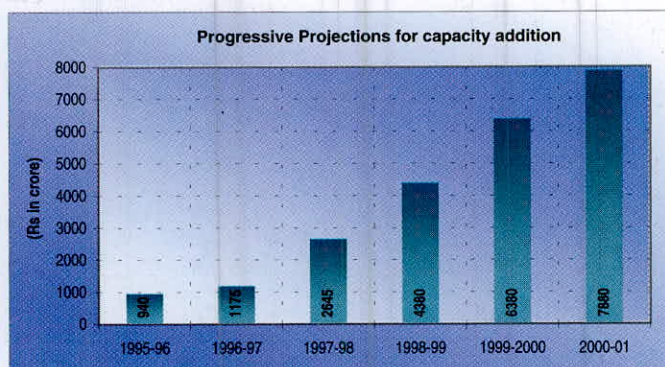
The Committee made the following projections for the capacity addition and flow of funds in a phased manner:

Year	Capacity addition (progressive) (MW)	Funds requirement at * 1989 prices (progressive) (Rs in crore)
Up to 1988-89		906.50
1989-90		1626.50
1990-91		2695.50
1991-92		4171.50
1992-93		5903.50
1993-94		7960.50
1994-95		10151.50
1995-96	940	12183.50
1996-97	1175	13796.50
1997-98	2645	15006.50
1998-99	4380	15915.50
1999-2000	6380	16435.50
2000-01	7880	16661.50

* Includes expenditure on on-going plants also

The committee did not make any year-wise projections in respect of procurement of material and creation of infrastructure

Although the Committee realised the importance of timely procurement of material and creation of infrastructure viz. acquisition of land and execution of civil works, it did not set year-wise mile stones for this.



2.1.5 Finance

Financial sanction for four 235 MW and two 500 MW plants had only been issued as of March 1998

The financial sanctions were issued in respect of four 235 MW plants in 1986 (two plants) and 1987 (two plants) and an expenditure of Rs 213.07 crore had been incurred on these four plants up to 1988-89. The total additional capital outlay required for the programme at 1989 price level required during

1989-2001 for the 20 plants covered under the 'Profile' and on-going plants outside the 'Profile' was estimated by the Committee at Rs 15755 crore. The projections made by the Committee were based on the presumption that financial sanctions for 10 out of the remaining 16 plants would be available during 1989-90. However, financial sanctions in respect of only two 500 MW plants for Tarapur Atomic Power Plant – 3 and 4 estimated at Rs 2427.51 crore were issued in January 1991, which was further revised to Rs 6421.00 crore (at 1996 constant rupee value) in December 1997. Thus, excluding the interest during construction of Rs 1580 crore, the cost estimates have already gone up by 99 per cent. The financial sanctions in respect of the remaining 14 plants had not been issued as of March 1998.

The table below gives the annual requirement of funds, the funds proposed under plan and funds actually allocated there-against:

(Rs in crore)

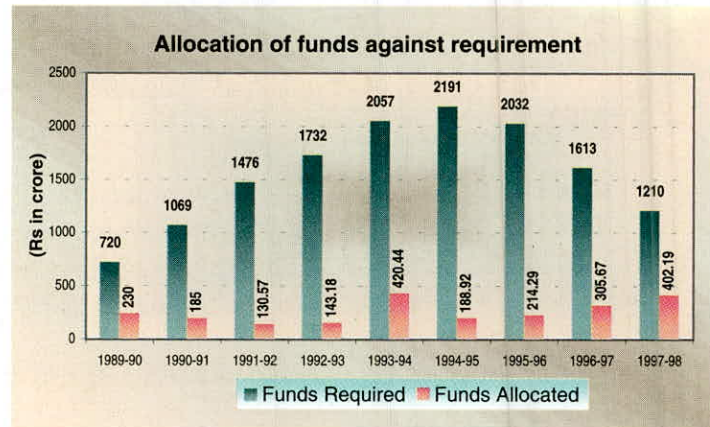
Year	Funds required	Funds proposed under plan	Funds allocated		
			Equity	Loan	Total
Up to					
1987-88	466.50	N.A.	185.92	-	185.92
1988-89	440.00	461.00	211.23	-	211.23
1989-90	720.00	799.00	230.00	-	230.00
1990-91	1069.00	1069.33	185.00	-	185.00
1991-92	1476.00	1491.46	130.57	-	130.57
1992-93	1732.00	1433.00	143.18	-	143.18
1993-94	2057.00	1202.00	170.44	250.00	420.44
1994-95	2191.00	1180.00	188.92	-	188.92
1995-96	2032.00	1229.00	214.29	-	214.29
1996-97	1613.00	1183.78	305.67	-	305.67
1997-98	1210.00	1273.00	402.19	-	402.19
1998-99	909.00	1300.00	-	-	-
1999-2000	520.00	1300.00	-	-	-
2000-2001	226.00	N.A.	-	-	-
Total	16661.50	13921.57	2367.41	250.00	2617.41

NA : Not available

It would be seen from the above table that the planned target for achievement of capacity was much more than the target achievable with the funds allocated. This has to be viewed in the light of 99 per cent increase in cost estimates over the original projections for Tarapur Atomic Power Plant – 3 and 4 as brought out above. Delay in implementation of the plants due to lack of funds was,

therefore, further bound to multiply the cost. Moreover, the increased cost of construction would increase the cost of power.

Against the requirement of Rs 15006.50 crore up to 1997-98 for twenty plants and on-going plants, only Rs 2617.41 crore had been allocated for the 'Profile'.



As against this, the expenditure incurred was Rs 5291.48 crore, i.e. Rs 2674.07 crore (102.16 per cent) more than the allocation. As the budgetary support could not be maintained by DAE either as debt or as equity, the additional

funds of Rs 2674.07 crore were mobilised by NPCIL through Capital Market borrowing. The funds so borrowed included Rs 1443.77 crore for meeting the payment of interest on borrowed funds. The details of funds borrowed were as follows:

(Rs in crore - cumulative)

Year	Funds allocated	Market borrowings	Interest during construction	Total expenditure
Up to 1988-89	397.15	-	-	298.79
1989-90	627.15	53.37	3.42	585.38
1990-91	812.15	319.52	18.85	1150.52
1991-92	942.72	610.66	106.06	1659.44
1992-93	1085.90	898.21	248.26	2232.37
1993-94	1506.34	894.05	400.75	2801.14
1994-95	1695.26	1208.45	556.84	3460.55
1995-96	1909.55	1372.80	801.71	4084.06
1996-97	2215.22	1342.67	1120.07	4677.96
1997-98	2617.41	1230.30	1443.77	5291.48

DAE stated in February 1999 that since the budgetary support was not adequate even to meet the committed expenditure towards the advance procurement and since NPCIL had to discharge its obligation for payment, borrowing was resorted to as a source of funding for part financing of advance procurement expenditure and therefore interest on such borrowing had also to

be included as expenditure towards advance procurement which was not envisaged at the time of initiating advance procurement programme.

In respect of four 235 MW plants under construction, included in the 'Profile', against DAE funds of Rs 1578.40 crore allocated as equity and loan, NPCIL incurred an expenditure of Rs 3586.30 crore till 1997-98. These projects were stated to be in the advanced stages of completion. In respect of 10 future plants (four 235 MW and six 500 MW), only Rs 1039.01 crore had been allocated by DAE till 1997-98 which was less than the requirement for a single 500 MW plant. No funds had been allocated for the remaining six 500 MW plants.

DAE stated that availability of funds was not a problem till VII Five Year Plan (up to 1985). With a view to accelerate the Nuclear Power Programme as per profile of 1984 and to access the additional fund from market borrowing, the earlier Nuclear Power Board was incorporated as NPCIL in 1987.

The actual expenditure against this was Rs 1705.18 crore as detailed below:

Year	For four 235 MW plants under construction				For future ten plants			
	Funds allocated	Market borrowings	IDC	Expenditure	Funds allocated	Market borrowings	IDC	Expenditure
Up to 1988-89	240.52	-	-	213.07	156.63	-	-	85.72
1989-90	334.52	14.92	1.65	351.09	292.63	38.45	1.77	234.29
1990-91	419.52	156.07	15.73	591.32	392.63	163.45	3.12	559.20
1991-92	517.76	300.46	57.17	875.39	424.96	310.20	48.89	784.05
1992-93	602.76	449.09	133.35	1185.20	483.14	449.12	114.91	1047.17
1993-94	980.26	441.44	230.08	1651.78	526.08	452.61	170.67	1149.36
1994-95	984.88	803.20	306.45	2094.53	710.38	405.25	250.39	1366.02
1995-96	1058.58	1048.20	460.13	2566.91	850.97	324.60	341.58	1517.15
1996-97	1250.33	1098.74	697.82	3046.89	964.89	243.93	422.25	1631.07
1997-98	1578.40	1042.44	965.46	3586.30	1039.01	187.86	478.31	1705.18

Note: IDC Interest during construction

2.1.6. Additional Capacity

DAE reduced the total capacity of 7880 MW envisaged by the Committee to 6050 MW in August 1990. This was further reduced to 3820 MW in March 1994. Even the six plants sanctioned with capacity of 1940 MW had not been completed and therefore, there had been no addition to the capacity under the 'Profile' as of March 1998.

DAE stated in February 1999 that due to inadequate budgetary support during early 1990s, the target of the 'profile' was slashed down to 8050 MW by 2002 AD.

Even if budget constraint was the only reason for slashing down the target, it could not be scaled down below the limit of the capacity for which advance procurement has already been made.

Even the six plants sanctioned with capacity of 1940 MW has not been completed and therefore, there had been no addition to the capacity under the 'Profile' as of March 1998.

2.1.7. Procurement of material

The Committee appointed to review the 'Profile' had presumed that advance action would be needed for procurement of material with long lead-time for delivery. In respect of four 235 MW plants sanctioned prior to 1989, the advance procurement of material had already been made. In addition, DAE had taken approval of the Cabinet for advance procurement of material and equipment for Rs 1328.40 crore for 10 plants with total capacity of 3940 MW (including six 500 MW plants) during February 1986 to July 1988, on the ground that lead-time of three to four years was required from importing the raw material for fabrication of finished goods. Lack of matching action in other areas and constraint of funds, without which the material and equipment could not be utilised resulted in the material lying unused for long time. Out of the ten plants, financial sanctions were issued in respect of only two 500 MW plants in January 1991. Another sanction for procurement of equipment valued at Rs 182.04 crore was obtained from Cabinet in January 1991.

DAE stated in February 1999 that setting up of site infrastructure, obtaining environmental clearance from State and Central Government and obtaining construction commencement clearance etc. had been completed. The site infrastructure included fenced land, approach road, job shacks, warehouses etc. Design and engineering and development works have also progressed. However, audit scrutiny disclosed that the progress made in works did not match with the progress in procurement of material.

Some of the finished goods including equipment had been stored at different locations for the past one to nine years as may be seen from the following illustrations noticed during test-check:

Sl. No	Supplier	Item and date of purchase order	Payment to supplier (Rs in crore)	Status of execution of order	Status as of March 1998
1	BHEL	Four Turbo-generators in March 1989	301.53*	Order reduced to two Turbo-generators in October 1997; Order for other two was short closed by taking over semi-finished goods	Components for first Turbo generators set received from 1992 onwards are stored in a shed at site
2	KSB, West Germany	Primary Coolant Pump Motor set consisting of 4 Pumps and 5 Motors in July 1988	38.59	Order completed in March 1990	Stored at site wrapped in aluminium foil with silica gel since March 1990
3	KSB, Pune	Primary Coolant Pump Motor set consisting of 4 Pumps and 5 Motors in July 1988	26.32	4 Pumps completed in March 1996; Work on motors not yet taken up	4 Pumps stored at manufacturer's site

Sl. No	Supplier	Item and date of purchase order	Payment to supplier (Rs in crore)	Status of execution of order	Status as of March 1998
4	KSB, Pune	4 Primary Coolant Pump Motor sets consisting of 4 Pumps and 5 Motors each in July 1988	88.27	Order kept under hold	Raw material is stored at the site of the supplier
5	L&T	6 orders for Steam generators, End Shields and sub-assemblies during January 1989 to April 1991	122.43*	Order kept under hold	Free issue material and semi-finished components stored at supplier's premises
6	KBL	11 canned motor moderator pumps	10.49	Order completed	Stored with vacuum sealed packing since 1997
7	WIL	5 Calandria with one pair of End Shield assemblies and Pressuriser equipment during July 1988 to April 1990	7.19	Calandrias completed during January 1992 to October 1994; order for other items closed	Calandrias stored at manufacturer's site; Free issue material and semi-finished goods stored at manufacturer's site in sheds.
8	ECIL	Imported Self Powered Neutron detectors	3.24	Order completed for one 500 MW plant	235 Self Powered neutron detectors lying at Trombay Village Stores since 1990
9	BHPV	4 sets of moderator heat exchangers in November 1989	1.11	Order agreed to be short closed by taking over semi-finished goods	Semi-finished goods yet to be taken over♥
10	GRE	One Calandria assembly in February 1989	0.50	Short closure by taking over semi-finished goods agreed	Semi-finished goods yet to be taken over♥

* Including Rs 21.32 crore for short closure of order.

* Free issue material - Rs 78.19 crore, advance - Rs 44.24 crore.

♥ Since taken over as per the reply of the Department of February 1999.

Note: BHEL: Bharat Heavy Electricals Ltd.; KSB: A German firm having a branch at Pune; L&T: Larsen and Toubro Limited; KBL: Kirloskar Brothers Ltd.; WIL: Walchandnagar Industries Ltd; EIL: Electronic Corporation of India Ltd.; BHPV; Bharat Heavy Plates and Vessels; GRE; G.R. Engineering Works.

The equipment worth Rs 1069.61 crore, which remained unutilised, were stored at various sites including manufacturer's sites

The equipment worth Rs 1069.61 crore stood stored at various sites including manufacturer's sites. This included raw material valued at Rs 119.28 crore procured during January 1986 to September 1992 which were lying unused at Trombay Village stores.

DAE stated that the advance procurement of material cost was less than 10 per cent of the total project cost.

The reply had to be viewed in light of the fact that when there was a financial crunch even for this expenditure of 10 per cent, the possibility of arranging 90 per cent of the funds to make use of 10 per cent already invested on procurement was not an easy task. While confirming that the items procured in

advance cannot be sold, DAE stated that the items procured were mostly custom made to suit the requirement of Nuclear Power plants and hence may not find use in other industries.

While the cabinet had been informed that advance procurement was necessary in view of the long lead-time required for fabrication of equipment from raw material, these had not been utilised or issued for the purpose of fabrication. A test-check of stock cards pertaining to stock valued at Rs 50.48 crore revealed that these material were stored in open yard without any water/rust proof coating. As a result, the coating initially provided with the material started deteriorating. The material was covered with water proof and ultraviolet resistant fully welded tarpaulin only in May 1995.

While the funds stood blocked in these equipment, expenditure was incurred on their storage. The expenditure on storage could not be worked out as no separate accounts were kept for this purpose. It was, however, seen that Rs 12 lakh had been spent on procurement of primer required for preservation of carbon steel plates and beams at Trombay village stores. The expenditure incurred for cleaning and application of primer was estimated at Rs 44.73 lakh. For storage of goods at the site of Walchandnagar Industries Limited, sheds had specifically been constructed at a cost of Rs 15 lakh.

DAE stated that in view of deferment of commencement of the project, a task force was formed in February 1995. The responsibility of the task force included assessment of materials at Trombay village stores for their condition and urgent action for suitable rust prevention wherever required. The task force carried out their responsibility. Subsequently, due to continued resource crunch, in October 1996 the Committee was reconstituted and the scope of the task force was widened to include long term preservation of the material, equipment and components lying at Trombay stores, manufacturers premises and sites.

Since the equipment had been lying unused for a long time, there was very little chance of their replacement or rectification by the suppliers, if these did not work satisfactorily at the time of installation.

NPCIL stated in June 1998 that as the pumps and components were being preserved with due protection based on manufacturer's guidelines, the question of their deterioration during storage did not arise.

As there was no possibility of immediate use of the equipment worth Rs 523.86 crore, there was risk of their deterioration

The reply of NPCIL should be viewed in the background of the fact that there was no performance warranty from the manufacturers for satisfactory performance after indefinite storage. Moreover, the Primary Coolant Pump Motor sets were designed for a life of 40 years whereas these had already been stored for nine years i.e. 23 per cent of their designed life. As the financial sanctions in respect of four 500 MW and four 235 MW plants, for which material/equipment were procured had not been issued as of March 1998, there was no possibility of immediate use of the equipment worth Rs 523.86

crore procured for these plants. Consequently, there was a risk of obsolescence and deterioration besides recurring inventory carrying cost and interest burden. A status report on advance procurement of material prepared by Chief Engineer (Corporate Planning) in March 1997 revealed that the possibility of disposal for any sizable value was difficult due to the specialised and custom made nature of the items.

DAE stated, in February 1999, that ageing is stress related and depends on parameters which are encountered in actual working condition, while under storage the equipment sees parameters far smaller in value resulting in practical no ageing. It also added that in commissioning these equipment in future, any reconditioning or repairing if required or replacement of limited shelf life items can be done by in-house as well as with the help of the industry. Any expenditure in that regard will not be significant. It further added that the designs have evolved over a period of time and have several advanced features. Therefore, risk of obsolescence for the material procured may not arise.

The reply had to be viewed in light of the fact that BARC had to constitute two task forces for rust prevention to reduce the risk of ageing. The reply regarding subsequent repairs and expenditure thereupon was presumptive and has to stand the test of time in future.

