

REPORT OF THE COMPTROLLER AND AUDITOR GENERAL OF INDIA — UNION GOVT.  
FOR THE YEAR ENDED 31 MARCH 1987, NO. 7 OF 1988 (SEVENTH DEPTT.)

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PAGE	COLUMN	LINE	FOR	READ
TABLE OF CONTENTS	PARA	22	33	32
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PREFATORY REMARKS	PARA 2	reviews		a review
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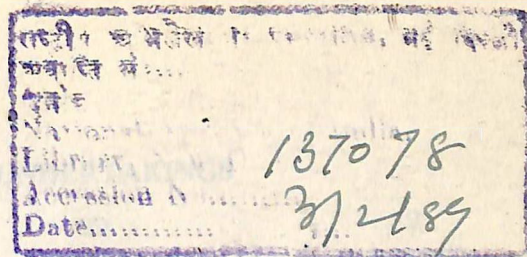
# REPORT OF THE COMPTROLLER AND AUDITOR GENERAL OF INDIA

FOR THE YEAR ENDED 31 MARCH 1987

No.7 OF 1988

UNION GOVERNMENT

(SCIENTIFIC DEPARTMENTS)



## TABLE OF CONTENTS

	PARAGRAPH	PAGE
Prefatory Remarks		i
<b>CHAPTER I</b>		
Overview		1
<b>CHAPTER II</b>		
General	1	5
<b>CHAPTER III</b>		
<b>DEPARTMENT OF ATOMIC ENERGY</b>		
Heavy Water Plant, Tuticorin	2	7
Research Reactor Dhruva	3	15
Avoidable payment of customs duty on imported scientific equipments	4	17
<b>DEPARTMENT OF ELECTRONICS</b>		
National Silicon Facility — Unfruitful expenditure in import of documents for a technology not in use	5	18
Non-utilisation of grant for a Hindi computer application programme	6	20
<b>DEPARTMENT OF ENVIRONMENT</b>		
Unfruitful expenditure on a mobile museum	7	21
<b>DEPARTMENT OF SPACE</b>		
Productionising Product 'X'	8	21
Infructuous expenditure and blockage of funds on Rocket Sled Facility	9	23
Infructuous expenditure in establishing Teflon bladder manufacturing facility	10	25
Avoidable expenditure on hiring of premises	11	25
Excess payment of agency commission due to non-observance of purchase procedure	12	26

## CHAPTER IV

### AUTONOMOUS BODIES

General	13	27
---------	----	----

#### MINISTRY OF AGRICULTURE DEPARTMENT OF AGRICULTURAL RESEARCH AND EDUCATION (INDIAN COUNCIL OF AGRICULTURAL RESEARCH)

Avoidable expenditure on acquisition and operation of a sub-standard research vessel.	14	28
Infructuous expenditure on purchase of Agar Agar Plant	15	28
Blockage of capital and avoidable expenditure on import of Mass Spectrometer	16	29
Inordinate delay in operation of a machine acquired for training purpose - Blocking up of funds	17	29
Excess payment for electricity consumed	18	30
Acquisition of Motor Fishing Vessel - Sunderbans - Heavy expenditure thereon to make it operative	19	31
Unfruitful expenditure on purchase of a movie camera	20	31
Non-deployment of surplus staff - Infructuous expenditure thereon	21	32

#### DEPARTMENT OF ELECTRONICS (REGIONAL COMPUTER CENTRE, CHANDIGARH)

Short accountal of Government money	22	33
-------------------------------------	----	----

#### MINISTRY OF SCIENCE AND TECHNOLOGY DEPARTMENT OF SCIENCE AND TECHNOLOGY (BOSE INSTITUTE, CALCUTTA)

Blocking up of capital due to non-installation of imported equipments	23	33
---	----	----

#### DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH (COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH)

Recurring loss on production of magnesium - Blockage of capital and unproductive expenditure	24	35
Blocking up of funds for 24 years due to unnecessary acquisition of land	25	36
Administrative lapses in the import of equipment and resultant blockage of capital and avoidable expenditure	26	36
Administrative lapses resulting in overpayment to a contractor	27	37
Purchase of IBM Electronic Selectric Composer	28	38

## CHAPTER V

### DEPARTMENTALLY MANAGED COMMERCIAL UNDERTAKINGS

General	29	39
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#### APPENDICES

Appendix - I	Outstanding Utilisation Certificates .	40
Appendix - II	Summarised Financial Results of departmentally managed Government Undertakings	42

## PREFATORY REMARKS

As mentioned in the Prefatory Remarks of the Report of the Comptroller and Auditor General of India for the year ended 31 March 1987 - Union Government - Civil (No. 1 of 1988) this Report includes other points arising from audit of the financial transactions of the Scientific Departments of the Union Government and Autonomous Bodies under these departments.

2. The Report includes among others, paragraphs and reviews on Tuticorin Heavy Water Project, National Silicon Facility, Productionising a Product and Pilot Plant for Production of Magnesium.
3. The cases mentioned in this Report are among those which came to notice in the course of test audit during the year 1986-87 as well as those which came to notice in earlier years, but could not be dealt with in previous years, matters relating to the period subsequent to 1986-87 have also been included, wherever considered necessary.
4. Chapter-I gives an 'Overview of the Report bringing out the significant Audit findings.