Since the plants were not likely to be completed in near future the entire expenditure had to be viewed as infructuous

Standing Committee of Tenth Lok Sabha on Energy, in its thirty fourth report titled 'Nuclear Power Programme – an Evaluation', submitted in December 1995, observed that the handling of the Profile was not satisfactory. The Standing Committee also observed that though efforts had been made to divert/dispose off the items, the only possibility in disposal was to salvage the scrap value. Since the plants were not likely to be completed in near future and the equipment were left with only scrap disposal value, the entire expenditure on advance procurement of material for the plants for which financial sanctions had yet not been issued, had to be viewed as infructuous. This could have been avoided by restricting the number of plants within the limit of funds available.

DAE stated that nuclear power programme of setting up of these units for which advance procurement action had been taken still stands. It added that only the timing of commencement will be consistent with fund availability. Moreover, these items in future would cost more if the factors like cost escalation, exchange rate variations are considered.

The reply was not acceptable in view of the fact that the timing for at least a part of power generation could have been advanced within the resources available if proper matching action had been planned for all the related activities rather than merely concentrating on advance procurement.

DAE further stated that under present restriction and embargo, the decision to go for advance procurement of equipment and materials was further reinforced.

The reply was not acceptable in view of the fact that the embargo has been imposed after a decade of procurement of equipment.

2.1.8 Indigenisation

The Committee appointed to review the profile, in its report, observed that available indigenous industrial infrastructure should be used in a balanced manner by appropriate planning to meet the requirement of the 'Profile'.

While payment of Rs 3.07 crore was made to ECIL for indigenisation of Self Powered Neutron Detectors, these were not procured from them

Payment of Rs 17.83 lakh was made to ECIL for training of personnel at Thermocoax, France to enable them to indigenise the production of Self Powered Neutron Detectors. ECIL was also required to get the technological know-how for this purpose. Payment of Rs 3.07 crore was made to ECIL for transfer of technology. While the technology was transferred and the personnel were trained, no indigenously manufactured Self Powered Neutron Detectors were procured from ECIL as of June 1998.

DAE stated, in February 1999, that since the construction of two of the plants had commenced, the quantity required for second unit will be procured from ECIL.

A Primary Coolant Pump-Motor set consisting of four pumps and five motors, was imported from KSB, West Germany. The coolant Pump-Motor set received from KSB, West Germany was stored in wrapped condition. For indigenisation, an amount of Rs 26.32 crore was paid to KSB, Pune for fabrication and supply of first indigeneous Primary Coolant Pump-Motor set. The payment of Rs 26.32 crore included Rs 2.35 crore for technology transfer by imparting training and exchange of documents/technology to KSB, Pune. After indigenisation, KSB, Pune was to supply four more Primary Coolant Pump-Motor sets for which Rs 88.27 crore was paid to them. Against the order of production of the first indigeneous Coolant Pump-Motor set, while the pumps had been manufactured, the motors had not been manufactured. As such the objective of indigenisation had not been achieved. The material issued to KSB, Pune for the Coolant Pump-Motor sets was lying unused with KSB, Pune.

2.1.9 Consultancy

While the cost of Rs 50.12 crore of consultancy could be apportioned to twelve plants, the entire cost was apportioned to only two plants

For consultancy relating to various works of 500 MW plants, 58 consultancy contracts, including two foreign contracts of Rs 6.09 crore, were entered into with various consultants during 1985 to 1993. A total expenditure of Rs 50.12 crore was incurred on these consultancies till March 1998. While the cost of consultancy could be apportioned to the twelve 500 MW plants, the entire cost of the consultancy got apportioned to only two of the plants as the financial

sanction in respect of other 10 plants had not been issued. The relevance of the consultancy to other plants, if sanctioned, due to passage of time and development of technology elsewhere in the world was doubtful. Thus, the average cost of consultancy amounted to Rs 25.06 crore per plant in stead of Rs 4.18 crore per plant.

Of the 58 consultancies, 49 were completed till March 1998. Work in respect of five consultancies was in progress whereas three consultancies were short closed and one was kept pending. Examination of eight of the consultancy contracts revealed as follows:

- (i) Rs 8.20 crore was spent on consultancy work for design, engineering, inspection services etc. in respect of 500 MW plants at inland site by Tata Consulting Engineers while no plant at 'inland site' had been sanctioned as of March 1998.
- (ii) In case of two contracts with Tata Consulting Engineers for general engineering consultancy for coastal site and adoption of American Concrete Institute code, the total estimated cost was Rs 26.43 crore. While only 50 per cent work had been completed till March 1998, an expenditure of Rs 25 crore (95 per cent) had already been incurred.

DAE stated, in February 1999, that due to regulatory requirements, upgraded design, safety standard etc., the quantum of work increased. Besides, the design of 500 MW PHWR was being done for the first time.

- (iii) While fee of Rs 3.76 crore was paid for know-how design of a steam generator to a foreign firm and BHEL, the orders for fabrication of the steam generator had been put on hold.
- (iv) Fuel handling system developed at Rs 1.07 crore, had not been installed and tested as of November 1998.
- (v) While thermal and mechanical design consultancy was completed at Rs 27.67 lakh, the order for supply of heavy water heat exchangers placed on BHEL was short closed.
- (vi) A consultancy contract for improvement of computer code "CLAIR" for study of accidents due to loss of coolant in Pressurised Heavy Water Reactors was entrusted to a firm at an estimated cost of Rs 35 lakh in January 1991. As the firm closed down their business, the contract was closed midway in August 1997 without recording any specific reasons. After making a final settlement of Rs 10.55 lakh for foreclosure of work, the balance job was completed with in-house facility.

2.1.10 Land and civil works

The Committee appointed to review the profile had expressed that advance action on tendering main plant civil works would be desirable so as to be in a state of readiness to award the work when financial sanction for the plant was received. In order to set up the site infrastructure facilities, sites for the programme needed to be identified and approved in advance and then developed. This was considered essential by the Committee in the context of public acceptability and lead time required for various clearances. Nevertheless, the site and civil works had to keep pace with the fabrication of equipment to prevent these from remaining idle after fabrication.

Against total area of 207 hectare of land required for two 500 MW, the actual land in possession was 120 hectare only

Though the financial sanctions for two plants of 500 MW was issued in January 1991 and advance procurements had already been made, the land required for the plants had not been acquired as of September 1998. Thus, the land acquisition had not been completed even after a delay of more than seven years against two years envisaged in the 'Profile'. Against total area of 207 hectare of land required for setting up of these two plants, the actual land in possession was only 120 hectare. Though land acquisition awards were declared for 193 hectare, possession of the land would not be available till Government of Maharashtra took up and completed a rehabilitation plan for the displaced persons. The probable time for completion of these programmes was also uncertain.

NPCIL stated in September 1998 that they had adequate land for location of main plant buildings and commencing construction activities.

The reply was not tenable in view of the fact that commencement of work without possession of entire land would leave uncertainty about completion of the work. DAE already had similar experience in case of Narora Atomic Power Plant and Kakrapar Atomic Power Plant where resistance from the owners of land had led to delays.

DAE stated, in February 1999, that the acquisition of remaining land was being pursued with Government of Maharashtra and it did not envisage any problem in this regard. The remaining land was required for exclusion zone and for township which in no way would affect the construction.

2.1.11 Power generation

The actual additional generation of power as on March 1998 was nil in spite of an expenditure of Rs 5291.48 crore

Against the targeted additional power generation of 940 MW by 1995-96, gradually increasing to 7880 MW by 2001 AD, the actual additional generation of power under the 'Profile' as of March 1998 was nil in spite of having incurred an expenditure of Rs 5291.48 crore. Had the material been procured according to availability of funds and other related factors such as procurement of land, civil works and infrastructure been given corresponding importance, at least a part of power proportionate to the funds available could have been generated.

The action of initiating the work relating to a number of plants disproportionate to funds available was the main reason for failure of the 'Profile'. DAE, however, decided to launch two more Pressurised Water Reactors with installed capacity of 1000 MW each at Kudankulam, Tamilnadu in spite of continued shortage of funds for the plants for which material had already been procured. The equity proposed to be released for these two reactors outside the 'Profile' up to 2006 AD was estimated at Rs 5734 crore notwithstanding the fact that the gap in the allocation for the plants included in the 'Profile' was also required to be met during this period.

DAE stated, in February 1999, that 880 MW of power would be added to the installed capacity by 2000 AD. The reply had to be viewed in the light of the fact that even this projection of DAE turns out to be only 11 *per cent* of the projection under the 'Profile'.

2.2 Undue benefit to a Joint Sector company

Amount payable to a joint sector company under the contract was increased by the Department of Atomic Energy beyond the terms of contract without correspondingly increasing the amount receivable from them resulting in undue benefit of Rs 1.22 crore.

A mention was made in Para 3.2 of Report of the Comptroller and Auditor General of India for the year ended March 1997 about unilateral deduction of Rs 11.90 crore by Gujarat State Fertilizers Company (GSFC) for six tonne of Ammonia against the agreement for compensation for loss of one tonne of Ammonia per day and failure of Department of Atomic Energy (DAE) to recover the excess amount claimed by GSFC.

DAE invested Rs 3.82 crore for increase in the capacity of an ammonia plant of SPIC, who in turn was to route ammonia through plant of DAE

In a similar agreement between DAE and Southern Petrochemical Industries Corporation Limited (SPIC), a joint sector company, the ammonia synthesis gas and liquid ammonia required at the Heavy Water Plant (HWP) of DAE was to be provided by Ammonia Plant of SPIC which was to be returned to them in vapour form after passing through HWP. DAE invested Rs 3.82 crore during 1971-72 to 1975-76 for increasing the capacity of ammonia plant of SPIC from 1000 tonne per day to 1100 tonne per day. SPIC was free to use extra quantity of ammonia produced for making other products or for sale or for any other purpose.

Payment for increase in capacity for ammonia production was to be received from SPIC and compensation for routing ammonia was to be paid by DAE

For routing ammonia through HWP, DAE was to pay a compensation of 2.5 *per cent* of total cost of production subject to a maximum of Rs 12.50 per kg of heavy water produced and further subject to the condition that transit loss of ammonia did not exceed one tonne per day. Similarly, for excess ammonia produced as a result of increase in the capacity, SPIC was to pay Rs 63 lakh per annum to DAE for first ten years and Rs 40.50 lakh per annum thereafter.

DAE revised the compensation payable to SPIC in May 1993 from Rs 12.50 per kg to slab rates ranging from Rs 40 per kg to Rs 350 per kg. The revised rates were given retrospective effect from April 1992. In October 1997, these rates were further revised retrospectively with effect from April 1995 to range between Rs 55 per kg and Rs 480 per kg. At this stage DAE also agreed to revise the rates again in April 2000. While the increase in the rate of compensation was not justifiable as brought out in the succeeding paragraph, DAE was negligent in not revising the rate of recovery for excess ammonia produced out of the facility set up in SPIC by them.

This resulted in undue payment of Rs 1.22 crore in six years

Increase in the rates resulted in a total payment of Rs 1.47 crore against the amount of Rs 24.95 lakh payable under the contract during 1992-98 leading to undue benefit of Rs 1.22 crore to the joint sector company, which could have been avoided if the payment had been made as per terms of the contract.

Heavy Water Board stated in June 1997 that as there was a substantial increase in cost of inputs and efforts involved on the part of SPIC in maintaining the purity level, deuterium concentration and pressure of the inlet gas to HWP, SPIC was insisting for increased compensation.

The reply was not acceptable in view of the facts that the increase in input cost got reflected in the cost of production of ammonia which was sold/utilised by SPIC. Besides, SPIC had derived advantage of increased production of 100 tonne of ammonia per day through investment made by DAE. Moreover, in a similar agreement of July 1973 between DAE and GSFC, the rate of compensation of Rs 11.25 per kg for total production of heavy water at HWP, Baroda had not been revised since 1973.

DAE stated in January 1999 that the basic intent of the agreement with SPIC was to pay compensation linked to the cost of production of heavy water. It further added that the agreement with SPIC did not provide for any increase in the rate of payment by SPIC to DAE.

The reply of DAE ignores the fact that despite the provision for the amount of compensation linked to the cost of production of heavy water, the payment was to be linked to a ceiling of Rs 12.50 per kg of heavy water produced. There is, therefore, no justification in increase of the amount of compensation beyond the ceiling. Further while DAE has paid compensation at rates higher than the maximum amount provided in the agreement, the contention about their inability to revise the payment by SPIC to DAE due to absence of any such provision in the agreement is self-contradictory.

2.3 Retention of an uneconomical motor launch

While the Department of Atomic Energy has not been able to decide the issue of retention of an uneconomical launch for more than seven years, an expenditure of Rs 57.07 lakh was incurred for 12 VIP trips of approximately 54 km each during the period by utilisation of this launch.

The question whether a launch being maintained by Bhabha Atomic Research Centre (BARC) by incurring huge expenditure, not commensurate with its utility, should be retained has been under consideration of the Department of Atomic Energy (DAE) since February 1989 on which no decision had been taken as of March 1998.

No decision had been taken by DAE for nine years on retention of an uneconomical launch

The existing launch was acquired in 1960-61. While the audit had been questioning the desirability of retention of this launch, BARC realised only in February 1989 that the issue of maintaining this launch by incurring huge expenditure every year had to be critically examined. BARC accordingly sought the decision of DAE regarding further course of action. No decision had been taken by DAE on this request of BARC as of 31 March 1998 although an expenditure of Rs 57.07 lakh including Rs 16.59 lakh on the salary of staff, had been incurred during 1991-98.

By incurring expenditure of Rs 57.07 lakh during seven years, only 12 VIP trips of 54 km each had been made

BARC informed DAE in February 1989 that the launch was being utilised for bringing VIPs and other dignitaries through sea route. An analysis of utilisation of the launch during October 1991 to January 1998 with this point in view revealed that in all only 35 to and fro trips were made by the launch in six years, of which 12 were utilised for taking Chairman, Atomic Energy Commission/Additional Secretary, DAE/Director, BARC/foreign delegates from Gateway to BARC/ Elephanta caves. Of the remaining 23 trips, 16 were made for shore patrolling, diesel filling and inspection, and the purpose of seven trips had not even been placed on record. Each useful trip of approximately 54 km, thus, on an average, cost Rs 4.76 lakh.

Due to delay in decision, expenditure continues to be incurred

Due to indecision on the retention of launch since February 1989, questionable expenditure of Rs 57.07 lakh had been incurred during 1991-98 and further expenditure continued to be incurred.

While DAE did not clarify the reasons for indecisiveness for seven years on the proposal of BARC, it supported the views of Internal Financial Advisor of BARC wherein he had stated that in the event of VIP visitors including foreigners, which is not an uncommon event, it takes very long time to take them to BARC by road owned and operated by Mumbai Port Trust which was very dirty and generally not in good condition creating an adverse impression.

The reply was not tenable in view of the fact that the launch had been used for foreigners only on three occasions during October 1991 to January 1998 and DAE had not examined the possibility of renting a launch on such occasions.

2.4 Idle equipment

Two furnaces purchased by BARC for Rs 22.59 lakh without finalising the location of their installation resulted in their remaining idle for over four and half years.

Directorate of Purchase and Stores (DPS), Department of Atomic Energy (DAE) placed orders for the electric resistance vacuum annealing furnace and electric resistance high vacuum sintering furnace for refractory metals during November and December 1989 with the scheduled date of delivery as December 1989 and March 1991 respectively for installation at BARC. The furnaces were considered essential for a project "Development of processes for production and fabrication of reactive and refractory metal alloys". The project was scheduled for completion in two phases during Sixth and Seventh Five Year Plan.

BARC procured two furnaces in December 1993/ March 1994 considered essential for a project

Against the scheduled date of delivery in December 1989/March 1991, the furnaces were received in December 1993 and March 1994 respectively. Meanwhile the space earmarked for vacuum annealing furnace had been utilised for some other purpose and another space was allocated for annealing furnace, which lacked inbuilt infrastructure facility for its installation. As a result while the sintering furnace had been installed, the annealing furnace had not been installed until December 1998.

DAE stated in December 1998 that it must be appreciated that BARC was a multiple-disciplinary R&D institution and there were conflicting pressures amongst various specialisations to locate their facilities.

The reply was not tenable in view of the fact that the importance of expenditure incurred on all the projects had to be recognised in spite of multiple disciplines and while allocating an alternative space for annealing furnace, the basic infrastructure facilities required should have been taken note of.

While the warranty period of two furnaces had expired, none of these had been utilised

Head of the Metallurgy Division of BARC had been unable to determine a suitable location for installation of annealing furnace until May 1998 i.e. for over four and half years. While the warranty period of the two furnaces had already expired in December 1994 and September 1995 respectively, none of the two furnaces had been utilised.

The project for which two furnaces were procured was completed without the facility of these furnaces

The project for which these furnaces were essential, was completed by utilising the small-scale facilities available with Material Group, Atomic Fuel Division of BARC and Nuclear Fuel Complex, Hyderabad. This indicated that BARC could have managed the project even without procuring these furnaces and the entire expenditure on the purchase of the furnaces was avoidable.

BARC stated in October 1997 that these furnaces when installed, would be used extensively on a large scale for current and future activities. DAE stated in December 1998 that furnaces would be extensively used in the extended phase II of the project. DAE further stated that Rs 22.59 lakh constituted a negligible percentage of the total cost of equipment of Rupees four crore sanctioned for the project.