## CHAPTER I

### OVERVIEW

1. The Audit Report for the year ended 31 March 1987 contains 29 paragraphs including one review.

#### 1.1 Heavy Water Plant, Tuticorin

Amongst the operational heavy water plants, Heavy Water Plant, Tuticorin (THWP) is the most successful, having produced about 60 per cent of the indigenous heavy water. Yet its average annual production has been only 20 per cent of the rated capacity. The Estimates Committee (1983-84) in their 82nd Report (Seventh Lok Sabha) commented upon the poor performance. Subsequently additional investments, change in strategy of production, repairs, etc. were undertaken. But the annual production did not even reach the derated capacity. The cost of production remains high because the total project investment was more than doubled while average production hovers around 20 per cent. Additionally running costs are high due to price variance, quantity variance of direct materials and labour. The manpower employed is about 13 times more than that envisaged in the project report. In sum the imported technology had not been successful but the foreign collaborator had been absolved of all contractual obligations. No proforma accounts have been prepared in the last 8 years. (Paragraph 2).

#### 1.2 Research Reactor Dhruva

Research Reactor Dhruva was indigenously built and commissioned by the Bhabha Atomic Research Centre in about 13 years at a cost of Rs.107.85 crores. There were avoidable delays in various sectors and also the cost went up by Rs.31.55 crores including the cost of heavy water. Soon after commissioning, the reactor had to be shut-down due to vibrational problems resulting in loss of heavy water and replacement

of fuel rods. Further power output of the reactor has been below the rated capacity, leading to non-fulfilment of objectives and facilities for engineering, basic research and isotope production remaining to be fully established. (Paragraph 3)

#### 1.3 National Silicon Facility

Department of Electronics assessed the demand for Poly-silicon would be 200 tonnes *per annum* by 1990 and decided in favour of foreign collaboration without calling for global tenders when indigenous technology was emerging. The total project cost was indicated as Rs.90.75 crores with a foreign exchange component of Rs.23 crores. Even before the collaboration agreement was confirmed, it was indicated that the project cost was high and the demand for silicon would decline due to the emergence of alternative technologies etc. However the agreement was confirmed and Rs.7.92 crores was paid for know-how fee, etc. Finally when an Experts Committee was appointed it was observed that indigenous technology had come of age and the demand for Poly-silicon was overestimated. They recommended adoption of indigenous technology. Ultimately the contract was annulled and the technology which was imported did not benefit the country. (Paragraph 5).

#### 1.4 Productionising Product 'X'

A critical Product X required for Polaris Satellite Launch Vehicle Programme was developed successfully in the laboratory by the Department of Space. In converting it into an industrial product, the pilot plant stage was skipped to save time. But technology and process difficulties were encountered leading to loss of five years. The Indian collaborator obtained Rs.65 lakhs but could not develop the product. Ultimately import was resorted to. Subsequently, the Department entered into another contract with another collaborator for productionising



a second laboratory process for the same product. In this case, a pilot plant was established and also the collaborator was asked to invest their money thereby ensuring their commitment to the development of the product. By foregoing pilot plant and investment by the collaborator in the first instance the Department incurred infructuous expenditure of Rs.65 lakhs and lost five years. (Paragraph 8).

### 1.5 Rocket Sled Facility

Department of Space approved establishment of dynamic test facility in 1971 to be commissioned in 1974. However due to budgetary constraints its immediate need and utility were sought to be reviewed through an Experts' Committee. The Committee was to submit its report in 28 days. But on the very next day of the appointment of the Committee special steel worth Rs.9.27 lakhs was ordered which foreclosed deliberations of the Committee. One year after the ordering of steel, the Department decided that no further expenditure on this facility should be incurred because of budgetary constraints and redeployed the staff. The facility was not established even after a lapse of 12 years but the Department reiterates that the facility has not been abandoned but only postponed. On the other hand the Department also stated that in the context of evolving technology, more reliable testing facilities should be adopted. In all, the infructuous expenditure was Rs.9.44 lakhs and idle investment was Rs.4.72 lakhs. (Paragraph 9).

### 1.6 Poor utilisation of sub-standard research vessel

Central Marine Fisheries Research Institute, Cochin a constituent unit of Indian Council of Agricultural Research (ICAR) acquired a research vessel in December 1982 from an Indian shipyard at a cost of Rs.170.28 lakhs. Due to design and equipment defects, the vessel has operated only 444 days since acquisition. During this period, Rs.43.33 lakhs had been spent on repairs and maintenance. It has since been recognised that it is uneconomical to maintain and run the vessel. Due to poor utilisation, no significant achievement on research front was possible; anticipated benefits out of the investment did not accrue to the Institute. (Paragraph 14).

### 1.7 Non-installation of expensive imported equipment

The Bose Institute, Calcutta a grantee institution under the Department of Science and Technology imported four scientific equipments worth Rs.80.20 lakhs but could not install any of them for periods ranging from 2 to 7½ years for want of infrastructural facilities. Some of the equipments were rusted and became defective. Inadequate pre-planning had resulted in blockage of funds, avoidable expenditure and lapse of warranty period. Even obsolescence of the equipments was indicated. (Paragraph 23).

### 1.8 Pilot Production of magnesium

National Metallurgical Laboratory, Jamshedpur a constituent unit of Council of Scientific and Industrial Research (CSIR), commissioned a pilot plant for producing 200 tonnes of magnesium *per annum* in February 1972. Till March 1985 it had produced only 238.36 tonnes and has been in suspended animation since then. The production had declined to 5 tonnes *per annum* in the last five years preceding the suspended animation. 121 persons are continuing to be employed and the recurring expenditure on an average was Rs.39.66 lakhs *per annum*. The total infructuous expenditure till March 1987 was Rs.442.24 lakhs, besides idle investments of Rs.114.15 lakhs. Since it is outside the by-laws of CSIR to run or manage a regular production unit, attempts were made to transfer the know-how to a public/private sector agency since 1975. These were not successful because the cost of production was very high. (Paragraph 24).

### 1.9 Other Points

1.9.1 Department of Electronics released in November 1984 a grant of Rs.8.50 lakhs to Agra University for conducting a Diploma Course in Computer Application in Hindi medium. The programme was not monitored and after 2½ years in June 1987 it was ascertained that the course could not be started for want of teachers. (Paragraph 6).

1.9.2 Department of Space sent an engineer abroad and created facilities for manufacturing of teflon bladders. Quality bladders could not be produced for want of additional facilities

and import was resorted to at a cost of Rs.15.60 lakhs after incurring an expenditure of Rs.2.34 lakhs on creating the facilities. (Paragraph 10).

1.9.3 Central Marine Fisheries Research Institute, Cochin of the Indian Council of Agricultural Research purchased Agar Agar plant from the State Government of Tamil Nadu under its 'Lab to Land' programme. The plant had been lying idle with the State Government for 13 years. After purchase the plant remained idle with the Institute for another 7 years. In response to an Audit enquiry, it has been

stated that the plant which had remained idle for 20 years, would now be transferred to another Institute. (Paragraph 15).

1.9.4 Directorate of Oil Seeds Research, Hyderabad a constituent unit of Indian Council of Agricultural Research purchased a movie camera in March 1985 at a cost of Rs.3.21 lakhs. The films required for the camera could not be purchased as the import of the films had been stopped since 1984. The movie camera has remained idle for the last 2½ years. In response to an Audit enquiry, the movie camera is being proposed to be transferred to Films Division, Government of India. (Paragraph 20).

## CHAPTER II

### 1. General

As per the declared scientific policy, the key to national prosperity, apart from the spirit of the people was to be found in technology. Technology, it was stated could grow out of the study of science and its applications and it was recognised scientific techniques could make up for deficiencies in natural resources and reduce the demands on capital. Accordingly, a significant science and technological infrastructure covering a very broad spectrum of disciplines has been created.

In addition to the scientific policy, a technology policy has also been announced (1983) by the Government covering development, assessment, forecasting, import, absorption, adaptation, etc. of the technology. Together with scientific policy this provides the thrust for attempting to bring about the emergence of an industrial economy with rising levels of scientific and technological maturity and self-reliance.

During the Sixth Five Plan period (1980-85), there was significant expansion of the scientific infrastructure which included the creation of Departments of Environment, Non-Conventional Energy Sources and Ocean Development. A Cabinet Committee on Science and Technology (CCST) was also set up (1981) to provide policy guidance and a Scientific Advisory Committee to the Cabinet (SACC) was also set up (1981) with Member (Science) in the Planning Commission for providing appropriate linkages. Thus at the end of the Sixth Plan, apart from the various departments and policy making bodies, there were 320 Science and Technology institutions of which 216 institutions were specialised laboratories under the aegis of the various scientific departments. Simultaneously, allocation of funds had also been stepped up from Rs.20 crores in the First Five Year Plan to Rs.3400 crores in the Sixth Five Year Plan.

Recognising the critical role of Science and Technology in achieving the goals of Seventh Five Year Plan (1985-90) for growth, self-

reliance, improved efficiency and productivity, the allocation has been Rs.6748 crores. It has also been recognised that during the Seventh Plan period, an attempt could be made to consolidate and modernise the infrastructure that has already been built up. There is also an awareness to establish linkages between different sectors of education, scientific research, technology development and productive activities. The major new areas in Science and Technology, such as bio-technology, micro-electronics, micro-biology, oceanography, etc. are recognised as thrust areas to receive significant support. In 1986 a new Department of Biotechnology was also created.

In addition to structural changes and enhanced budgetary provisions, a large measure of autonomy has been granted in administrative matters together with enhancement of financial powers. In this context, it was also felt that the Audit arrangements for all the Scientific departments should be unified. This was done with effect from 1st April 1986. As a logical next step, a unified and separate report was considered necessary and hence this volume. In December 1987 a supplementary Audit Report covering exclusively the Madras Atomic Power Project had also been brought out.

During the course of Audit it had been urged on many occasions that the scientific departments strive for self-reliance in hi-tech processes and a certain amount of hit and miss could happen in attempting to catch up with a fast changing technology. Such failures, it was stated, happen even in the more advanced countries. It was also said that some of the processes are highly sensitive to be discussed or disclosed and that conventional methods of financial propriety and procedure should not be the yardstick. Audit is conscious of this view point and due note has been taken of this point. However, it is for the Parliament to judge how much of the scarce resources could be diverted to such ventures.

In addition to the audit of transactions within the departments, transactions pertaining

to all the autonomous bodies under the aegis of the scientific departments were also audited by the unified Audit.

The provision of funds under the Seventh Five Year Plan for the scientific departments are as under:

The expenditure, both under Plan and Non-plan heads, for the first two years of the Seventh Plan period was as under:

Departments	(Rs. in crores)	Department	1985-86	1986-87
			(Rupees in crores)	
(i) Atomic Energy	2800.00	(i) Atomic Energy	963.03	1098.58
(ii) Space	793.96	(ii) Space	229.10	310.00
(iii) Electronics	471.00	(iii) Electronics	110.91	100.87
(iv) Non-Conventional Energy Sources	412.35	(iv) Non-Conventional Energy Sources	119.79	124.80
(v) Bio-technology	132.00	(v) Bio-technology	0.04	14.32
(vi) Ocean Development	110.00	(vi) Ocean Development	14.12	16.29
(vii) Science and Technology including Survey of India Meteorological Dept. and Dept. of Scientific and Industrial Research	656.78	(vii) Science & Technology, Survey of India, Meteorological Dept. and Scientific & Industrial Research	294.54	320.02
(viii) Environment and Forest including Zoological Survey of India and Botanical Survey of India	797.00	(viii) Environment and Forest including Zoological Survey of India and Botanical Survey of India	79.51	121.72
(ix) Indian Council of Agricultural Research	425.00	(ix) Indian Council of Agricultural Research	250.44	284.23
(x) Indian Council of Medical Research	150.00	(x) Indian Council of Medical Research	39.90	38.52

## CHAPTER III

### DEPARTMENT OF ATOMIC ENERGY

## 2. Heavy Water Plant, Tuticorin

### 2.1 Introduction

The Indian Nuclear Power Programme aims at an installed capacity of 10,000 M.W. by 2000 A.D. through the establishment of a chain of natural uranium fuelled thermal reactors with pressurised heavy water (PHWR) used as moderator and coolant. Heavy Water is a compound of the heavier isotope of hydrogen, called deuterium and oxygen ( $D_2O$ ).