The reply of BARC shows low concern for realising value for money

The reply of BARC underscores low concern for realising the value for money as not only have they been unable to use the two furnaces for over four and half years since their supply and for over eight and a half years since the need for their purchase was first felt but even the professed extensive large scale use for current and future activities had not been initiated.

CHAPTER 3 : DEPARTMENT OF SPACE

3.1 National Remote Sensing Agency, Hyderabad

Highlights

- While the rate of accumulation of data from various satellites had been increasing, the rate of utilisation showed decreasing trends. Only 61 per cent of the cost of accumulation of data from foreign satellites had been realised from its sale.
- In case of one remote sensing application project test-checked, the net visible achievement of objective had been a mere 1.6 per cent, after nine years of operation and an expenditure of Rs 14.82 crore.
- Although aerial remote sensing operation required only one aircraft, an additional aircraft was procured at a cost of Rs 13.84 crore.
- Funds amounting Rs 49.47 crore in cash and Rs 5.24 crore as debts/advances stood blocked as of 31 March 1998.

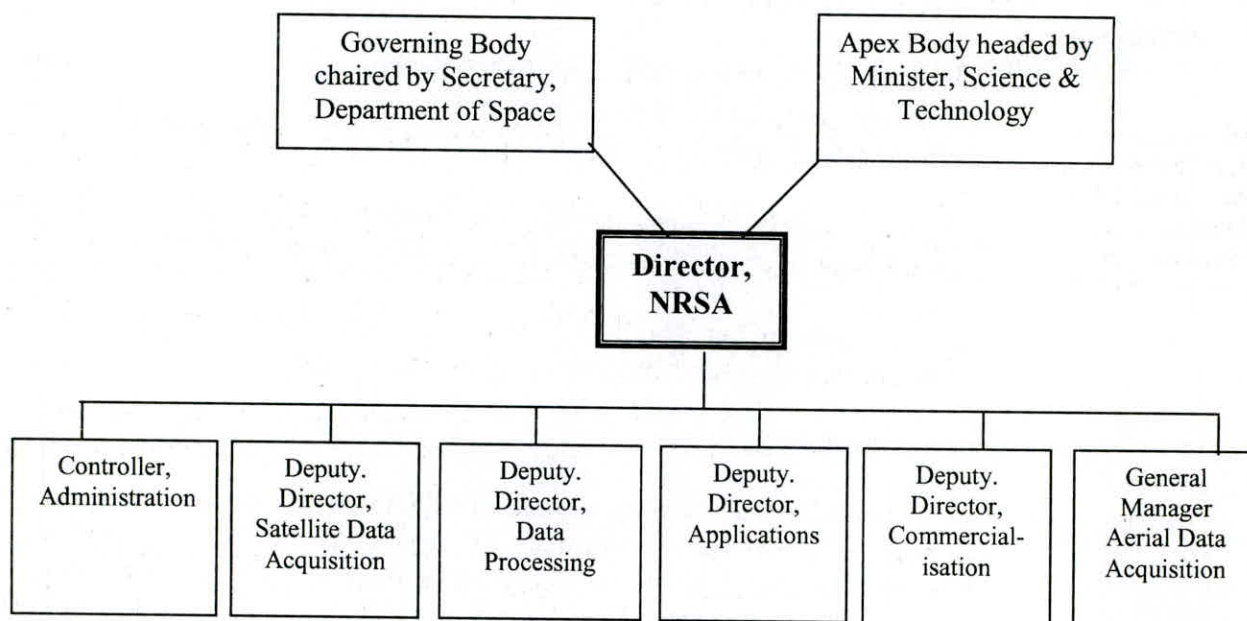
3.1.1 Introduction

The National Remote Sensing Agency (NRSA), Hyderabad, an autonomous organisation under the Department of Space (DOS), is responsible for providing operational resource survey services to users by utilising modern remote sensing techniques. The objectives of NRSA were to undertake, aid, promote, guide and co-ordinate research in the field of remote sensing. Major activities through which these objectives were intended to be achieved included:

- Acquisition, processing of remote sensing data from various satellites including Indian Remote Sensing (IRS-1B, IRS-1C, IRS-1D, IRS-P2 and IRS-P3), Land Satellite (LANDSAT) and European Remote Sensing (ERS) satellites and their supply to users.
- Operational flight facility for aerial photographic, multispectral scanner and geophysical survey.
- Remote sensing application projects for effective utilisation and better management of natural resources.
- Technology development projects and transfer of such technology to industries.

3.1.2 Organisational set up

Secretary, DOS, is the Chairman of the Governing Body of NRSA. NRSA is headed by a Director, who reports to the Governing Body and to the National Apex Body on Space headed by the Minister in charge of Science and Technology. In discharge of his duties, the Director is assisted by a Controller in-charge of administration and four Deputy Directors responsible for (i) Satellite Data Acquisition, (ii) Data Processing, (iii) Applications, (iv) Commercialisation and a General Manager responsible for Aerial Data Acquisition.



3.1.3 Scope of Audit

NRSA is audited under Section 14 of the Comptroller & Auditor General's (Duties, Powers and Conditions of Service) Act, 1971. The records of NRSA for the period 1992-98 maintained at Hyderabad were test-checked during May 1998 and September 1998. The results of test-check are included in succeeding paragraphs:

3.1.4 Finances

NRSA is financed through grants released by DOS. It also generates revenue through sale of data products, technology transfer, consultancy projects and equipment usage. NRSA prepares an Annual Financial Statement which is certified by Chartered Accountants appointed by NRSA with the approval of DOS.

The details of grants-in-aid received, revenue realised and expenditure incurred by NRSA during 1992-98 were as follows:

(Rupees in crore)

Year	Receipt			Expenditure				Saving	Closing Balance √
	Grants-in-aid	Revenue realised	Total receipt	Capital	Operational* Expenditure	Establishment expenditure	Total expenditure		
1992-93	12.60	10.68	23.28	3.71	7.79	9.05	20.55	2.73	27.06
1993-94	15.40	11.05	26.45	2.90	8.25	10.98	22.13	4.32	31.38
1994-95	15.00	13.07	28.07	3.92	8.76	12.56	25.24	2.83	34.21
1995-96	13.75	19.90	33.65	4.22	9.98	13.97	28.17	5.48	39.69
1996-97	18.70	19.46	38.16	5.86	9.68	16.73	32.27	5.89	45.58
1997-98	17.50	23.63	41.13	6.19	9.36	21.69	37.24	3.89	49.47

* Operational expenditure includes all revenue expenditure other than establishment

√ Closing balance at the end of 1991-92 was Rs 24.33 crore

DOS continued to release funds every year without taking into account huge surplus balance available with NRSA

(i) NRSA had a closing balance of Rs 24.33 crore at the end of 1991-92. Yet during the next six years, DOS continued to release grants-in-aid in excess of their overall requirement after reckoning all other receipt and total expenditure, which led to an excess cash balance of Rs 27.06 crore to Rs 49.47 crore at the end of every year. The accumulated cash balance of Rs 49.47 crore at the end of 1997-98 was equivalent to the net requirement of grants-in-aid for over three and half years.

The Secretary and Financial Advisor of the Department did not take note of the cash balance with NRSA while approving the release of grants-in-aid in a routine manner.

During these years the Union Government ran a fiscal deficit of Rs 40173 crore to Rs 85529 crore which was met by borrowed funds at the maximum rate of interest of 14 *per cent*. Unnecessary release of funds under such circumstances without reference to the balances already available with NRSA reflected deficient financial management.

DOS stated in January 1999 that the grant to NRSA was decided after taking into account the total requirement of funds for NRSA centre activity and the internal receipts of NRSA from sale of data products, user projects etc. As an illustration, DOS stated that the cash flow requirement of NRSA for the year 1997-98 was estimated as Rs 42.88 crore. To meet this expenditure, grants-in-aid of Rs 17.50 crore was decided after taking into account the estimated internal receipts of NRSA to the extent of Rs 25.38 crore.

The reply was not acceptable in view of the fact that while considering the estimated receipt and expenditure for the purpose of reckoning the grants-in-aid required, the cash balance already available with NRSA at the end of 1996-97 had not been taken into account.

DOS also stated that the cash balance included the advances and deposits received by NRSA from various users and the amount received from users towards advances/deposits could be used only for executing their jobs such as

aerial flights, application projects, satellite data supplies etc. and not for meeting running expenditure of NRSA.

The reply was not tenable in view of the fact that (a) while working out grants-in-aid, the total expenditure and receipt including the user's works were taken into account as stated in the above illustration and (b) a major amount of deposit/advance was from DOS itself. As an example, out of the total deposits/advances of Rs 41.90 crore as on 31 March 1998, an amount of Rs 24.54 crore i.e. 59 per cent was from DOS.

It is recommended that the Ministry should get the balance with NRSA excluding those of the other users, refunded and release grants-in-aid in future based on requirement only.

Large amount stood invested in the Indian Remote Sensing Satellite. DOS ought to maximise their utilisation and ensure that NSRA generates adequate funds for its revenue and most of the capital expenditure.

(ii) NRSA had to receive Rs 7.21 crore from suppliers and organisations, pertaining to 1984-85 to 1997-98, at the end of March 1998. This included Rs 2.35 crore as receivable for services provided, mainly pertaining to aerial photography, survey work and Rs 4.86 crore on account of advances outstanding against suppliers. Of this, Rs 0.96 crore was outstanding from one to 13 years.

DOS stated in January 1999 that out of Rs 4.86 crore and Rs 2.35 crore respectively, Rs 0.99 crore and Rs 0.98 crore had since been adjusted.

As such substantial amount was still pending adjustment.

(iii) The accounts of NRSA for 1997-98 included the value of an aircraft worth Rs 4.03 crore which had been lost in an accident in July 1993. NRSA had, thus, failed to indicate the impact of the loss of this property in their accounts for the last five years.

NRSA stated that report on crash was yet to be received from Directorate General, Civil Aviation.

The reply was not tenable as no action had been taken to write off this amount during last five years. On being pointed out by Audit, NRSA forwarded the proposal for write off of the aircraft to DOS in November 1998.

(iv) Advances of Rs 2.51 crore given to State Remote Sensing Centres remained unadjusted as of March 1998. Of this, Rs 2.04 crore was outstanding for more than a year.

DOS stated in January 1999 that a sum of Rs 0.26 crore had since been adjusted. The fact remain that substantial portion was still pending adjustment.

3.1.5 Acquisition and sale of data from various satellites

NRSA was acquiring remote sensing data from various remote sensing satellites mainly IRS series, LANDSAT and ERS. The data acquired was processed and archived from which data products were generated against user's demands.

IRS series were owned by DOS, NRSA had an agreement with the operators of LANDSAT and ERS satellites to access and acquire data within the footprints of the Indian Earth Station*. While no charges were required to be paid by NRSA for utilisation of IRS series, an annual accession fee was paid to acquire the data from LANDSAT. Payment to ERS operators was made against specific requirements. NRSA paid accession and distribution fee of Rs 11.92 crore for hire of LANDSAT and ERS during 1992-98. The details of scenes acquired, sold and revenue realised during 1992-98 were as follows :

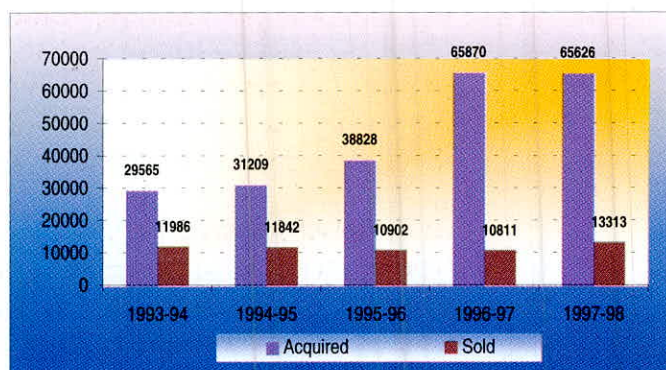
Year	Scenes acquired (cumulative)			Scenes sold			Revenue realised (Rs in lakh)		
	IRS [∨]	LANDSAT [†]	ERS [†]	IRS	LANDSAT	ERS	IRS	LANDSAT	ERS
Up to 1992-93	123211	NA	NA	8928	1319	101	204	107	9
1993-94	152776	20509	284	11986	1285	232	255	82	17
1994-95	183985	41499	365	11842	1310	165	303	155	20
1995-96	222813	62546	493	10902	987	118	341	132	11
1996-97	288683	82144	951	10811	747	354	563	92	34
1997-98	354309	99825	980	13313	267	95	891	46	22

[∨] Cumulative with effect from 1989-90

[†] Cumulative since 1993-94 N A : Not available

The utilisation of data at NRSA was low as compared to its acquisition

(i) While the desirability of data/scenes collection on a continuous basis was an acceptable function of NRSA, promotion of the use of data for economic and environmental purposes was equally important. The utilisation of data collected by NRSA raised a



* Footprint refers to the area within which Indian Earth Station at Shad Nagar is capable of capturing scenes from LANDSAT/ERS

doubt about its ability to propagate and promote their use. The number of scenes acquired from IRS series during 1994 -95, 1995-96 and 1996-97 was more than the scenes acquired during previous year by 5, 24 and 69 *per cent* respectively. As against this, the scenes utilised/ sold were less than those in the previous years. Since the policy of NRSA for acquisition of data was based on the national needs to map, monitor and manage natural resources, this trend of data utilisation implied poor value for money.

DOS stated in January 1999 that the technology had to overcome resistance to change in user organisations and the lead time for technology absorption was four-five years for utilisation of data from new sensors even in developed countries. DOS further stated that the institutional mechanism of National Natural Resource Management System and Standing Committees with user Ministries had a positive effect in popularising the use of state-of-the-art resources management system.

The reply of DOS, however, is not supported by figures of the utilisation of data/scenes by user agencies.

Revenue realised from sale of data from two foreign satellites was 61 *per cent* of expenditure

(ii) Against an expenditure of Rs 11.92 crore incurred on acquisition of data from LANDSAT and ERS, the value of data sold during 1992-98 from these sources was Rs 7.27 crore, which constituted only 61 *per cent* of the expenditure.

DOS stated in January 1999 that the prices of satellite data products charged by NRSA from Indian users were quite low when compared to international prices.

The reply was not acceptable in view of the fact that the charges in case of ERS data acquisition were being fully recovered from the users and consequently less recovery in case of LANDSAT had to be attributed to less sale of data rather than low price.

Very little data was sold to organisations in the private sector

(iii) The pattern of data/scenes used, disclosed that NRSA's data was used primarily by Government departments/agencies. Only 3.7 *per cent* sales of data had been to non-government organisations during 1994-95 to 1997-98. Since the data collected by NRSA was an important national resource, its proper dissemination and marketing should make NRSA not only self-supporting but turn it into a revenue earning agency. DOS hoped that private users in the country would be the major users in the coming years.

(iv) User requirement should have been an important tool for deciding the type of scenes to be stored as inventory. DOS stated in January 1999 that the number of products rejected by the users was less than 0.3 *per cent*. NRSA management, however, could not produce any evidence in support of a system of feedback, its review and remedial measures prevailing in NRSA. Besides rejection alone could not serve as an index of users' needs.

3.1.6 Aerial Remote Sensing

The aerial remote sensing operations of NRSA included aerial survey and photography tasks carried out with help of aircraft. These operations were carried out for large scale mapping applications like urban planning, utility/infrastructure planning, legal applications and other aeromagnetic and scanner surveys. While no targets for aerial surveys were fixed, such surveys were taken up only on specific demands from the users.

Of the four aircraft operated by NRSA, including two additional aircraft, one was lost in an accident

Two aircraft were disposed off and one aircraft was procured for Rs 13.84 core as a replacement of the aircraft lost

From 1990, NRSA has been carrying out aerial surveys using two aircraft viz. a Dakota and an AVRO. As a part of replacement plan, two Beechcraft Superking aircraft viz. B-200 and B-300 were inducted in 1990 and 1991 respectively. However, Dakota and AVRO were not disposed off even after procurement of replacements and NRSA was operating four aircraft. B-300 aircraft was lost in an air accident during July 1993. In spite of having three aircraft in operation, DOS decided to acquire one more Beechcraft Superking Air B-200 aircraft in June 1994. For this purpose a high power committee under the chairmanship of Joint Secretary (Finance) was constituted to handle the procurement. Before appointment of this committee, DOS did not examine whether purchase of the additional aircraft was necessary. The committee recommended the disposal of Dakota and AVRO aircraft and purchase of a new aircraft in lieu thereof. Dakota aircraft was disposed off in 1993-94 and AVRO aircraft was disposed off in 1995-96. After about one year of disposing off both the aircraft, a new B-200 aircraft was purchased in February 1997 at a cost of Rs 13.84 crore. During the intervening period, NRSA managed its aerial survey with one aircraft only.

The operation of one to four aircraft from time to time and continued operation of uneconomical aircraft after procurement of replacement were manifestations of lack of proper management.

NRSA did not review the decision to procure the new aircraft even though one was enough for the available work

For procuring the new aircraft, NRSA explored the possibility of major users like Oil and Natural Gas Commission (ONGC) etc. who could contribute to the cost of aircraft. No favourable response was received from them. However, NRSA did not analyse the reasons for lack of any favourable response to find whether these major users were losing interest in getting the aerial survey conducted through NRSA. Moreover, during the period when NRSA was operating only one aircraft, no request from any user for aerial survey was denied by NRSA vindicating that one aircraft was enough for the work available with NRSA.

The utilisation of aircraft had been declining year after year as detailed below:

Year	1993-94	1994-95	1995-96	1996-97
Flying hours	555	433	497	182

The utilisation of two aircraft was less than the minimum capacity of one aircraft

NRSA did not review the decision to procure the new aircraft in the light of the above factors. Consequently, after purchase, the aircraft was utilised for 100 flying hours during 1997-98 by correspondingly reducing the utilisation of the other aircraft to only 197 flying hours, making the combined use of the two aircraft for only 297 hours i.e. less than the capacity of 325 flying hours for one aircraft per season.

While confirming that flying hours had come down drastically during 1996-97, DOS attributed this in January 1999 to (a) some of the users like ONGC discontinuing their flying assignments and (b) change of requirement of users from aerial photographs alone to value added products such as maps derived from aerial photographs.

The reply of NRSA that some of the users discontinued their assignments was not tenable as the position was known before the procurement

The reply was not tenable in view of the fact that the decreasing trend in use of the flying hours was apparent since 1993-94 and an investigation into lack of interest by ONGC could have indicated their likely reduction of use of aerial remote sensing facilities.

DOS further added justifying the need for a second aircraft on the following grounds:

- (a) Installation of antenna with motion compensation system, radome, equipment racks, microwave cables, wires and ground calibration would take around two weeks.
- (b) Normally the flying programmes for the magnetometer surveys took around 2¹/₂ to 3 months of flying duration. During this period, photography tasks would necessarily have to be carried out by the second aircraft.
- (c) During the current year, one aircraft would be engaged for aeromagnetic survey for Defence Research and Development Laboratory whereas second aircraft would be required to carry out the tasks of other users.
- (d) During monsoon period, while one aircraft would undergo annual maintenance inspection, the other aircraft would be kept in readiness for flood mapping studies etc..
- (e) Requests for simultaneous flying of both the aircraft for Scanner and Synthetic Aperture Radar System had been received during the period when satellite pass over the same area.
- (f) Any possibility of break-down required at least a fleet of two aircraft to sustain this facility.

While the above arguments were not supported by records made available to audit, the reply was also not acceptable in view of the fact that the procurement committee had not recommended the purchase of aircraft as a

stand by, as envisaged in the above reply. Moreover, a minimum of 325 flying hours per flight per season had been arrived at, after taking into account all the related factors such as weather, serviceability of aircraft and periodical service checks etc. and the total flying hours for the two aircraft were less than this limit.

3.1.7 Remote Sensing Application Projects

As of March 1997, NRSA had nine major remote sensing application projects. Examination of one of these projects namely, 'Integrated Mission for Sustainable Development' (IMSD), revealed as follows:

Phase I of IMSD initiated in 1987 to cover 21 districts in 13 states was expanded in 1992 to cover 153 districts in 25 states under phase II

IMSD was initiated in 1987 with a view to finding a scientific and lasting solution to mitigate the drought which affected many parts of the country during 1985-87. Under this project, NRSA was to provide action plans to the districts recommending therein the optimum management practices for land and water resources, developmental effort, change of existing practices etc.. An illustrative list of the contents of the action plan included (i) sites for water harvesting; (ii) sites for soil conservation and (iii) sites for afforestation etc..

Under phase I, a study for a pilot demonstration of the methodology was commenced in 21 districts of 13 states in 1988-89 by DOS at an estimated cost of Rs 4.62 crore in collaboration with the respective State Remote Sensing Application Centres. In phase II which commenced in 1992, the project was expanded to include 153 districts in 25 States. The requirement of funds for phase II was estimated at Rs 33.12 crore with DOS share of Rs 28.01 crore. NRSA was expected to work in close coordination with State/District agencies for the implementation of these action plans and their evaluation in terms of visible improvements.

IMSD - Phase II

The progress of work under both the phases was very slow despite an expenditure of Rs 12.46 crore

While phase I was scheduled to be completed by December 1992, the action plans had been handed over to district administration for only 18 out of 21 districts as of March 1998, at an expenditure of Rs 2.56 crore. Implementation was in progress in 14 of these districts. In phase II, against 153 districts/blocks/watersheds (areas) initially proposed for the study, the study was taken up only in 146 areas. Reasons for not taking up seven areas were not available. Against the target of completing phase II by March 1996, action plan in respect of only 23 areas had been handed over to district administration as of March 1998. Out of Rs 15.72 crore released by DOS, only Rs 9.90 crore had been spent during 1992-98.

Special study of 92 blocks

A special study was initiated in October 1994 in respect of 92 priority blocks to be completed by November 1995

A special study was also initiated at the request of the Ministry of Rural Area and Employment in October 1994 in 92 priority blocks, which was to be completed by the end of November 1995. This included 12 blocks which had already been completed under phase-I. The studies were, therefore, taken up only in respect of 80 blocks. Seven areas chosen for special study were also included in phase II leading to duplication of work in certain blocks in these districts.

Funds allotted for the special study were rupees two crore whereas the actual expenditure incurred was Rs 2.36 crore up to March 1998. The excess expenditure of Rs 0.36 crore was met from the balances available under phase II.

Action plan had been completed in 58 out of 80 blocks as of March 1998

Though the special study was to be completed by November 1995, action plans in respect of 58 blocks only out of 80 blocks had been handed over to district administration as of March 1998. Out of these 58 blocks also, implementation of the action plan was in progress in respect of four blocks only.

Demonstration model

The net achievement of the Integrated Mission for Sustainable Development was only 1.6 per cent

Out of 247 areas (phase I : 21; phase II : 146 and special study : 80), where preparation of action plan was taken up, NRSA selected 41 areas as demonstrative models. Implementation of the action plan had commenced only in 17 of these areas. In only three of these areas (18 per cent), the beneficiaries had reported visible effects of implementation such as increase in crop yield, rise in ground water levels and control of soil erosion. In remaining 14 areas, no visible effect of implementation had been reported. As such, the net achievement of the objective had been 1.6 per cent only after nine years of operation and an expenditure of Rs 14.82 crore, in addition to the expenditure incurred by State Governments.

While confirming that the visible results had been reported in 1.6 per cent cases only, DOS stated that there was a lead time for showing up visible improvements; in respect of areas which were taken up 3-4 years back, visible improvements had been reported.

The reply was not tenable in view of the fact that phase I was scheduled to be completed by 1992. As such visible effects in at least 21 districts covered under phase I should have been visible by 1996. Moreover no effect whatsoever could be expected in case of 148 districts (60 per cent) in which even the action plan had not been handed over to district authorities.

3.2 Non-utilisation of in-house facility

Instead of using available in-house fabrication facility for an equipment, Vikram Sarabhai Space Centre unnecessarily placed supply order on an external agency at a cost of Rs 27.38 lakh.

Vikram Sarabhai Space Centre (VSSC) could not procure two sets of a component as of July 1998 although these were required for Geosynchronous Satellite Launch Vehicle (GSLV), which was scheduled to be launched in December 1995. The order for these components had been placed on private agency on the ground that the available in-house facilities could fabricate these components only by June/September 1996.

Two sets of GSLV strap-on attachment systems were required for use in GSLV, scheduled to be launched in December 1995. Despite this, VSSC asked for supply of one set of components by January 1996 and the other in May 1996, i.e. well past the originally scheduled date of the launch. In October 1995, the in-house facility of VSSC confirmed its ability to deliver the first set by June 1996 and the second set by September 1996. Since this schedule was not acceptable, VSSC floated a limited tender enquiry in January 1996 to get the fabrication done externally.

Department of Space (DOS) stated in January 1999 that it was found on further detailed discussion that it might not have been possible for in-house fabrication facility to keep up the schedule of June 1996 and September 1996, especially in view of the development work involved. This reply was, however, not borne out by records produced to audit.

Based on the tenders, an order for fabrication was placed on an external agency in June 1996, by which time, the in-house fabrication centre could have fabricated the first set. Under the contract, material was to be supplied free of cost to the fabricator and VSSC was to pay Rs 27.38 lakh for fabrication. The sets were to be supplied by fabricator within seven months of supply of material. However, the supply of components of even the first set had not been completed as of July 1998. No liquidated damages in terms of the contract had been claimed by VSSC for this delay.

Director, VSSC stated in July 1998 that the flight schedule of GSLV was changed from December 1995 to April 1999, and the delay in placement of the purchase order and subsequent non-supply of strap-on attachment system has not directly contributed to any slippage in the schedule of the project. The reply established that the revised flight schedule could have been met even by taking up fabrication internally, which could have resulted in a saving of Rs 27.38 lakh. VSSC should have been aware of the delay in launch of GSLV by June 1996 when they placed the supply order.

The supply against order for fabrication, placed in June 1996 for Rs 27.38 lakh, had not been made till July 1998

DOS stated in January 1999 that keeping in view the sophistication of space technology, the strategic nature of its development, and being a relatively new technology area, such a slippage in the planned schedule could not be ruled out.

The reply of DOS does not address the specific issues regarding delay in initiating the proposal for GSLV strap-on-attachment and their inability to anticipate the time required for launching GSLV.

CHAPTER 4 : COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

4.1 Central Scientific Instruments Organisation, Chandigarh

Highlights

- Out of 48 technologies developed at a cost of Rs 17.64 crore, CSIO could transfer only 12 for commercial exploitation against premium aggregating Rs 8.20 lakh. CSIO filed only three patent applications during 1993-98 but none could be sealed.
- Five instruments developed out of the UNDP assisted project at a cost of US \$ 1.93 million had not been transferred to pre-identified users.
- The objective of achieving self-reliance in microelectronics had not been achieved even after an expenditure of Rs 3.63 crore.
- Against the target of nine sensors for a sanctioned grant of Rs 90 lakh, only five sensors at Rs 79.03 lakh were developed for robotics. The technology developed was not commercialised.
- The technologies relating to integrated system for water management and atomic force microscope developed by CSIO at a total cost of Rs 17.48 lakh remained commercially unexploited though production agencies were identified.
- In a project for development of five endoscopes, only three endoscopes were developed, out of which only one was transferred for commercialisation.
- The amount of outstanding advances adjustable from private parties for over three years aggregated Rs 80.81 lakh.

4.1.1 Introduction

Central Scientific Instruments Organisation, Chandigarh (CSIO), a constituent laboratory of Council of Scientific and Industrial Research (CSIR), was established in October 1959 in pursuance to the recommendations of a committee set up by the Planning Commission to formulate a scheme for the development of scientific instruments industry in India. The objectives of CSIO include:

- To undertake research, design and development of scientific and industrial instruments;

- To develop techniques and to create sophisticated facilities for the same and
- To establish regional centres in different parts of the country for repair, service and maintenance of the instruments.

4.1.2 Organisational set up

CSIO is headed by a Director who is assisted by a Management Council (MC) for administering and managing the affairs of CSIO. It has a Research Council (RC) consisting of five external experts, Director of the CSIO and a senior scientist from another national laboratory. One of the external experts is designated as Chairman of RC. Director General, CSIR or his representative is a permanent invitee to RC. RC is entrusted with the task of advising and recommending the formulation of research programmes, conducting periodic review of the research activities, advising on future directions and fostering linkages with academic institutions, other research organisations, industry and potential clients.

CSIO has four Service and Maintenance (S&M) Centres at Chandigarh, New Delhi, Jaipur and Chennai. The research and development (R&D) activities of CSIO are organised under 14 divisions, which are supported by a Mechanical Workshop, a Metallurgy and Foundry division, a Standards and Calibration division and a Photo-reproduction Unit. Each S&M centre and each R&D division is headed by a scientist in-charge.

4.1.3 Scope of audit

CSIO is audited under Section 20(1) of the Comptroller and Auditor General's (Duties, Powers and Conditions of service) Act, 1971. The records maintained at CSIO headquarters at Chandigarh as well as its S&M centre at Delhi relating to the period 1993-98 were test-checked during May to September 1998. The observations as a result of test-check are included in the succeeding paragraphs :

4.1.4 Financial management

The activities of CSIO are mainly funded by the allocations made by CSIR out of the grants-in-aid received by it from the Government of India. This is supplemented by the receipts from the contract projects and other miscellaneous receipts. The year-wise position of sources and application of funds was as under:

(Rupees in crore)

Year	Sources					Application			
	CSIR		Contract* projects	Misc. receipt	Total	Revenue	Capital	Contract projects	Total
	Revenue	Capital							
1993-94	5.14	1.63	1.12	0.47	8.36	5.60	1.63	1.25	8.48
1994-95	6.60	1.60	1.41	0.18	9.79	6.26	1.60	2.67	10.53
1995-96	8.10	1.94	1.26	0.18	11.48	7.62	1.94	1.47	11.03
1996-97	8.39	1.75	2.01	0.31	12.46	7.92	1.75	1.46	11.13
1997-98	11.27	2.90	1.28	0.34	15.79	10.18	2.90	1.81	14.89

* Includes grants-in-aid, sponsored, collaborative and consultancy projects

(i) External cash flow

External cash flow generated was below the level of 33.3 per cent required to be achieved

CSIO was required to generate external cash flow of not less than one-third of their R&D expenditure. External cash flow generated, however, ranged between 9.78 to 20.80 per cent only. Against a specific target of Rs 5 crore to be generated from external sources during 1997-98, the actual external cash flow was only Rs 1.28 crore. Even out of the low amounts of external cash flow, most of it was from the Government departments only. During 1993-98, the total external cash flow from non-government source was a mere Rs 2.37 lakh.

(ii) Outstanding advances

Advances to the extent of Rs 6.71 crore granted by CSIO to its employees (for local purchases, travelling allowances/leave travel concessions), government departments and suppliers were outstanding for up to 22 years as detailed below:

(Rupees in lakh)

Year	To staff for local purchases	TA/LTC	Government departments	Suppliers	Total
1975-76 to 1992-93	4.45	10.02	97.37	68.72	180.56
1993-94	1.79	1.68	0.81	11.40	15.68
1994-95	2.79	2.66	6.48	0.69	12.62
1995-96	2.93	4.09	14.30	17.03	38.35
1996-97	2.85	1.69	10.69	88.39	103.62
1997-98	17.62	14.40	2.95	284.91	319.88
Total	32.43	34.54	132.60	471.14	670.71

Rs 80.81 lakh was not recovered from private parties for more than three years

- (a) Rs 20.14 lakh on account of TA/LTC was pending for recovery/adjustment for period ranging from one to over 20 years.
- (b) Advances adjustable from suppliers were Rs 4.71 crore which included Rs 80.81 lakh pending for recovery/adjustment ranging from three to over 20 years.

The position indicated that the safeguard of public fund in CSIO is lax and there is no accountability of the individuals towards public fund.

It is recommended that CSIR should institute an enquiry into the failure of CSIO to recover the outstanding amount and establish accountability of those entrusted with management and safeguarding of public fund. The amount outstanding against institute's employees should be recovered from them forthwith.

(iii) *Bank Account*

CSIO maintains four bank accounts i.e. for CSIO, S&M centre at Delhi, Grants-in-aid projects for 'Development of head up display for light combat aircraft' and 'CSIO-Technology information forecasting and assessment Council'. While the bank accounts have been reconciled up to 31st March 1998, the Institute was negligent in sorting out the following discrepancies constituting a risk of fraud/ misappropriation :

Receipt worth Rs 47.81 lakh pertaining to the period 1970-98 not credited by the bank

- (a) Receipt worth Rs 47.81 lakh in 141 cases during 1970-71 to 1997-98 and one item for £ 595.91 pertaining to year 1985-86 were credited in Cash Book but did not appear in Bank Statement. The shortages in bank account had not been investigated inspite of being repeatedly pointed out by Audit.

- (b) Receipt worth Rs 35.23 lakh in 320 cases were credited by bank during 1969-70 to 1997-98 but did not appear in cash book.

Amounts aggregating Rs 29.13 lakh debited by the bank were not recorded in the cash book

- (c) 321 items worth Rs 29.13 lakh for the period 1970-71 to 1997-98 were debited by Bank but did not appear in cash book.

- (d) 17 items worth Rs 96 thousand for the period 1985-86 to 1997-98 were debited in cash book but did not appear in bank statement.

Items (a) and (c) are particularly risk prone to possible frauds.

4.1.5 *R&D management*

The objective of development of scientific and industrial instruments is achieved by CSIO through its R&D projects which could broadly be classified under the following categories:

- (i) In-house projects including project assisted by UNDP*
- (ii) Grants-in-aid projects
- (iii) Sponsored projects
- (iv) Collaborative projects
- (v) Consultancy projects

In-house R&D activity of CSIO was very low as compared to Grants-in-aid projects

The emphasis of CSIO was primarily on the grants-in-aid projects, for which grant was received from different government departments. Such projects covered about 80 *per cent* of the total projects.

Though ready with a package of instruments, CSIO failed to supply any equipment to CSIR laboratories

CSIO had a package of instruments ready for use by CSIR laboratories but these instruments were not supplied to the laboratories though the value of the apparatus and equipment purchased by CSIR laboratories during 1993-98 was Rs 104.54 crore.

CSIO stated in May 1998 that the concerned laboratories preferred to import the equipment from abroad.

It had not analysed the reason for preference given to imported equipment.

CSIO undertook only four sponsored and one consultancy projects in five years. Out of four sponsored projects, only one had been completed. Of the remaining incomplete projects, one project taken up in April 1995, which was to be completed by March 1997 had, however, not been completed as on March 1998 even after delay of 12 months.