Department of Atomic Energy (DAE) had estimated the total requirement of heavy water for the entire programme (10,000 MW) as 13,000 Tonnes and there were five operating plants at various locations.

According to DAE, Tuticorin plant produced 20.6 per cent of installed capacity in the last 8 years. The performance, problems and remedies put through to scale up production etc. at Tuticorin Heavy Water Plant (THWP) are discussed in the following paragraphs.

### 2.2 Scope of Audit

This review covers the performance of THWP during the period July 1978 to March 1986 and the major reasons for the delay in commissioning the plant.

### 2.3 Organisational set up

The heavy water plants are managed by the Heavy Water Projects division of the DAE. The heavy water manufactured and acquired are pooled and costed and leased to the individual nuclear power projects. There are heavy water projects in Nangal, Baroda, Talcher, Tuticorin, Kota, Thal Vaishet and Manuguru. The last one is under construction. The Nangal plant is with National Fertilizers Limited and Thal Vaishet is with Rashtriya Chemicals and Fertilizers Limited.

### 2.4 Highlights

- It was anticipated that each heavy water plant could be set up within 4-5 years. This was not achieved and Tuticorin plant took 7 years.
- There were delays in completion of structural works, plant erection, fabrication of equipments etc. The departmental delays even resulted in the award of damages by the arbitrator.
- The delays increased capital cost from the original Rs.21.32 crores to Rs.48.93 crores including interest during construction. An analysis of expenditure showed that in 5 out of the 9 cases the variation was more than 65 per cent. In the case of civil and structural work the variation was 36 per cent. Since commissioning had been delayed by about 10 months additional supervision charges of Rs.3.60 crores had to be paid to M/s Gelpra.
- The Tuticorin plant achieved an average annual production of 20.6 per cent against its installed capacity in the last 8 years.
- The plant has been able to operate on an average for about 150 days against 300 available days per annum in the last 8½ years. The loss of production is in the order of Rs. 123.97 crores.
- The Heavy Water Board had attempted a series of repairs, replacement and modifications to the plant to improve production at additional cost. Coupled with low production, it has changed the economic profile of the plant.

- DAE itself has admitted that the cost of heavy water would be Rs.4120 per kg. based on achievable capacity. On the basis of actual average annual production, the cost would be Rs.13,800 per kg.
- The plant has also attempted a change in strategy of production by initially producing off-grade heavy water which is subsequently upgraded outside the plant.
- The consumption of spares and maintenance cost was high and Rs.190 lakhs had been spent *per annum* on an average. This means a maintenance cost of Rs.1301 per kg. of heavy water produced on an average.
- The power consumption in 1984-85 and 1985-86 was high and the expenditure on this alone was Rs.1650 per kg. in the latter year on the basis of actual production.
- Though the plant has been in production for about 8 years, no proforma account is being prepared.
- Southern Petrochemical Industries Corporation (SPIC) delayed repayment of the financial assistance afforded to them. Since the agreement did not envisage payment of any interest for delayed repayments SPIC was absolved and loss to the Government till 31st March 1985 was Rs.8.65 lakhs.
- No compensation is being collected from SPIC for obtaining cooler Ammonia in

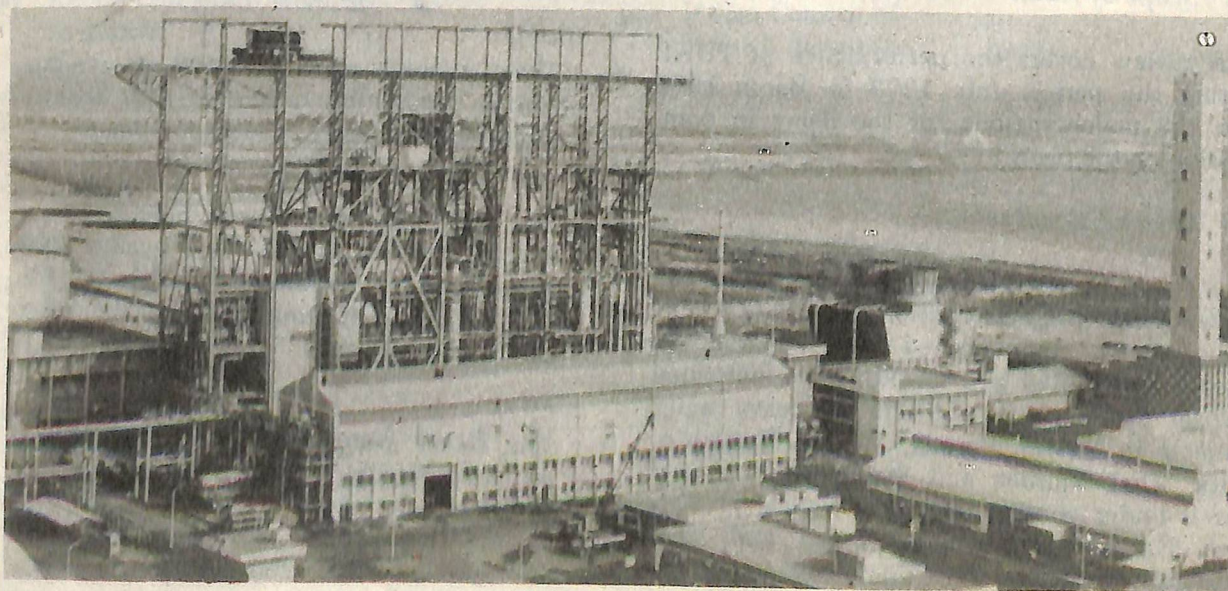
return, than what they originally supply. To an Audit query, DAE stated that the matter was being pursued.

## 2.5 Import of know-how

It was initially decided in January 1971 that THWP would have a certain capacity which was subsequently scaled up as it was found feasible to increase the production of ammonia from 1000 tonnes per day to 1100 tonnes per day in the fertilizer plant at SPIC. The total capital cost was estimated as Rs.2132 lakhs including a financial assistance of Rs.382 lakhs to SPIC for agreeing to increase the ammonia production.

A technical collaboration agreement was entered into with M/s Gelpra, a French Consortium, for a turn-key project and an agreement was entered into in April 1971 with the plant scheduled to be commissioned by January 1975. The agreement provided for various guarantees and warranties for machinery supplied, utilities to be consumed, maintenance of production levels etc.

The plant was commissioned in July 1978 instead of January 1975 with a delay of 42½ months. However M/s Gelpra was absolved of all their contractual obligations, guarantees, warranties etc. through an amending agreement entered into in November 1978 because the plant could not be run and tested on sustained basis due to power shut-down etc. THWP did not reach the level of production indicated in the technical agreement and even the consumption of utilities and spares were higher than



Heavy Water Plant, Tuticorin.

those anticipated. Thus, the technology transfer was incomplete at the time of the termination of the contract and the foreign collaborator had to be absolved of his contractual responsibilities.

## 2.6 Delays

The delay of 42½ months was due to a variety of causes and some of the illustrative cases of delays are mentioned below:

### (i) Delay in acquisition of land and soil testing

As per the schedule, acquisition of land and soil testing were to be completed within 4 months i.e. 24th September 1971. However, this was completed only in April 1972. The DAE stated in October 1987 that SPIC changed the location of the site within its premises leading to delay. There was also some delay in acquisition since the land to be acquired was under salt cultivation.

### (ii) Delay in completion of structural work

Firm 'Y' was awarded the structural steel work at plant building and was to complete the job in 10 months, i.e. by December 1973. The work was completed only in July 1976, i.e. after a delay of 32 months. The sole arbitrator held (April 1982) that the delays in the submission of the approved drawings and supply of the requisite steel were mainly responsible for the prolongation of the contract. He held the DAE to be exclusively responsible for a delay of 9-10 months and the contractor was allowed Rs.2.05 lakhs by way of wage escalation. DAE stated that the delay was due to complexity of the structure, steel shortage, transportation and delay in getting the approval of the collaborator.

### (iii) Delay on the part of indigenous fabricators/equipment suppliers

A public sector undertaking was to supply 14 items of equipments by October/November 1973 for a total value of Rs.34.04 lakhs. Subsequently the order was cancelled since no production work had commenced even by October/November 1973 and import was resorted to. No claim for liquidated damages had been made (October 1986) because the exact effect of the delay could not be assessed since there were

also delays in the completion of other items of work like civil work, erection of structures etc. In addition, there were other instances of delay in receipt of equipment from indigenous suppliers. A list of important cases where the purchase value of the equipment is more than Rs.5 lakhs and where delays had occurred is appended.

DAE accepted the facts (September 1987) and stated "keeping in view our efforts to induce Indian vendors to take up fabrication of complex structures and equipment to exacting specifications, levying of penalty would have been counter-productive".

### (iv) Delay due to increased imports

The agreement with M/s Gelpra provided specific items of machinery/equipment which were to be indigenously procured. However, a later survey revealed that all these items could not be indigenously procured according to specifications and had to be imported. This resulted in delay. Had the survey been done in time and decisions taken earlier the delay could have been reduced. DAE stated that reordering on foreign vendors by itself did not delay the completion of the project.

## 2.7 Cost over run

The initial financial sanction issued in September 1971 indicated the project cost as Rs.2027 lakhs with foreign exchange component of Rs.690 lakhs. This was revised to Rs.2132 lakhs with a foreign exchange component of Rs.1142 lakhs when the production was scaled up. However a variety of reasons including delays led to cost escalation and a revised financial sanction for Rs.3741 lakhs was issued in June 1979. This was exclusive of capital cost on spares of Rs.117 lakhs which has been deducted from capital account. The total capital cost including Interest During Construction (IDC) was Rs.4893 lakhs and the variation with reference to the original cost was Rs.2761 lakhs or 130 per cent.

An analysis indicated additional expenditure of more than 65 per cent occurring in the case of 5 out of the 9 sanctioned heads. There was 36 per cent increase in the case of civil and structural work. The additional expenditure was also heavy in the case of imported machinery and equipment, supervision charges paid to M/s Gelpra etc. The details are given below:

Sl. No.	Item	Original cost	Revised cost	Difference +increase -decrease	Reasons
(Rupees in lakhs)					
1.	Establishment and office contingency	96.80	160.00	+63.20	Delay in completion of the plant by 43 months.
2.	Plant contingency	40.80	99.80	+59.00	
3.	Civil and structural work	141.00	192.00	+51.00	i) Increase in foundation, civil and structural works; ii) Need for pile foundation; iii) Acquisition and development of additional land with independent approach to plant site; iv) Additional structural steel and piping layout firmed up subsequently and escalation in the cost of steel, labour and material; v) Additional civil works for switchyard, control room, stores etc.
4.	Erection	105.00	121.20	+16.20	General upward trend in cost.
5.	Machinery	1398.90	2346.00	+947.10	i) Increase in cost of FOB supplies combined with variation in exchange rate: 470.75 ii) Additional stores: 77.26 iii) Insurance and ocean freight: 45.40 iv) Increase in customs duty: 313.21 v) Railway freight and inland transportation: 40.48 <u>947.10</u>
6.	Supervision of erection and commissioning	70.00	450.00	+380.00	i) Extended stay of personnel of consortium: 243.00 ii) Variation in exchange rate: 110.00 iii) Increase in the allowance payable in India and cost of extension of bank guarantee: 27.00 <u>380.00</u>