In-house projects

The details of the in-house projects pursued and completed by CSIO during 1993-98 were as under:

Year	No. of projects			
	Brought forward	Taken up	Completed	Carried forward
1993-94	1*	1	-	2*
1994-95	2	5	-	7*
1995-96	7	-	-	7*
1996-97	7	-	-	7*
1997-98	7	-	2*	5

* Including one project assisted by UNDP

* United Nations Development Programme

Only two projects, including one assisted by UNDP, were completed after time over-run of 24 months and 44 months. Of the five continuing projects, the scheduled time of completion of two projects had exceeded by three and twelve months as of March 1998. Other three were due for completion after 1997-98. CSIO did not take up any new projects during 1995-98.

UNDP assisted project

None of the five instruments developed had been released to any of the user agencies

With the long term objective of development of technology and the production of Large Scale Integrated Circuit/Very Large Scale Integrated Circuit (LSI/VLSI) devices in India and establishing competence and achieving self-reliance in the vital area of Microelectronics, CSIO formulated a project approved by the United Nations Development Programme (UNDP) in May 1988 with the financial assistance of US \$ 2.30 million, which was revised to \$ 2.51 million* in December 1992. The project titled 'Instrumentation for Microelectronics' aimed at fabricating seven instruments viz. Reactive Ion Beam Etching System, Reactive Ion Etching System, RF/DC sputtering system, Electron Beam Controlled Evaporation System, X-ray Lithography System, Auger Microprobe and LSI/VLSI testing system.

Two of these equipment viz. X-ray Lithography System and Auger Microprobe were dropped from the scope of the UNDP project in August 1990 as their production required special facilities which were very expensive. UNDP assistance was correspondingly reduced from US \$ 2.51 million to US \$ 1.93 million. The project was scheduled to be completed in August 1993. The project was operationally completed in August 1995. The preparation of terminal reports and technical documents was, however, completed only in December 1997. While specific organisations were identified as the users of the instruments developed under the project, none of the instruments developed had been released to the production agencies as of March 1998.

CSIO stated in September 1998 that the production agencies did not come forward for taking up the technologies due to non-availability of production facilities at their premises.

Grants-in-aid projects

Grants-in-aid projects involve grants by way of financial inputs either in full or in part, or/and assistance in kind. The details of the grants-in-aid projects undertaken by CSIO, was as follows:

* The account of the project was separately maintained in US \$ only and not in Indian rupees

Year	No. of projects			
	Brought forward	Taken up	Completed	Carried forward
1993-94	28	8	0	36
1994-95	36	1	3	34
1995-96	34	4	1	37
1996-97	37	4	9	32
1997-98	32	5	20	17

Out of 28 projects in hand as of March 1993 and 22 new projects taken up during 1993-98, 33 projects were completed as of March 1998. Out of 33 projects completed, 9 projects were test-checked. The desired objectives had not been achieved in five of them. Out of 17 projects yet to be completed, the scheduled date of completion in six cases had already exceeded by 36 to 51 months.

(a) Failure to achieve the objectives

(i) Development of sensors for robotics

Department of Electronics (DOE) sanctioned grant of Rs 90 lakh in November 1987 for a technology development project titled 'Development of Sensors for Robotics, Flexible Manufacturing system and Process Control' to be completed within three years. The project included development of nine Robotic sensors. Against the sanctioned grant of Rs 90 lakh, DOE released Rs 80 lakh during December 1987 to July 1991.

Out of nine sensors planned to be developed, only five sensors had been developed as of June 1998. CSIO stated in June 1998 that the work of only seven was actually taken up. Two were dropped right in the beginning as some critical components required for their development were not available from international market off the shelf. The work of other two was not pursued as the concerned scientists left CSIO.

Five sensors developed against the target of nine, had not been tested, for commercial exploitation

After successful experimentation of robotic sensors at CSIO, these were to be tested at Maruti Udyog Limited. The work on the project scheduled to be completed in November 1990, continued to be pursued till March 1997. By this time, an expenditure of Rs 79.03 lakh had been incurred. However, the required tests were not conducted. CSIO had not sent the completion report to DOE to facilitate evaluation of the technologies developed and consequential action for commercialisation thereof as of March 1998. As a result, the technologies developed at an expenditure of Rs 79.03 lakh could not be commercialised.

(ii) Defective Seismographs

Under an agreement between CSIO and Special Design Bureau (SDB), Moscow, signed in May 1993, CSIO was to procure six each of two types of sensors viz. 'Triaxial Seismometer TS-1' and 'Single-Component Vertical Seismometer SM-3 KVM' valued at US \$ 19,500 equivalent to Rs 8.35 lakh from SDB under barter trade arrangements. CSIO, in return, was to supply to SDB, various electronics equipment like personal computers, Xerox machines and printers etc of equivalent value. In disregard to the terms of contract, CSIO placed an order on SDB for supply of five each of two type of sensors at a cost of US \$ 19500 to be paid in cash. The supplies against these orders were received in February 1994 and payment was also made in February 1994 itself after certifying that the consignment had been received in good condition.

Sensors supplied to IMD, after integration with the seismic recorder developed by CSIO, were found unsuitable

The sensors received by CSIO were integrated with the analogue seismic recorders and were supplied to India Meteorological Department (IMD) in June 1994 for Rs 39.75 lakh. IMD reported the sensor's breakdown and high current consumption. The defects were traced to defective sensors imported by CSIO from SDB. CSIO also noted that the battery would require frequent charging. Instead of taking corrective action for equipment already supplied, CSIO took up the matter with SDB for modification of the design for future seismographs.

CSIO stated in June 1998 that the units supplied subsequently were based on new design and consumed less power.

The equipment supplied to IMD at a cost of Rs 39.75 lakh were, thus, rendered wasteful for field operations which could have been avoided if this aspect had been examined before certifying that the sensors had been received in good condition.

(iii) Inductive Electromagnetic Soil Salinity Tester

To address the problem posed by increasing soil salinity, CSIO undertook a project for development of Inductive Electromagnetic Soil Salinity Tester with financial support of Rs 22.18 lakh from Department of Electronics (DOE) in September 1991. The technique on which the design was based, was specific to advanced countries like USA. The steering committee*, therefore, apprehended in February 1995, whether the same would be applicable to Indian conditions and observed that the salinity tester was not capable of being used by the agricultural community directly. The steering committee further suggested to bring down the cost of the instrument from the estimated Rs 75,000 to Rs 15,000 to make it affordable at Block level.

* A committee appointed by grant-in-aid giving/sponsoring authority to monitor the progress of the project

**Inductive
Electromagnetic Soil
Salinity Tester
developed by CSIO
was yet to be tested
for Indian conditions**

The project was, however, continued without taking into account these observations of the steering committee. The project was completed in March 1997 without any changes in design as suggested by the steering committee. The project was concluded without testing the instrument in extensive field trials for accuracy and repeatability of the measurement under environmental and geological conditions of India. Since the equipment was yet to be tested or used in Indian field conditions, its utility had not been established. Thus, the utility of effort and expenditure on the project was questionable.

CSIO stated in December 1998 that field trials could not be carried out within the duration of the project due to non-availability of expert manpower.

(iv) Self-reliance in microelectronics

With a view to achieving self reliance in the vital area of microelectronics, a project titled 'Instruments for Microelectronics Device Processing' aimed at fabricating three instruments viz. Ion Implantation System, Molecular Beam Epitaxy System and Stepper Optical Lithography, was sanctioned by DOE in June 1990 with a grant-in-aid of Rs 4.53 crore. CSIO, however, did not take up the fabrication of Ion Implantation System. It decided to drop this instrument from the project in December 1996 due to uncertainty about the specifications of the system proposed to be developed. The project was completed in June 1997 with fabrication of two instruments only at a cost of Rs 3.63 crore. CSIO refunded Rs 85 lakh to DOE.

**Stepper Optical
Lithography System
integrated at CSIO
did not meet the
objective of self-
reliance**

The Stepper Optical Lithography System was integrated and installed in November 1993 with the help of subsystems imported from USA in August 1993. Semiconductor Complex Limited (SCL), a public sector undertaking of DOE found it suitable for its requirement in December 1994. DOE, accordingly, decided to shift the instrument to SCL in July 1995. In December 1996, CSIO observed that it needed the services of the supplier firm for shifting the machine in view of complex tooling and critical parameters of the machines involved. The instrument had not been shifted to SCL as of March 1998. The desired self-reliance, thus, had not been achieved.

Endoscopes

**Of the three
endoscopes developed
against a target of
five, only one could
be commercialised**

Under a project titled 'Design and development of endoscopes', sanctioned by DOE with a grant of Rs 19.50 lakh in March 1992, CSIO was to develop proto-types of Laparoscope, Cystoscope, Boroscope, Gastroscope and Industrial fiberoscope. The project was concluded in March 1998 without development of Cystoscope and Industrial fiberoscope. Out of Laparoscope, Gastroscope and Boroscope for which the technology was developed, the technology in respect of Laparoscope only was transferred for commercial use. The know-how documents for Gastroscope and Boroscope had not been prepared even as of June 1998.

(b) Non-commercialisation of technologies/ instruments

(i) Integrated system for water management

The tremendous increase in the amount of algae and other organic matter in the lakes, ponds and rivers due to the presence of Nitrate and Phosphate salts in water, often leads to serious depletion of dissolved oxygen in water. The reduced amount of dissolved oxygen in water leads to destruction of aquatic life supporting environment in the pond or lake, which can kill animals like fish etc. Accordingly CSIO, with the help of grant provided by Department of Science and Technology (DST) developed an indigenous system in March 1997 that would meet the instrumental requirement of aquaculture, water management and agriculture in the country. This technology could be further explored to develop a complete portable soil analysis system and also a much needed water quality analysis system for use in fields and remote areas.

Indigenous system developed by CSIO for water management remained unexploited

Although the Principal Investigator informed the Steering committee in June 1997 that three companies were interested in obtaining the know-how, the technology developed under the project remained unexploited as of December 1998.

CSIO stated in June 1998, that the transfer of technology was to be done by DST.

The reply was not acceptable in view of the fact that DST had provided the grants-in-aid without any such stipulation against a project proposed by CSIO.

(ii) Atomic Force Microscope

AFM developed, had not been commercialised despite identification of a user firm

CSIO, in collaboration with Institute of Microbial Technology (IMTECH), in March 1994, undertook development of Atomic Force Microscope (AFM) with a grant-in-aid of Rs 12.58 lakh received from DST. AFM so developed had extensive use in universities, biological research, medical institutions and forensic laboratories etc. for imaging surface of samples by profiling their topology with a microscope probe and could map non-conducting surfaces without exposing the samples to high voltage, as was being done in other microscopes. AFM was also capable of operation in air for imaging non-conducting surfaces. While the instrument was under development, a manufacturing unit M/s Vacuum Instruments Company (VICO) evinced interest for taking the know-how in October 1995. The project was completed in July 1997. The technology transfer was not affected resulting in the technology developed remaining unutilised as of December 1998.

CSIO stated in July 1998, that the efforts were going on with VICO for transfer of technology.

The reply had to be viewed in light of the fact that the request of VICO was pending for almost three years.

(c) Delay in completion of project**Seismological studies**

Work for setting up observatory for seismological studies not started despite availability of funds

Considering that there was no seismic station operating near Chandigarh, DST approved a project on 'Seismological studies at Chandigarh and around' with a grant of Rs 24 lakh in October 1996, of which Rs 16.70 lakh was released in October 1996 itself. Under the project, seismological observatory and necessary infrastructure were to be provided by CSIO. Instruments for recording the seismic data, a basic input for knowing the seismic status of the region as well as to understand the physical processes inside the earth were to be purchased and installed by October 1997. The data recorded at this observatory was to be processed and given to the user department like IMD and some Universities etc.. Neither tenders for civil work had been finalised nor equipment had been purchased as of March 1998. The work was, thus, still at commencement stage even after 18 months of release of funds.

4.1.6 Technology development, transfer and patents

The details of the technologies developed and transferred by CSIO during 1993-98 along with the status of patents filed and sealed were as under:

Year	In house projects				Sponsored projects				Grants-in-aid projects			
	TD	TT	PF	PS	TD	TT	PF	PS	TD	TT	PF	PS
1993-94	-	-	-	-	-	-	-	-	1	-	-	-
1994-95	1	1	-	-	-	-	-	-	3	2	1	-
1995-96	-	-	-	-	-	-	-	-	1	1	-	-
1996-97	-	-	-	-	-	-	-	-	13	2	1	-
1997-98	7	2	-	-	1	1	-	-	21	3	1	-
Total	8	3	-	-	1	1	-	-	39	8	3	-

Note: TD - Technologies developed, TT - Technologies transferred, PF - Patents filed, PS - Patents sealed

Against the 48 technologies developed by CSIO, only 12 were transferred for commercialisation

CSIO filed only 3 patents during 1993-98 of which none could be sealed

- (a) Against 48 technologies developed at Rs 17.64 crore, only 12 developed at Rs 4.68 crore were transferred by CSIO for commercial exploitation/production against premiums aggregating to Rs 8.20 lakh.
- (b) Despite having developed 48 technologies, CSIO filed only three patent applications in respect of grants-in-aid projects. None of them had been sealed as of March 1998. Not a single patent application was filed for the technologies stated to have been developed in in-house projects.

CSIO did not realise any royalty, though fixed at 2 to 5 per cent of sales

- (c) Though CSIO had fixed royalty ranging from two to five *per cent* of the sales value as a consideration for technology transfer, it did not have the details of the production linked to these technologies and consequently did not realise any amount as royalty.

CSIO stated in June 1998 that it planned to review the status of utilisation of the technologies transferred periodically and take steps for recovery of outstanding dues of premium and royalty.

The reply had to be viewed in the light of the fact that CSIO did not have any database for sale of products by the manufactures on the basis of technology transfer to know the amount of royalty receivable by them.

4.1.7 Management of purchases

On test-check of records, following shortcomings relating to purchases were observed :

Purchase orders did not contain liquidated damages/risk purchase clause

- (i) The purchase orders did not contain any liquidated damages and risk purchase clause to safeguard the interest of CSIO in case of a default by the supplier.

Purchase order did not specify the required precision of the computer

- (ii) CSIO required a RISC* processor computer. Verbal enquiries from a firm revealed that 64-Bit RISC processor would not be slow and would meet the requirement. CSIO placed an order for purchase of 64- Bit RISC processor computer in March 1995 for US \$ 37,320, equivalent to Rs 12.75 lakh on the firm. While placing the order, the requirement that the computer would not be slow when switched on for double precision, was not indicated in the purchase order. The computer was installed in July 1995. It could not demonstrate the desired performance on installation. The matter was taken up by CSIO with the supplier but no remedy was provided by the supplier. CSIO, then, requisitioned the services of an expert from Jamia Milia Islamia University, who confirmed that the computer could run only on single precision.

Thus, expenditure of Rs 13.01 lakh, including agency commission and demurrage did not give the desired precision. This could have been avoided if CSIO had specified the requirement of computer not being slow when switched on for double precision, in the purchase order.

* RISC : Reduced Instruction Set Computing

(iii) Non-installation/non-inspection/delay in installation of equipment

15 equipment procured between January 1993 and December 1997 had been lying un-inspected

A total of 15 equipment procured between January 1993 and December 1997 were lying un-inspected and therefore, uninstalled and uncommissioned as of May 1998. The aggregate cost of 12 such equipment was Rs 98.12 lakh. The cost of the remaining three equipment was not intimated by CSIO. There was also a delay in installation of equipment in 20 other cases for periods ranging from four to 20 months.

4.1.8 Manpower planning

The position regarding sanctioned and working strength of different categories of manpower at the end of each of the financial years under review was as under:

Categories	Manpower position as of											
	31.3.1993		31.3.1994		31.3.1995		31.3.1996		31.3.1997		31.3.1998	
	SS	WS	SS	WS	SS	WS	SS	WS	SS	WS	SS	WS
Scientific	184	114	184	119	184	119	166	121	166	115	166	121
Technical	419	464	420	449	420	453	379	449	379	438	379	431
Adminis- trative	175	153	190	167	190	166	170	163	188	158	188	149
Total	778	731	794	735	794	738	715	733	733	711	733	701

SS - Sanctioned strength

WS - Working strength

The ratio of non-scientific staff in relation to scientific staff had been in excess of the prescribed ratio

(a) A Review Committee appointed by the President of CSIR in December 1986 to review the functions and structure of CSIR and its laboratories recommended the ratio of scientific to non-scientific staff at 1: 1.5. In case of CSIO this ratio was 1:5 during 1993-98 resulting in excess employment of non-scientific staff.

The working strength of technical staff exceeded the sanctioned strength

(b) The working strength of technical manpower consistently exceeded the sanctioned strength. CSIO stated in June 1998, that the excess in working strength was due to reduction in sanctioned strength by 10 per cent in September 1995 in pursuance of CSIR instructions and inclusion of certain categories of personnel in the technical cadre.

The reply of CSIO was not tenable as even before reduction of posts, the working strength during 1992-93, 1993-94 and 1994-95 was in excess of the sanctioned strength by 45, 29 and 33 respectively and 12 technical persons were recruited by CSIO even after September 1995.

This calls for fixing responsibility for unauthorised increase in the strength.

(c) Sample checks disclosed that CSIO did not utilise the scientific manpower optimally. Some instances noticed in audit were as under :

Name of division	Scientific & technical staff	Utilisation of Manpower
Process Instrumentation division	13	Not involved in any project during 1997-98
Modulation Transfer Function Group	8	Not involved in any project during 1996-98
Coherent Optics Division	10	Not involved in any project during 1995-97
Optical System Design Division Environmental Monitoring	7	Engaged in only low cost grants-in-aid projects during the period of review
Evaluation Division	12	-do-
Medical Electronics Instruments Division	10	-do-

The matter was referred to CSIR in November 1998; their reply was awaited as of December 1998.