7.	Engineering design and consultancy	279.50	344.00	+64.50	Variation in exchange rates.
8.	Plant commissioning expenses	—	145.00	+145.00	Cost of raw materials and utilities consumed during trial run and commissioning.
9.	LESS cost of spares operational items to be decapitalised on commercial operation of the plant	—	(-) 117.00	(-)117.00	Cost of spares since decapitalised (March 1979).
Total		2132.00	3741.00	(+)1609.00	

The commissioning period provided in the agreement was 2½ months and the supervision charges provided were Rs.70 lakhs. Since the period of commissioning was extended to 10 months, additional payment of Rs.360.47 lakhs had to be made to M/s Gelpra inclusive of variations in exchange rates. The extension was attributed to frequent interruptions in the supply of synthesis gas by SPIC and power failures, over which THWP had no control.

The original estimate did not provide for any plant commissioning expenses presumably on the ground that the commissioning was to take place in a short period and the expenses were expected to be marginal. However, since the period of commissioning extended to 10 months and the actual consumption of raw materials and utilities such as water, boiled feed water, electricity, lubricant, etc. was on a high scale, the expenditure of Rs.162 lakhs had to be separately booked and capitalised. Similarly in the original estimate no provision for import of spares was provided as the technical agreement with M/s Gelpra provided for supply of 2 years' spares valued at FF 16,40,000. However subsequently spares valued at FF 23,86,898 were imported. DAE stated that additional spares were required to suit Indian conditions and they were also required to minimise outages.

## 2.8 Performance of the plant

According to the perspective plan (1985-2000) prepared by DAE, the Baroda Plant, set up with M/s Gelpra collaboration, faced problems right from the erection stage. There were also

delays in the supply of fabricated equipments, design defects, leakages, failures of pumps, cracking of equipments, explosion, etc. The problems encountered were typical of a new technology and step by step advance was made towards better performance. Since a new technology was being absorbed and since French Pilot Plant had been operated only for 2 years, in retrospect, the decision to contemporaneously set up two plants at Baroda and Tuticorin was not ideal. DAE stated in September 1987 that the technology was a newer one and the reactor programme drawn up by DAE envisaged additional production of heavy water and there was no time to wait for Baroda plant to become operational. The Baroda plant which was taken up in 1970 finally became operational in 1980 and THWP became operational in 1978. The production performance of THWP was far below the anticipated levels in the last 8 years. The best production was 42.7 per cent of the designed capacity and the average has been 20.6 per cent even after 8 years. The shortfall in production amounted to Rs.186.67 crores.

DAE stated (September 1987) that the accepted achievable capacity of the plant is now different and the shortfall in production should therefore be compared with the above achievable capacity. In the year 1986-87 about 73 per cent of the effective capacity was achieved and it was expected to improve further. But the effective capacity which the DAE is referring to is the revised one and not the original one for which investments had been made.

The reasons for shortfall in production have been identified as under:

- (i) the content of deuterium in the feed synthesis gas was not upto the required quality;
- (ii) the content of deuterium in the depleted gas was richer in quality; and
- (iii) frequent shut-down due to external and internal causes like interruptions in the supply of feed gas and mechanical problems.

Several modifications were carried out to overcome these identified problems including recycling of the depleted gas which was expected to increase the production. Additional major equipments like heat exchanger, buffer vessel, quick open valves, isolation valves, safety valves, etc. were ordered (September 1979) at a cost of Rs.28.66 lakhs. The scheme was only partially implemented because of difficulties encountered during the actual modifications. Also there was improved power supply which made the actual modifications redundant. The total expenditure on partial modification and dismantlement amounted to Rs.51.08 lakhs.

Earlier, it was the experience that after every shut-down 3 days were required to line up the system after the synthesis gas was made available and 4-5 days thereafter to achieve 70 per cent concentration of nuclear grade heavy water and further 10 days to reach 100 per cent concentration. Thus the plant had to operate for a continuous 17/18 days to put the system through. In order to abridge the start up operations, it was decided to reduce the concentration of heavy water to be produced to 70 per cent nuclear grade and upgrade it separately. The above change was attempted during 1979-80 and 1980-81 and it was estimated that production value would go up by Rs.450 lakhs. DAE sanctioned (November 1981) the upgradation facility at an estimated cost of Rs.95.05 lakhs. The facility was commissioned in October 1984 at a total cost of Rs.99.70 lakhs.

Since the production did not match the rated capacity, despite the above modifications the Heavy Water Board (Board) constituted a sub-committee (December 1982) to study the causes. The sub-committee recommended remedial measures/modifications to be carried out in two phases at an estimated cost of Rs.250 lakhs. The plant authorities stated in February 1987 that all recommendations except the one for increasing the liquid-gas ratio and provision

of captive power plant had been implemented. Despite the implementation of these recommendations, heavy water production was far below the designed capacity.

The poor production at THWP was also the subject of comment of the Estimates Committee (1983-84) who in their 82nd Report (7th Lok Sabha) observed "The Committee find that the Heavy Water Plants at Tuticorin and Baroda which were commissioned in July 1978 and in July 1980 with an installed capacity of 71.3 MT and 67.2 MT respectively have not been working at full capacity because of technical problems. The Committee are of the firm view that when the demand for heavy water to support the nuclear energy programme is picking up so fast, we cannot afford to let the existing heavy water plants languish". But the production could not be substantially improved. Ultimately, the Board recommended (July 1986) derating the achievable capacity of the plant which was accepted by the Atomic Energy Commission.

DAE had also approved (June 1986) further modification at a cost of Rs.100 lakhs involving recirculation of a part of the synthesis gas going through the converter for increasing the ammonia conversion ratio so that additional ammonia required for the reflux could be obtained from the existing system. On this account the improvement in production was expected to reach at least the derated capacity. DAE stated (September 1987) that recirculation pump was expected to be delivered by October 1987.

In addition the plant operational days were also below the norms and in the last 8½ years it has operated only for 1284 days as against 2550 available days. The loss of production in 1266 days is calculated to be Rs.123.97 crores.

In the light of the actual average annual production the technology absorption and stabilisation of operational procedures seem doubtful. The plant authorities stated (February 1987) that at the time of entering into contract with SPIC the deuterium concentration in the feed gas and the quantity of gas to be supplied by SPIC could not be predicted as the SPIC plant had not come into being.

## 2.9 Cost of Production

The plant commissioned in July 1978 has not yet been declared commercial and no proforma accounts have been prepared. DAE agreed to

consider the commercial notion of the project and stated that the plant would be declared commercial as soon as sustained operation and production levels were reached.

At the time of setting up of the plant (September 1971) the cost of indigenous production of heavy water was estimated to be Rs.500 per kg. which compared favourably with the then landed cost of Rs.670 per kg. Even after the revision of the project cost (June 1979) the unit cost of production was worked out at Rs.1145 per kg. But many instalments of additional investments and shortfall in production have considerably escalated the cost of production.

DAE stated (September 1987) that cost of production of heavy water at the achievable capacity works out to Rs.4120 per kg. and the investment including interest during construction per annual tonne is Rs.99.80 lakhs. This is only notional now because the actual average production is much less than the achievable (derated) capacity taken for the purposes of calculation by the Department.

On the basis of actual average annual production the cost would be Rs.13800 per kg. Apart from low production levels which had increased the cost of production, increased capital deployment, increased consumption of utilities and spares etc. had also contributed to high cost. The consumption of spares and maintenance cost as per the accounts for the period 1978-86 are given below:

Year	Spares	Maintenance (Other than spares) (Rs. in lakhs)	
1978-79	--	30.08*	
1979-80	--	19.76*	
1980-81	--	107.82*	
1981-82	122.92	6.58	
1982-83	164.97	4.09	
1983-84	159.63	2.16	
1984-85	250.93	17.66	
1985-86	126.01	13.08	
Total	824.46	201.23	1025.69
Average per annum	164.89	25.15	190.04

\*Includes spares also

The maintenance cost including spares has been Rs.1301 per kg. on the basis of average annual production. The high cost of maintenance had been attributed to the relatively increased wear and tear due to frequent shut-downs and start-ups of the plant. DAE however stated (October 1987) that approximately only 20 per cent of the spares have been consumed so far. This means a huge inventory of Rs.660 lakhs which is about 4 years consumption and represents blockade of capital.

Amongst the other inputs electricity is important because the project is energy intensive. During 1984-85 and 1985-86, the consumption of power was more than twice the limits indicated in the project report. The cost of this input was Rs.262.37 lakhs and Rs.456.28 lakhs respectively. In the latter year the expenditure was Rs.1650 per kg. on the basis of actual production.

In 1985-86 the total cost of utilities amounted to Rs.1100.97 lakhs or Rs.4000 per kg. on the basis of actual production.

As per the original agreement with M/s Gelpra 35 persons exclusive of maintenance personnel were to be employed to run the plant. However, DAE assessed (December 1971) the requirement to be 350 persons on commissioning the plant. The men in position after the plant became operational were 373 in 1978-79 and 457 in 1985-86.

The personnel cost has been on the increase both on account of numbers and on account of normal increase in salaries and wages. Contrasted against the derated production the personnel cost for per tonne of heavy water would be mounting. DAE stated (September 1987) that the revised requirement of staff is 523 and the Gelpra assessment was not valid in the operational context of THWP.

### 2.10 Other interesting points

#### (i) Payment of extra financing charges of FF 215,000 due to delays

The contract entered into with Gelpra provided for supervision charges of FF 2,260,000 for erection and commissioning of the plant. This was increased to FF 12,260,000 later. An amended contract of November 1978 provided for payment of FF 215,000 for any delay in payment. There was delay in making the payment of FF 2,500,000 being the last instalment resulting in additional payment of FF 215,000 (Rs.3.99 lakhs).

DAE stated (September 1987) that supervision charges were released late to have additional hold over them so that they would expedite the commissioning and conduct the performance test. The objective of the DAE was not achieved and the foreign technicians were released before commissioning. Also the above amendment was entered into in November 1978 when the plant was already delayed by 42 months.

DAE further stated that due to continued unstable power supply, the commissioning of the plant got delayed considerably and the period upto which the foreign engineers and technicians were required to be maintained at site was not definitely known. A decision was, therefore, taken to terminate the contract with an amendment which was signed in November 1978 in order to minimise the total payments.

(ii) *Loss of interest on belated repayment by SPIC*

In terms of agreement between THWP and SPIC, the latter had to repay at Rs.80.22 lakhs *per annum* for the first ten years from the date their ammonia plant went into commercial operation to liquidate the financial assistance of Rs.382 lakhs given to them. THWP claimed

(July 1983) interest from SPIC on belated repayments. SPIC rejected (April 1985) the claim stating that the agreement did not envisage any such payment of interest.

Failure to make suitable provisions in the agreement resulted in a loss of Rs.8.65 lakhs upto 31st March 1985. DAE stated that they had no comments.