4.2 National Metallurgical Laboratory, Jamshedpur

Highlights

- Out of 259 projects completed, patent applications for only 44 had been filed, of which no patent could be sealed.
- Research results of 24 projects completed during 1993-96 at the cost of Rs 64 lakh were neither transferred to industry nor utilised by NML.
- In spite of intimation given to PAC in Action Taken Note in September 1993 that technology for production of pig iron was ready for transfer, the technology had not been transferred as of May 1998.
- Technology developed from a thrust area project for beneficiation and purification of tungsten completed in December 1993 at Rs 2.74 crore was not utilised as it was not economically viable. Another technology developed for production of ceramic tiles for floor and wall using iron ore tailing was also not utilised.
- Against the target of 33 per cent, the external cash flow ranged between 21 per cent and 25 per cent of the total expenditure during 1993-98.
- Equipment worth Rs 31.40 lakh had not been utilised for the projects for which these were purchased. Of these, equipment worth Rs 14.81 lakh were not on record.
- Physical verification of stores had not been conducted since 1992-93.

4.2.1 Introduction

The National Metallurgical Laboratory (NML) at Jamshedpur was established as a constituent unit of the Council of Scientific and Industrial Research (CSIR) in 1950 with a view to fostering fundamental and applied metallurgical research on an organised basis and to serve as a central station for carrying out research and development work on indigenous ores, minerals, refractories, ferrous and non-ferrous metals and alloys, etc. for their potential application in Indian mineral and metal industries.

The objectives of NML are:

- research in the preparation and properties of engineering materials;
- to develop know-how for gainful utilisation of natural resources of the country;

- to develop linkage with the user organisations; and
- to apply the results of research for the benefit of the society.

NML achieves its objectives through its R&D projects. As per directives issued by CSIR in August 1989, NML was expected to be more user responsive. Accordingly, all projects taken up by NML are application oriented.

Paragraph 14.3 of Report of the Comptroller and Auditor General of India for the year ended 31 March 1991: No.2 of 1992 Union Government, (Scientific Departments) had brought out deficiencies in areas of benefication of research results derived out of the projects completed and utilisation of costly equipment etc.. Cases of persistent shortcomings where noticed are included in this review.

4.2.2 Scope of Audit

Audit of NML is conducted under Section 20(1) of the Comptroller and Auditor General's (Duties, Powers and Conditions of Service) Act, 1971. The records maintained at NML, Jamshedpur pertaining to 1993-98 were test-checked during May and June 1998. The observations as a result of the test-check are included in the succeeding paragraphs:

4.2.3 Organisational set up

NML functions under the administrative control of CSIR. It is headed by a Director who in discharge of his duties, is assisted by nine R&D divisions, each headed by a Senior Scientist; six extension units at Ahmedabad, Batala, Digha, Madras, Howrah and Liason Office at Calcutta, each headed by a Scientist; and three supporting divisions, each headed by a Scientist respectively. Administration and Accounts divisions are headed by a Senior Controller of Administration and Finance and Accounts Officer.

A Research Council (RC) advises and recommends the formulation of research programmes, conducts periodic review of research activities, assesses progress of projects and advises on fostering linkages between NML and other research organisations, industry and potential clients. A Management Council (MC) consisting of eight members and Director, NML as its Chairman is responsible for managing the day to day affairs of NML.

4.2.4 Finance

NML is financed mainly through funds provided by CSIR. NML also receives External Cash Flow (ECF) in the form of contribution from sponsors and collaborators and by rendering consultancy services, the other sources of fund being the royalty premium etc. The receipt and expenditure of NML for 1993-94 to 1997-98 were as under:

(Rupees in crore)

Year	Funds from CSIR	External cash flow	Other receipt	Total receipt	Expenditure		Total expenditure	Percentage of ECF to total expenditure
					Capital	Revenue		
1993-94	9.41	2.38	0.87	12.66	0.85	8.80	9.65	24.66
1994-95	11.42	2.03	0.49	13.94	0.77	8.84	9.61	21.12
1995-96	12.54	2.52	0.75	15.81	0.72	11.55	12.27	20.54
1996-97	15.17	2.94	0.94	19.05	2.49	11.66	14.15	20.78
1997-98	19.73	3.32	1.77	24.82	1.32	13.10	14.42	23.02

(i) NML prepared project-wise estimates for in-house projects but did not maintain project-wise accounts of expenditure. Therefore, there were no means to review the project expenditure with reference to the estimates.

Generation of external cash flow fell short of the required proportion

(ii) As per directives of CSIR issued in August 1989, NML was expected to be more user responsive and to generate externally, at least one third of its expenditure on R&D from 1992-93. Against this, the external cash flow generated from outside agencies ranged between 20.54 per cent and 24.66 per cent only during 1993-98.

Recovery from sponsors was based on estimated cost and not on actual cost of the projects

(iii) The recoveries made from sponsors were on estimated cost and not on actual cost. A project titled 'Design, development, fabrication, erection, installation and commissioning of three pollution control units suitable for six cupolas at Kulti works' was sponsored by Indian Iron and Steel company, Kulti, at a contract of Rs 1.43 crore with the objective to control pollution from Kulti works (plant). Against this, NML, recovered Rs 1.32 crore only, leaving the balance of Rs 10.50 lakh unrecovered.

(iv) *Non-recovery of royalty*

Royalty and the defaulted interest thereon was not realised from APIDC, Hyderabad

NML sold Magnesium plant technology to M/s Andhra Pradesh Industrial Development Corporation (APIDC), Hyderabad in August 1987. The agreement for transfer of technology provided that APIDC would pay to NML a royalty on the magnesium produced by them for seven years from the date of commencement of production. In case of default, interest at rate of 15 per cent per annum was to be paid by APIDC. No royalty had, however, been received from APIDC. Based on the production of magnesium by APIDC during 1990 to 1993, Rs 10.65 lakh was recoverable towards royalty and interest on overdue payments. NML, however, did not act to realise this amount. It was not even aware of the production of magnesium by APIDC after 1993.

4.2.5 Development of know-how for gainful utilisation of natural resources

R&D activities for development of know-how are conducted through in-house projects and grants-in-aid projects. While in-house projects are wholly funded by NML itself, grants-in-aid projects are partly funded by NML and partly by the government departments.

(i) In-house projects

The position of in-house projects undertaken by NML during 1993-94 to 1997-98 was as under:

Year	1993-94	1994-95	1995-96	1996-97	1997-98
Carried forward	20	19	33	11	20
Additional taken up	22	35	7	19	29
Completed	23	21	29	10	17
Kept-in-abeyance	-	-	-	-	1
Ongoing	19	33	11	20	31

Technologies developed from 24 in-house projects out of 100 completed was not utilised for commercialisation

(a) During 1993-98, NML completed 100 in-house projects with estimated cost of Rs 2.32 crore. Of these, technologies developed from 24 projects (three of 1993-94, eight of 1994-95 and 13 of 1995-96), involving estimated expenditure of Rs 64.01 lakh were not utilised for commercialisation.

NML stated in June 1998 that the industry wanted technology in package form, which was not actually followed by them.

The reply was not tenable as the objective of NML was to utilise the expertise generated and it should have attempted to provide the technology as per requirement of the users.

NML further stated in June 1998 that provision of technology in packages would have involved heavy funding to reach that level, which was not available.

The reply was not acceptable as the funds required for the purpose had never been worked out and sought by NML from CSIR.

Systematic analysis of in-house projects was not possible due to non-maintenance of project folders by NML

(b) No project folder giving the details of research undertaken in respect of in-house projects had been maintained centrally. However, examination of two cases on the basis of the information made available to audit revealed the following:

An in-house project titled 'Alternate route for production of compacted graphite iron' with the objective to develop a technology for production of graphite without Titanium at an estimated cost of Rs 4.5 lakh was undertaken by NML in May 1994. As per project proposal, external trials, marketing and interaction with users were to be carried out. The project was intended for use by Tata Iron and Steel Company (TISCO) only. It was, however, taken up as an in-house project without any sponsorship from TISCO. An arrangement was, however, made for conducting trial runs at TISCO. Only a few trial runs could be conducted as it affected the production schedule of TISCO. The project, therefore, could not reach the stage of transfer of technology and the expenditure incurred on the project was rendered wasteful.

(ii) Grants-in-aid projects

In the beginning of 1993-94, only two grants-in-aid projects were in hand. During 1993-98, 20 more grants-in-aid projects were taken up. Of these 22 projects, 10 projects were completed as of March 1998.

4.2.6 Development of linkage with user organisations

The linkage with sponsors was maintained through collaborative agreements.

(a) Sponsored projects

During 1993-98, 126 new sponsored projects were taken up. Out of the total 148 projects, including 22 carried forward from 1992-93, 136 projects were completed during 1993-98. Test-check of 12 completed projects selected at random revealed the following shortcomings in four projects :

(i) Beneficiation and purification of Tungsten Ores

NML undertook in January 1988 a five year thrust area project on 'Beneficiation and purification of Tungsten Ores of India' sponsored by Defence Research and Development Organisation (DRDO) through Defence Metallurgical Research Laboratory (DMRL), Hyderabad, at an estimated cost of Rs 1.98 crore. The objective was to study the process route for beneficiation and purification of tungsten ores of Degana in Rajasthan including graphite and setting up of a versatile pilot plant at NML. In view of the fact that sizeable Indian resources were of low tenor and technology for economic beneficiation of such ores to acceptable ore concentrates or intermediaries was not indigenously available, the project was sponsored by DMRL to evolve appropriate technology.

While the project was underway, RC pointed out in June 1990 that they should be clear, right at the beginning, whether it would be worthwhile to upgrade the tungsten ores from Degana since handling of the waste materials might be much more difficult than the gains from the small amount of concentrates. RC pointed out again in November 1991 that apart from the strategic importance of producing tungsten from indigenous resources, one should minimise the

Technology developed for 'Beneficiation and purification of tungsten ores of India' costing Rs 2.74 crore, turned out to be economically non-viable

Recommendations of RC to minimise the cost of production of tungsten were not considered by NML

cost of its production as per objectives. RC further stated in May 1992 that exercise carried out would help in handling the ore but flow sheet developed would not be techno-economically attractive by international norms.

The technology developed could not be used by sponsor as it was economically unviable

All these recommendations of RC were not considered by NML while executing the project. The project scheduled to be completed in December 1992 was actually completed in December 1993 due to delay in supply of samples for analysis by the mine owners. The final project report was sent to DMRL only in March 1994. The technology developed by NML had not been used by the sponsor as of May 1998 even after a lapse of four years from the date of despatch of technology as it was not economically viable, rendering the expenditure of Rs 2.74 crore including salary component of Rs 76 lakh unproductive.

NML stated in May 1998 that economic viability of the process was not within the scope of their work as outlined in the Memorandum of Understanding (MOU). Due to strategic nature of tungsten, the idea was to develop and keep the technology ready for use if eventualities arise due to disruption of imports.

The reply was not acceptable in view of the facts that (i) DMRL had sponsored the project keeping in view the economic beneficiation; (ii) preparation of flow sheet for commercial purpose was an objective in the Action Plan prepared by NML itself and (iii) RC had repeatedly pointed out the economic aspect which was never contradicted by NML on grounds of strategic importance.

(ii) Ceramic tiles

Though the technology developed by NML was not utilised by the sponsor, it was also not licensed to others

Between January 1996 and March 1996, NML undertook two projects, funded by M/s Kudremukh Iron Ore Company Ltd. (KIOCL), Bangalore, with the objective to develop process for production of ceramic tiles for floor and wall using iron ore tailings of KIOCL. The projects were to be completed between August 1996 and January 1997 at a cost of Rs 26 lakh.

CSIR guidelines for technology transfer and utilisation of knowledge base issued in August 1989 stipulated that in the event of a sponsor failing to exercise his option within the specified period or having done so, failed to exploit it commercially within stipulated time-frame, CSIR/Laboratory was free to license the intellectual property to others. The money accruing from such transactions was to be shared equally between NML and the sponsor with a ceiling on the sponsor's share equal to the amount the sponsor had paid as sponsorship charges. NML did not make any such agreement/MOU with the sponsor and closed the projects in August 1996 and in January 1997. The reports of the projects were also sent to the sponsor in September 1996 and June 1997. Neither KIOCL utilised the technologies nor did NML make any effort for utilisation of the same by any other party.

(iii) Technology for production of low Aluminum ferro silicon

The objective of the project 'Development of technology for production of low Aluminum ferro silicon' not achieved

A project titled 'Development of technology for production of low Aluminum ferro silicon, sponsored by Research and Development Centre for Iron and Steel (RDCIS), Ranchi, a unit of Steel Authority of India Limited (SAIL) was undertaken by NML in January 1992 at an estimated cost of Rs 7.16 lakh to be completed by January 1994. The objective was to produce low Aluminum ferro-silicon on a laboratory scale in order to upscale the technology for production on a commercial scale. Trials were to be conducted in induction furnace with capacity of 2.5 kg to 50 kg. The technology developed by the NML was, however, for a load of 10 kg scale only. The project was terminated by SAIL in November 1995 due to delay in completion of the project. NML received payment of Rs 3.08 lakh against the project.

NML stated in September 1996 that large scale trials would be possible provided some one supported NML for the same.

The reply had to be viewed in light of the fact that NML had not been able to make use of support from SAIL which was readily available till the sponsorship was terminated.

(b) Collaborative projects

NML works on collaborative projects which are partly funded by private agencies and autonomous bodies. NML had five collaborative projects as of March 1993. It had taken 15 new projects during 1993-98. Out of these, 13 were completed during that period leaving a balance of seven projects as of March 1998. Test-check of two projects completed by NML revealed as follows :

Technology developed through collaborative project not utilised

(i) In para 14.3.9 of Report of the Comptroller and Auditor General of India Union Government (Scientific Departments) for the year 1992, a mention was made of Phase II of the project on "Production of Low P&S Pig Iron through Vertical Retort Direct Reduction (VRDR) Submerged ARC Surface (SFA) Route" having been shelved. In the ATN, CSIR had stated in September 1993 that after completion of Phase I, SAIL felt that there was no need to pursue Phase II as enough data had been generated in Phase I which could be commercially exploited. CSIR had further stated in the ATN that the technology was ready for transfer and negotiations with interested parties were under progress with the help of National Research Development Corporation. NML did not transfer the technology as of May 1998.

NML stated in May 1998 that no entrepreneur had come forward in view of large capital investment for putting up the commercial plant.

(ii) Development of high chrome ferritic steel for super thermal and nuclear power plants

No action was taken for transfer of technology developed through a collaborative project

NML undertook in December 1989 an interactive collaborative project 'Development of high chrome ferritic steel for super thermal and nuclear power plants' with Research and Development Centre for Iron and Steel (RDCIS) Ranchi, a unit of SAIL with the objective to find out substitute of costly austenite grade of steel for elevated temperature application in modern plants. NML spent Rs 31.27 lakh for procurement of equipment out of which Rs 24.50 lakh was paid by RDCIS and the balance Rs 6.77 lakh was diverted from another sponsored project. The salary component against the project was borne by NML. NML completed the project in June 1995 and sent the report in the same month.

As per the MOU, commercial exploitation of the technology should be shared equally between RDCIS and NML. NML did not take any step to transfer the technology on the ground that it was the responsibility of RDCIS to commercialise. The contention of the NML was not correct as the project was a collaborative one and hence commercialisation was a joint responsibility of NML and RDCIS.

4.2.7 Patents

Out of 259 projects undertaken and completed by NML, only 44 patents were filed of which no patent was sealed

NML has a system of arranging patent filing for its scientific products through CSIR. Out of 259 projects completed during 1993-98, NML had filed application for only 44 patents out of which no patent has been sealed. Year-wise position in regard to patents filed by NML for the last five years was as follows:

Year	1993	1994	1995	1996	1997	Total
Patents filed	10	5	4	7	18	44

Regarding non-registration of patents NML stated, in October 1998 that it generally takes about five years to seal a patent in India.

The reply ignored the fact that 35 patent applications filed during 1988-92 also could not be sealed even after expiry of more than five to nine years.

4.2.8 Execution of works

Large scale testing facility for mineral beneficiation available in NML was required to be augmented and modernised to meet the current demand. To achieve this, a new shed was built and equipment procured by the laboratory from different sources. NML took up the work on 'Design, supply, erection and commissioning of equipment in the new shed' in December 1994. Due to complexity of the job, NML decided to get the job done on turnkey basis. NML awarded the job to a firm of Rourkela for Rs 62.70 lakh in September

1995 to be completed by October 1996. The contract signed in January 1996 provided that the period for carrying out the work was to be strictly observed and in case of lapse, the firm was to pay as compensation an amount equal to one *per cent* per month subject to a maximum five *per cent* of order value for every eight months.

Rs 23.04 lakh was paid to the contractor, though the construction work remained incomplete

NML granted two extensions up to December 1997 without imposing any penalty. NML paid Rs 23.04 lakh as of December 1997 to the firm but the firm left the assignment without completing. NML did not take effective measures to get the work completed.

4.2.9 Missing stores

Stores worth Rs 14.81 lakh acquired in connection with a project were not traceable

NML procured stores for Rs 31.40 lakh during 1975-86 against the 'Hydro-Electric Project', which were not used for that project since it was closed in July 1987. Out of this, store records for Rs 14.81 lakh were not available. NML stated in June 1998 that the stores consisting of mainly smaller items had been utilised by different divisions as and when required.

The reply was not tenable as NML should have maintained proper records of such distribution.

4.2.10 Stores

Physical verification of stores not conducted since 1992-93

Annual physical verification of stores held by NML, required to be conducted, had not been carried out since 1992-93 despite the lapse having been repeatedly pointed out by Audit. NML constituted a committee for conducting physical verification of stores in June 1997. The verification had not commenced as of March 1998.

4.2.11 Monitoring and evaluation

CSIR's instructions for monitoring and evaluation of projects were not observed

In terms of directives of CSIR, a Project Monitoring and Evaluation (PME) cell was to be constituted for monitoring and evaluation of on-going projects at regular intervals in each institution functioning under CSIR. The cell was to be responsible for budgeting, costing and maintaining project folders for each project. The cell was required to submit a statement of progressive expenditure incurred on each in-house project along with its physical progress to the internal committee for review. The PME cell did not perform any of these functions viz. project budgeting, costing, maintenance of project folders. Thus, the estimated cost vis-à-vis actual expenditure incurred in each in-house project could not be ascertained in audit.

Projects undertaken not properly appraised by the Research Council

A review of the minutes of the RC meetings held during 1994-98 revealed that RC discussed an average of six projects in the meetings held quarterly whereas about 50 projects were carried out by NML each year. As a result, R&D projects had been continuing without regular appraisal of the progress by the RC. Some of the projects were not appraised by the RC at all.

NML stated in June 1998 that the status of all in-house projects was reported to the members of RC through agenda papers and the members visited NML and had interaction with the project leaders to facilitate close monitoring and evaluation but the fact was not properly recorded in the minutes of the meeting.

4.2.12 Manpower

The staff of the laboratory and its field stations consisted of scientists, other technical staff and establishment staff. The composition of the staff at the end of 1997-98 was as follows :

	Scientists	Technical staff		Supporting staff		Establishment staff	
	Number	Number	Per cent of scientists	Number	Per cent of scientists + technical	Number	Per cent of scientists + technical
Head Quarter	144	296	206	96	22	236	54
Ahmedabad	4	3	75	1	14	3	4
Digha	1	7	700	2	25	2	25
Batala	1	9	900	1	10	1	10
Howrah	8	3	37.5	1	9	5	45
Chennai	14	0	0	0	0	6	43
Calcutta	2	0	0	1	50	2	100
Total	174	318	183	102	21	255	52

The ratio of non-scientific staff to scientific staff had been in excess of the prescribed ratio

As would be seen from the above details, the ratio of technical staff to scientists varied between zero to 900 *per cent* at various field stations. A Committee appointed by the President of CSIR in December 1986 to review the functions and structure of CSIR and its laboratories recommended the ratio of scientific to non-scientific staff as 1 : 1.5. In case of NML, this ratio was 1 : 4 resulting in excess employment by 166 *per cent* of non-scientific staff.

The matter was referred to CSIR in October 1998; their reply was awaited as of December 1998.

4.3 Irregular provision of security for staff quarters

Central Leather Research Institute (CLRI) incurred an unauthorised expenditure of Rs 11.19 lakh during May 1995 to October 1998 on security of staff quarters.

The staff of CLRI were provided accommodation in its residential colony. Although no permission ever existed for employment of security for the colony at the cost of CLRI, the staff recruited for the security of Institute premises was looking after the security of the colony also till 1994-95. CSIR decided in July 1987 that no further staff should be recruited for security of the institute and security arrangements were to be entrusted to private agencies.

CLRI arranged security for staff quarters for which no recovery was made from the residents

CLRI, however, instead of making arrangements for security on contract basis only for the institute premises, engaged private security for the residential quarters also with effect from May 1995. An expenditure of Rs 11.19 lakh had been incurred unauthorisedly from May 1995 to October 1998 for providing security arrangement for the staff quarters. This arrangement was continuing as of November 1998.

CLRI stated, in July 1998, that the properties of the Government in the form of buildings, fittings, fixtures, utility support items and number of other accessories worth Rs 5.35 crore were placed in the colony and not providing adequate security measures at the colony would leave the assets created to undue and avoidable risks.

This unauthorised expenditure should have been borne by the residents themselves

The reply was not acceptable in view of the fact that staff quarters were allotted to the residents and consequently their security was the responsibility of the residents themselves.

The matter was referred to CSIR in October 1998; their reply was awaited as of December 1998.

4.4 Extra expenditure due to defective design

National Institute of Oceanography (NIO), Goa incurred extra expenditure of Rs 33.69 lakh due to faulty structural design submitted by an architect engaged without proper evaluation of his past experience.

NIO, Goa engaged an architect for construction of a building without examining his past experience

During his visit to NIO, Director General (DG), Council of Scientific and Industrial Research (CSIR) approved in principle, the construction of a multipurpose auditorium. While it was decided to invite tenders for civil works, the DG approved the engagement of Dr. S. P. Deshpande as the architect for this purpose at the time of discussion during his tour. The details of experience of the architect in similar works were not examined. In pursuance to discussions, NIO submitted the proposal for entrustment of work

of preparation of design to Dr. Deshpande on 13 January 1988, which was formally approved by the DG on 1 February 1988. Based on the design submitted by Dr. Deshpande in the name of 'Environment Planning and Design Consultants', the contract for construction of auditorium with roof having shell appearance was assigned to M/s Premier Builders Engineers and Contractors, Goa at Rs 1.04 crore in March 1992.

The roof of the building developed cracks, the repair of which is estimated to cost Rs 33.69 lakh

By June 1994 the main structure had been erected at an expenditure of Rs 80 lakh, when only civil, sanitary and electrical installation valued at Rs 24 lakh were left to be covered. At this stage, while removing the shuttering and centering of beams, transverse cracks developed at different places in the roof of the auditorium. A committee of three experts appointed during August 1994 to July 1995, at a fee of Rs 1.08 lakh, opined that the development of cracks was due to faulty structural design. For getting the defects repaired with help of another consultant and contractor, the expenditure was estimated at Rs 33.69 lakh. The rectification of structure was expected to be completed by December 1998.

The matter was referred to the Council in July 1998; their reply was awaited as of December 1998.

4.5 Unfruitful expenditure

Central Electrochemical Research Institute (CECRI) Karaikudi, procured a pilot plant equipment at Rs 16.93 lakh despite being aware that the plant for which the pilot plant was to be a feeder plant had been shut down.

CECRI procured pilot plant equipment to serve as a feeder to a TMML plant

Tamil Nadu Magnesium and Marine Chemicals Limited (TMML) set up a plant for production of magnesium metal with rated capacity of 600 tonne per day, for which anhydrous magnesium chloride was required as a raw material. The process flow sheet and technology for the plant was provided by CECRI. Against the requirement of 2500 tonne of anhydrous magnesium chloride every year, only 300-400 tonne was available from Nuclear Fuel Complex. To meet the deficit, TMML constituted a task force under Director, Defence Metallurgical Research Laboratory (DMRL) with members drawn from TMML and CECRI. Based on the recommendation of the task force, TMML, CECRI and DMRL submitted a joint project proposal to Department of Science and Technology (DST) for establishment of a pilot plant with capacity of 500 kg of magnesium chloride per day.

Although pilot plant was to be exclusively used for TMML, no finance was obtained from TMML

The relevance of setting up a plant with capacity of about 170 tonne per year against the additional requirement of around 2200 tonne per year was not clear. DST sanctioned Rs 20.10 lakh and released Rs 19.75 lakh in January 1993 to CECRI for setting up the plant at TMML premises. Although the plant was meant to be exclusively used by TMML, the funding of pilot plant by

TMML itself was not considered. However, for running the plant, TMML was to provide necessary utilities such as power, cooling water, compressed air and chilled water etc. The plant of TMML for which the pilot plant was to be a feeder plant, was shut down on 1 February 1993 i.e. merely 10 days after release of the amount of Rs 19.75 lakh to CECRI by DST.

The plant which was to provide utilities was shut down by TMML

By March 1993, CECRI was also aware of move to privatise TMML. While such a move could affect the commitments made by TMML, CECRI placed orders for design, manufacture and supply of anhydrous magnesium chloride plant in April 1993 and for melting furnace in January 1994. An amount of Rs 17.63 lakh was spent as of August 1998 on the project including Rs 16.93 lakh for procurement of equipment. As the main plant of TMML which had to provide necessary utilities was closed in February 1993, the equipment was not installed and commissioned. Had CECRI stopped the action for construction of pilot plant after having come to know of the move to privatise TMML, the expenditure on construction of pilot plant could have been avoided.

CSIR stated in October 1998 that the purchases were made taking into account the commitment given by TMML to the effect that the concerned section of TMML plant would be operated as soon as the pilot plant was ready.

The reply was not acceptable as CECRI had not been able to enforce any such commitment.

CHAPTER 5 : INDIAN COUNCIL OF AGRICULTURAL RESEARCH

5.1 Avoidable expenditure on procurement of module

Procurement of a cold storage module without any specific requirement resulted in avoidable expenditure of Rs 29.98 lakh.

Department of Bio-technology sanctioned a project for collection and conservation of germplasm

Department of Bio-technology sanctioned a project for establishing a National Gene Bank for medicinal and aromatic plants at National Bureau of Plant Genetic Resources (NBPGR) in March 1993. Phase I of the project was to be completed in four years. The activities to be pursued under the project included collection/acquisition, conservation, maintenance, multiplication and distribution of germplasm.

Although spare capacity already existed for conservation of germplasm, a module costing Rs 29.98 lakh was imported for this purpose

For conserving and maintaining the germplasm, NBPGR had 16 long term cold storage modules with preservation period of 50 to 100 years and one medium term cold storage module with preservation period of five to 10 years. The storage capacity of each module ranged between 20,000 and 60,000 accessions; the total storage capacity being 9,20,000 accessions. As against this, NBPGR was holding a stock of only 1,66,980 accessions of germplasm. However, in spite of availability of spare capacity to conserve and maintain the germplasm, NBPGR made a provision of procurement of one medium term module and imported the same with a storage capacity of 40,000 accessions for five to 10 years duration in September 1997 i.e. six months after the closure of Phase I of the project. The medium term cold storage module imported at Rs 29.98 lakh was still under test as of October 1998. In absence of procurement of new medium term cold storage module, all the samples collected under the project were conserved in the existing facilities of NBPGR.

ICAR stated in December 1998 that a lot of germplasm was to be collected in subsequent years in a phased manner and the existing facility for conservation of the germplasm of the project was utilised under compelling circumstances.

The reply was not acceptable in view of the fact that NBPGR had conserved only 489 accessions of medicinal and aromatic plants inclusive of 220 accessions conserved under the project, which were negligible and could be easily preserved in the existing facilities.

CHAPTER 6 : INDIAN COUNCIL OF MEDICAL RESEARCH

6.1 Failure to prepare nutrition profiles

National Institute of Nutrition, Hyderabad could prepare the nutrition profile for only one out of the ten States originally envisaged, for which grant of Rs 50 lakh was released.

NIN agreed in March 1994 to prepare nutrition profiles in ten States with the financial assistance of Rs. five lakh per State

DWCD allotted the work to NIN and released Rs 50 lakh in April 1994

As the budget was repeatedly revised by NIN, the scope of work was reduced in July 1996 to three states only

Strengthening nutrition surveillance in the country was one of the instruments of National Nutrition Policy approved by the Cabinet and Parliament during 1993-94. Department of Women and Child Development (DWCD) constituted a working group under the chairmanship of Joint Secretary DWCD, with Director, National Institute of Nutrition (NIN), Hyderabad as a member.

The working group recognised in March 1994, that preparation of nutrition profile was the foremost requirement for achieving the goal of National Nutrition Policy, as this would help to serve as the base line. At that time, State level survey in ten states viz. Andhra Pradesh, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Tamil Nadu, Uttar Pradesh and West Bengal was already being conducted by National Nutrition Monitoring Bureau (NNMB), an adhoc Centre under NIN. The working group decided to prepare diet and nutrition profile for all districts of these ten states covered by NNMB rather than restricting the survey to State level. NIN expressed its difficulties in expanding the scope and area of surveys in these states without additional financial support. DWCD provided a one time financial assistance of Rs 50 lakh and allotted the work of preparation of the profile for these states to NIN in March 1994. The amount of Rs 50 lakh was paid by demand draft in April 1994. NIN, however, did not accept the demand draft on the ground that it had not submitted any project proposal. NIN further suggested that it would prepare a detailed proposal and could initiate action in September/October 1994. It also pointed out in May 1994 that the budgetary requirement was likely to be much more than Rs. 50 lakh. NNMB suggested in June 1994 that NIN should take up the district survey in respect of ten states out of the funds provided by the Ministry. NIN submitted a detailed proposal for preparation of profile for these states with a budget estimate of Rs. 98.62 lakh in June 1994 itself. While submitting this estimate, it realised the demand draft of Rs 50 lakh issued in April 1994 for preparation of profile. In May 1995, it submitted another revised estimate of Rs 1.13 crore, which was further revised to Rs 1.26 crore in September 1995. In July 1996, the Department asked NIN to carry out the profile for only three States of Uttar Pradesh, West Bengal and Orissa within the grant of Rs 50 lakh already made available.

Survey was completed in one state only as of March 1998

The survey work was completed in Orissa in May 1997 at a cost of Rs 9.99 lakh. The work in respect of Uttar Pradesh and West Bengal had not been initiated.

Indian Council of Medical Research (ICMR) stated in December 1998 that the delay in initiation of the survey was due to delay in process of decision making by DWCD.

Thus, more than four and a half years later, nutrition profile in only one out of ten states had been completed due to indecisiveness of DWCD and NIN to firm up the requirement of funds.

The reply was not acceptable in view of the fact that NIN had also been repeatedly revising its proposals for funds and did not complete the work even to the extent possible within the funds allotted.

CHAPTER 7 : DEPARTMENT OF ELECTRONICS

7.1 Avoidable expenditure on power consumption

Failure to take action to reduce the demand for power and to install capacitors for improving power factor resulted in avoidable expenditure of Rs 18.68 lakh.

Society for Applied Microwave Electronic Engineering Research (SAMEER), Mumbai failed to take corrective action to reduce the demand for power not actually required by them and for timely installation of capacitors at all power loads for improving the power factor. This resulted in avoidable expenditure of Rs 18.68 lakh during 1992-98.

SAMEER is an autonomous laboratory of Department of Electronics. The accounts of this society are audited under section 14 of Comptroller and Auditor General's (Duties, Powers and Conditions of Service Act), 1971. It entered into an agreement with Maharashtra State Electricity Board (MSEB) for supply of electrical energy in February 1988. The agreement envisaged supply of energy with a contract demand of up to a maximum of 750 KVA. The terms and conditions of power supply by MSEB stipulated that charges were payable to MSEB at the rates prescribed from time to time on the maximum demand established during the month or 75 per cent of the contract demand whichever was higher.

Test check of the energy bills of the society for the period 1992-98 revealed that the maximum monthly demand during the above period was far below the contract demand of 750 KVA. It varied between 300 KVA and 504 KVA except during one month when the consumption was 576 KVA. Though, SAMEER was drawing less power, it was paying demand charges on 563 KVA being 75 per cent of the contract demand. This resulted in avoidable payment of Rs 10.18 lakh representing demand charges of 75 per cent of the maximum established demand on the power not actually consumed during April 1992 to March 1998. Upon being pointed by Audit, the society reduced the contract demand to 600 KVA in June 1998.

The terms and conditions of power supply also stipulated maintenance of minimum monthly power factor* of 0.90. In the event of the actual power factor being less than the prescribed standard, penalty at the rate of one per cent of monthly energy bills, for every one per cent fall in the power factor was leviable.

* Power factor refers to ratio of Watts to Volt ampere.

The maximum established monthly demand during 1992-98 was far below the contract demand resulting in avoidable payment of Rs 10.18 lakh

During 1992-98, SAMEER also failed to maintain the average power factor at 0.90 and had to pay penalty of Rs 8.50 lakh

SAMEER failed to maintain the average power factor at 0.90 during 1992-98. As a result it had to pay Rs 8.50 lakh as penalty. Though the capacitors were installed at major loads in August 1993, power factor at 0.90 had been maintained only from November 1997. This could have been avoided had they installed capacitors at all power loads for maintaining the required power factor.

Failure of the Institute to take corrective action to reduce the demand for power not actually required and timely installation of capacitors for improving the power factor at all power loads till it was pointed out by Audit, resulted in avoidable expenditure of Rs 18.68 lakh during 1992-98.

The Deputy Financial Advisor, Department of Electronics stated in September 1998 that the power requirement was planned by calculating the total power points given in the various laboratories and buildings to cater to all machines and equipment required for operations simultaneously. He further stated that the power assessment was projected keeping in view the then power requirement and future expansion plan.

The reply ignores the obvious negligence of the Institute in taking *suo-moto* prompt action to reduce the contracted demand, after it was established that the peak load was much lower than the contracted demand and for not installing capacitors to maintain the power factor.

CHAPTER 8 : MINISTRY OF ENVIRONMENT AND FORESTS

8.1 Failure to conserve rare species of plants

Out of 2000 species of flowering plants which are likely to become rare by 2000 AD, only 10 species had been preserved by Indian Botanical Garden, Howrah while Rs 17.81 lakh authorised for this purpose remained blocked.

2000 species of flowering plants were likely to be rare, threatened or extinct by 2000 AD

Survey and assessment of species under threat or on verge of extinction conducted by Botanical Survey of India (BSI) and a series of publications by various authors during 1983 to 1990 revealed that out of the existing species of flowering plants estimated at 15000, two thousand species would become rare or threatened by 2000 AD, if suitable conservation measures were not taken immediately. As loss of a single species of plant might lead to endangering many other species of plants or animals, the possible extinction of any of the species was recognised as a 'great loss' to bio-diversity. Many of these species were growing in cold climatic regions. Eastern India, which is considered as one of the major area of bio-diversity in the world, covered a broad area of comparatively cold climate.

A research project for selecting, conserving, multiplying and distributing these species was sanctioned in March 1994

A research project titled 'Ex-Situ conservation of bio-diversity with special reference to rare, threatened, endangered and endemic species of plants' was proposed by Indian Botanical Garden, Howrah in September 1993. The objective of the project was to select rare, threatened, endangered and endemic species of plants from publications of BSI, whose population in the natural habitat had dwindled considerably and was likely to be extinct if suitable measures were not taken immediately to conserve, multiply and distribute these species among different botanical and experimental gardens. The total amount of assistance required for the project was estimated at Rs 50 lakh which included Rs 10 lakh for development of a seed bank and Rs 40 lakh for plant conservatories fitted with equipment for mist propagation and seedling growth. Ministry of Environment and Forests sanctioned the project in March 1994 authorising an expenditure of Rs 17.81 lakh. This included Rs 1.50 lakh for updating the existing seed storage bank, Rs 16.06 lakh for plant conservatories and equipment including mist chamber and glass house and Rs 25 thousand for preparation of final report and publication.

The project had not been initiated as of June 1998 although the expected time of extinction of plant species had almost approached

The entire amount sanctioned for the project was drawn in March 1994 as advance. No action was taken for one year. Rs 7.86 lakh provided for the mist chamber and glass house was paid in March 1995 to Central Public Works Department for deposit work. The remaining amount of grant had not been spent as of June 1998. BSI stated in June 1998 that the mist chamber was expected to be completed shortly. The expected date of completion of construction of the glass house was uncertain as of June 1998. Thus, while the

project had not even been initiated even after five years of its sanction and the entire fund of Rs 17.81 lakh remained idle, the expected time of extinction of the 2000 species of plants had almost approached resulting in possible 'great loss' to bio-diversity.

BSI stated in June 1998, that the work was being carried out by traditional methods. BSI further added that it was hoped that many species of our country would be saved by different institutes of our country engaged in such projects.

The reply was not acceptable in view of the fact that only 50 plants of 10 species (0.5 per cent) had been propagated as of June 1998 and no other significant conservation measures had been taken. The statement of BSI regarding possible preservation of some plants by other institutes, reflects their nonchalant attitude towards environmental issues.

The matter was referred to the Ministry in October 1998; their reply was awaited as of December 1998.

8.2 Non-utilisation of training facilities

The number of trainees in three State Forest Service Colleges of Ministry of Environment and Forests has been very low compared to their capacity. Yet the Ministry did not take initiative to either reduce their number or ensure sponsorship by participating state Governments resulting in non-utilisation of one of these colleges.

In order to impart professional training to in-service officers of the Indian Forest Service and State Forest Services, Ministry of Environment and Forests had established Directorate of Forest Education at Dehradun, which carries out training through State Forest Service Colleges (SFSC) located at Burnihat, Coimbatore and Dehradun. These colleges were set up in 1976, 1980 and 1981 respectively.

The trainees for the SFSC, Coimbatore were to be sponsored by various state/UT Governments, Forest Development Corporations, Agriculture Universities etc. The trainees were to be admitted to the college as per allotment by the Director, Forest Education, Dehradun for the diploma course. On successful completion of training, the trainees from states services were intended to be posted as Assistant Conservators of Forest (ACF) in those states. In addition, SFSC, Coimbatore sponsored refresher courses and computer application courses of two weeks duration each for State Forest Service Officers from 1992-93 and 1994-95 respectively.

Number of trainees in the college at Coimbatore continuously decreased from an average of 52 per year to 19 per year

In the first year after inception, SFSC, Coimbatore registered 51 trainees for diploma course. The average intake of trainees from 1982 to 1986 was 52 per year. During the next five years i.e. from 1987 to 1991, the average intake fell down to 33, which got further reduced to an average of 19 during 1992 to 1996. During 1997, not even a single trainee was admitted to the college. The Government of Maharashtra, which sponsored 127 trainees during 1983 to 1987 and was the largest sponsor of trainees, did not sponsor any trainee after 1987. The Government of Kerala, which sponsored 12 trainees during 1984 to 1987, did not sponsor any candidate after 1987. Similarly, the Governments of Gujarat and Tamilnadu, which sponsored 25 and 17 trainees during 1980 to 1984 respectively, did not sponsor any candidate after 1984. While the number of trainees continuously decreased from an average of 52 to 19 per year, the expenditure incurred by the college, increased from Rs 33.01 lakh in 1992-93 to Rs 49.97 lakh in 1997-98. Neither the college nor the Ministry made any effort to investigate the reasons for continued decline in the number of candidates and reluctance of sponsoring states.

Ministry did not review the continued existence of these colleges resulting in non-utilisation of available resources

The average intake of trainees in SFSC, Dehradun from 1993 to 1997 was 19 per year against the capacity of 80 trainees. In SFSC Burnihat, having a capacity of 40 trainees per year, only three candidates were admitted in 1993 whereas, not even a single candidate was admitted from 1994 to 1997. The total number of candidates being provided training by the three colleges together was less than the capacity of one college alone. SFSC, Coimbatore had informed the Ministry in August 1997 that the College was facing a prospect of closure due to non-receipt of sponsorship of direct recruit ACFs from states. However, no action was taken by the Ministry to review the continued existence of this college or merge it with other two colleges, resulting in waste of resources.

The matter was referred to the Ministry in October 1998; their reply was awaited as of December 1998.

CHAPTER 9 : MINISTRY OF MINES (GEOLOGICAL SURVEY OF INDIA)

9.1 Residential quarters lying vacant

Due to inaccurate assessment, 260 of the 428 residential quarters constructed at Hyderabad were lying vacant for the last 12 years. Licence fee on vacant quarters during this period would amount to Rs 27.25 lakh besides avoidable payment of Rs 120.94 lakh on house rent allowance.

It was mentioned in paragraph 11 of the Report of the Comptroller and Auditor General of India for the year ended 31 March 1990 (No. 13 of 1991) - Union Government- Civil, that 428 residential quarters constructed at Hyderabad in 1985 at a cost of Rs 4.21 crore for the employees of Geological Survey of India (GSI) remained vacant in the absence of water and electricity supply and resultant loss of licence fee of Rs 11.21 lakh and avoidable payment of house rent allowance (HRA) of Rs 50.26 lakh during January 1986 - June 1990. In their Action Taken Note, the GSI had stated in January 1993 that the quarters would be allotted as soon as the water and electricity supply was made available.

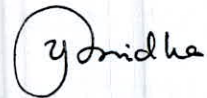
260 out of 428 quarters were vacant even as of March 1998 in spite of water and electricity supply made available in 1991

Further examination disclosed that 260 out of 428 quarters had never been occupied and were still vacant as of March 1998 even after water and electricity supply was provided in 1991. The Ministry of Mines stated in October 1997 that the residential quarters could not be allotted because of inaccurate assessment of the demand due to their location being 20 Kms away from the city and lack of basic facilities.

The Ministry failed to fix responsibility for inaccurate assessment of requirement. While the Ministry had been holding on to vacant quarters, it had not explored possibility of transferring the buildings to other needy departments or disposing them of. Had these quarters been allotted, the licence fee receipt during 1986-98 would have been Rs 27.25 lakh and HRA payment of Rs 120.94 lakh could have been avoided.

It is recommended that Ministry should fix responsibility for inaction of GSI in holding on to vacant quarters despite remote possibility of their occupation. Ministry should also consider transferring the residential accommodation to other Central Government offices who need residential accommodation.

The matter was referred to the Ministry in June 1998; their reply was awaited as of December 1998.

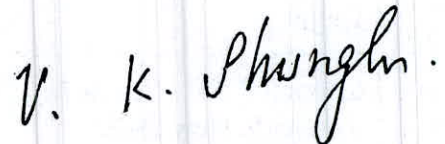


(Y.R. MIDHA)
Principal Director of Audit
Scientific Departments

New Delhi
Dated :

8 APR 1999

Countersigned



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

New Delhi
Dated :

12 APR 1999

APPENDIX I

Grants received by Autonomous Bodies audited under section 19(2) and 20(1) of Comptroller and Auditor General's (Duties, Powers and Conditions of Service) Act, 1971 and position of their accounts

(Reference - Paragraph No. 1.1.6 at page 5)

Sl. No.	Name of the Autonomous Body	Amount of grants received in 1997-98 (Rs in crore)	Date of preparation of accounts for 1997-98
1.	Wild Life Institute of India, Dehradun	4.69	23 July 1998
2.	Central Zoo Authority of India, New Delhi	3.80	17 June 1998
3.	Sree Chitra Tirunal Institute of Medical Sciences and Technology, Thiruvananthapuram	19.74	9 July 1998
4.	Technology Development Board, New Delhi	49.93	8 September 1998
5.	Indian Council of Agricultural Research, New Delhi	661.03	24 July 1998
6.	Indian Council of Medical Research, New Delhi	79.49	29 June 1998
7.	Council for Scientific and Industrial Research, New Delhi	564.12	30 June 1998
	Total	1382.80	

APPENDIX II**Grants received by Autonomous Bodies audited under section 14 of Comptroller and Auditor and General's (Duties, Powers and Conditions of Service) Act, 1971**

(Reference - Paragraph No. 1.1.6 at page 5)

(Rs in crore)

Sl. No.	Ministry/Department Name of the Autonomous Body	Amount of grants received in 1997-98
Department of Atomic Energy		
1.	Tata Memorial Centre, Mumbai	54.77
2.	Saha Institute of Nuclear Physics, Calcutta	18.04
3.	Institute of Physics, Bhubaneswar	5.60
4.	Atomic Energy Education Society's School, Mumbai	4.62
5.	Tata Institute of Fundamental Research, Mumbai	73.52
6.	Mehta Institute of Mathematical physics, Allahabad	4.57
7.	Institute of Plasma Research	22.93
8.	Institute of Mathematical Science	4.31
	Total	188.36
Department of Bio-technology		
9.	National Institute of Immunology, New Delhi	10.75
10.	National Centre for Cell Science, Pune	3.11
11.	Centre for DNA fingure printing and Diagnostics, Hyderabad	3.85
	Total	17.71
Department of Electronics		
12.	Centre for Development of Advance Computing, Pune	11.11
13.	Society for Applied Microwave Electronics Engineering Research, Mumbai	4.25
14.	Electronic Research and Development Centre, Bangalore	1.00
15.	National Centre for Software Technology, Mumbai	2.85
16.	Centres for Electronics Design and Technology of India, Aurangabad	0.57
17.	Software Technology Parks, Bhubaneswar	0.15
18.	Centre for Materials for Electronics Technology Research	4.26
19.	Centre for Liquid Crystal Research	1.05
20.	Centre for Electronics Design and Technology, Imphal	0.45
21.	Electronics Research and Development Centre, Thiruvanthapuram	5.03
	Total	30.72

Sl. No.	Ministry/Department Name of the Autonomous Body	Amount of grants received in 1997-98
Department of Environment, Forests and Wildlife		
22.	Central Pollution Control Board, New Delhi	9.83
23.	Indian Institute of Forest Management, Bhopal	2.67
24.	Indian Council of Forestry Research & Education, Dehradun	63.60
25.	Padmaja Naidu Himalayan Zoological Park, Darjeeling	0.12
26.	G.B. Pant Himalayan Paryavaran Evam Vikas Sansthan, Almora	5.23
27.	Indian Plywood Research and Training Institute, Bangalore	5.26
28.	Animal Welfare Board of India, Chennai	2.16
29.	Centres for Excellence	4.82
30.	Institute of Forest Productivity, Ranchi	NA
31.	Institute of Wood Science and Technology, Bangalore	2.63
	Total	96.32
Department of Science and Technology		
32.	Raman Research Institute, Bangalore	9.08
33.	Bose Institute, Calcutta	8.52
34.	Indian Institute of Tropical Meteorology, Pune	4.24
35.	Indian Association for Cultivation of Science, Calcutta	7.10
36.	Indian Institute of Astrophysics, Bangalore	13.32
37.	Indian Institute of Geo-Magnetism Mumbai	6.75
38.	Indian Science Congress Association, Calcutta	0.73
39.	Indian National Science Academy, New Delhi	5.73
40.	Birbal Sahni Institute of Palaeobotany, Lucknow	4.57
41.	Wadia Institute of Himalayan Geology, Dehradun	4.49
42.	S.N. Bose National Centre for Basic Sciences, Calcutta	1.61
43.	Maharashtra Association for Cultivation of Science	3.23
44.	Indian Academy of Sciences, Bangalore	1.44
45.	Institute for Plasma Research Ahmedabad	-
46.	J.N. Centre for Advanced Scientific Research, Bangalore	6.97
47.	National Academy of Science, Allahabad	0.44
48.	Technology Information Forecasting and Assessment Council, New Delhi	3.02
49.	Vigyan Prasar, New Delhi	0.52
	Total	81.76

Sl. No.	Ministry/Department Name of the Autonomous Body	Amount of grants received in 1997-98
Department of Space		
50.	National Remote Sensing Agency, Hyderabad	17.50
51.	Physical Research Laboratory, Ahmedabad	19.96
52.	National MST Radar Facility, Gadanki	1.08
	Total	38.54
Department of Telecommunications		
53.	Centre for Development of Telematics (C-DOT)	55.00
	Total	55.00
Planning Commission		
54.	Regional Computer Centre, Calcutta	0.01
	Total	0.01
	Grand Total	508.42

APPENDIX III**Outstanding Utilisation Certificates**
(Reference - Paragraph No. 1.2 at page 5)

(Rs. in lakh)

Ministry / Department	Period to which grant relates	Number of utilisation certificates outstanding at the end of March 1998	Amount
Atomic Energy	1985-86	1	1.50
	1987-88	-	-
	1988-89	2	2.96
	1989-90	2	0.57
	1990-91	1	0.75
	1991-92	1	2.51
	1992-93	3	1.82
	1993-94	3	5.79
	1994-95	9	20.33
	1995-96	9	16.64
	1996-97	42	138.14
	Total	73	191.01
Environment and Forests	1980-81	10	6.50
	1981-82	60	16.95
	1982-83	46	77.32
	1983-84	145	109.95
	1984-85	178	290.01
	1985-86	175	605.79
	1986-87	131	804.98
	1987-88	414	10408.91
	1988-89	462	2746.55
	1989-90	590	295.80
	1990-91	75	131.19
	1991-92	110	1744.19
	1992-93	292	3456.65
	1993-94	87	121.42
	1994-95	185	1495.10
	1995-96	41	64.55
	Total	3001	22375.86

Ministry / Department	Period to which grant relates	Number of utilisation certificates outstanding at the end of March 1998	Amount
Ocean Development	1983-84	8	101.52
	1984-85	23	22.94
	1985-86	48	43.53
	1986-87	29	36.13
	1987-88	27	227.76
	1988-89	80	74.74
	1989-90	134	506.33
	1990-91	17	227.46
	1991-92	32	434.31
	1992-93	8	3.00
	1993-94	44	773.04
	1994-95	79	668.87
	1995-96	53	58.77
	1996-97	99	534.94
	Total	681	3713.34
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	27	7.12
	1985-86	15	3.28
	1986-87	16	5.65
	1987-88	14	5.60
	1988-89	9	8.18
	1989-90	4	3.18
	1990-91	7	7.84
	1991-92	7	5.30
	1992-93	10	16.88
	1993-94	27	38.75
	1994-95	31	158.80
	1995-96	38	206.11
1996-97	67	23.52	
Total	324	507.15	

Ministry / Department	Period to which grant relates	Number of utilisation certificates outstanding at the end of March 1998	Amount
Geological Survey of India Department of Mines	1994-95	1	0.05
	1995-96	4	0.25
	1996-97	9	0.66
	Total	14	0.96
Electronics	1990-91	46	519.21
	1991-92	73	1346.96
	1992-93	94	1410.40
	1993-94	101	1169.81
	1994-95	135	2379.47
	1995-96	149	4279.14
	1996-97	170	5961.95
	TOTAL	768	17066.94
Non-conventional Energy Sources	1983-84	52	132.00
	1984-85	102	460.00
	1985-86	160	596.00
	1986-87	115	417.00
	1987-88	305	1414.00
	1988-89	409	1250.00
	1989-90	388	1047.00
	1990-91	99	272.00
	1991-92	158	609.00
	1992-93	49	56.00
	1993-94	NA	NA
	1994-95	NA	NA
	1995-96	271	1095.00
	1996-97	374	3649.00
	Total	2482	10997.00
GRAND TOTAL		7343	54852.26

APPENDIX IV**Outstanding Action Taken Notes**
(Reference - Paragraph No. 1.3 at page 6)

Sl. No.	Report No. and year	Chapter of the Report	Para No.	Pertains to	Brief Subject
1	5 of 1998	II	2.1	Council for Scientific and Industrial Research	Manpower audit
2	-do-	-do-	2.2	-do-	RRL Bhubaneswar
3	-do-	IV	4.1	Department of Bio Technology	Avoidable expenditure due to failure to maintain required power factor
4	-do-	VI	6.1	Department of Space	Avoidable expenditure
5	-do-	-do-	6.2	-do-	Overpayment due to change in notation of currency
6	-do-	VII	7.1	Department of Science & Technology	Excess payment of customs duty
7	-do-	-do-	7.2	-do-	Avoidable expenditure