(iii) *Undue benefit accruing to SPIC due to limitations in claiming compensation*

The agreement between THWP and SPIC provided specifications of the synthesis gas to be returned by THWP to SPIC and *inter alia* stipulated that if the temperature of the gas returned by THWP was lower than the temperature of the gas supplied by SPIC, SPIC should pay compensation to THWP on a mutually agreed basis. So far, THWP has not claimed compensation on this account.

DAE stated (September 1987) that SPIC is neither agreeable to pay any compensation for the additional frigories nor to receive the synthesis gas from THWP (Tuticorin) at higher temperature as it adversely affects their plant operation as a result of increase in pressure of their refrigeration system. The matter is still being pursued with SPIC.

*List of important cases where the purchase value is more than Rs.5 lakhs and where delay has occurred (Referred to in para 2.6(iii))*

Sl. No.	P.O. No./Date	Value (In Rupees)	Description of equipment/item	Name of the supplier	Due date of delivery and erection	Actual month of receipt
1)	HWP/PAB/7PO/1757 dated 27-10-1972	9,86,997	Pressure Vessels and heat exchanger	M/s BHPV	1-11-1973	Between 4-5-1975 and 26-5-1976
2)	HWP/FAB/11/PO/1749 dated 26-10-1972	8,04,224	-do-	-do-	1-9-1973	Between 24-2-1975 and 27-3-1982
3)	HWP/FAB/1/PO/1584 dated 29-9-1972	11,70,000	-do-	-do-	1-10-1973	Between 26-4-1974 and 26-5-1976
4)	HWP/FAB/3/PO/1585 dated 29-9-1972	31,55,817	-do-	-do-	1-10-1973	Between 3-5-1975 and 27-6-1976
5)	HWP/FAB/2/PO/1589 dated 29-9-1972	24,47,177	Pressure vessels	-do-	1-11-1973	Between 24-2-1975 and 27-5-1976
6)	HWP/FAB/7/PO/1591 dated 29-9-1972	12,08,499	Heat exchanger	-do-	-do-	Between 16-10-1974 and 14-7-1976
7)	HWP/FAB/9/PO/1651 dated 12-10-1972	5,48,800	-do-	M/s IAEC, Bombay	8-10 months from the date of receipt of free issue materials	18-2-1977
8)	HWP/CAP/129/PO 2378 dt. 9-2-1973	2,45,891	EOT Crane 10 ton	M/s New Standard & Co., Bombay	15-10-1973/ 30-12-1973	

Sl. No.	P.O. No./Date	Value (In Rupees)	Description of equip-ment/item	Name of the supplier	Due date of delivery and erection	Actual month of receipt
9)	HWP/CAP/106/PO/1694 dt. 30-10-1972	11,79,375	EOT Crane 100 ton	M/s Chitram & Co., Madras	16-11-1973	16-8-1975
10)	HWP/FAB/14/PO/2592 dt. 24-3-1973	3,33,600	Fab. of steel works	M/s R&C Ltd. Bombay	24-12-1973	
11)	PDN/HWP(T)/MIA/152 PO/3655 dated 24-1-1974	10,30,000	Relay panels	M/s ECIL, Hyderabad	July 1974	28-2-1978
12)	PDN/HWP/Ele/308/PO/4442 dated 18-2-1974	3,58,470	Cable	M/s Orient Power Cables Ltd., Bombay.	20-5-1974 amended to 20-6-1974	
13)	PDN/HWP/EEQ/59/PO 3201 dt. 23-7-1973	12,27,852	Bus Duct with aluminium bar	M/s Seimens India Ltd., Bombay	31-7-1974	Between 14-8-1974 and 11-4-1975
14)	PDN/HWP/CAP/105 PO/1657 dt.11.10.72	8,86,280	Cooling tower	M/s Paharp Cooling, Bombay	1-9-1974	Between 16-2-1976 and 27-4-1977
15)	PDN/HWP/CAP/144/PO/2345 dt.31-1-73	2,57,790	Air Compressors with allied accessories	M/s Ingersoll (India) Pvt. Ltd., Bombay	30-6-1974	
16)	PDN/HWP/CAP/204/PO/3734 dt. 17-10-73	1,10,525	Starpless Vacuum Ultrafilter expens	M/s Pennwalt India Ltd., Bombay	31-5-1974	
17)	PDN/HWP/EER/37/PO/4208 dt. 22-2,1974	1,05,750	Polower design	M/s Aircondi-tioning Ltd., Calcutta.	15-7-1974	
18)	PDN/HWP/FAB/8/PO/3329 dt.14-8-1973	12,02,700	Mech. lifting device	M/s New Stan-dard Engineering Co. Ltd., Bombay	14-6-1974	24-8-1977
19)	PDN/HWP/FAB/16/PO/3579 dt. 18-9-1973	1,55,125	Vessels & Heat Exchanger	M/s Bwevest Engg. Works, Coimbatore	25-3-1974	
20)	PDN/HWP/FAB/16/PO 3650 dt. 26-9-1973	1,34,930	Steam Condenser	M/s Dakabhai Ambalal, Bombay.	26-7-1974	
21)	PDN/HWP/PPF/118/PO/4645 dt.14-3-74	2,25,858	Multicore PVC covered instrument	M/s Teednut (Hind) Ltd., Bombay-34	14-7-1974	
22)	PDN/HWP/PPF/41/PO/3819 dt. 13-11-73	1,10,013	Elbows and Herds	M/s Shah Patel & Co., Bombay	10-3-1974 7-2-1975	
23)	PDN/HWP/Ele/308/PO 4441 dt. 18-2-1974	11,14,126	Aluminium Cordin. core Heavy Duty cables	M/s Seimens India Ltd., Bombay	August 1974	4-12-1974

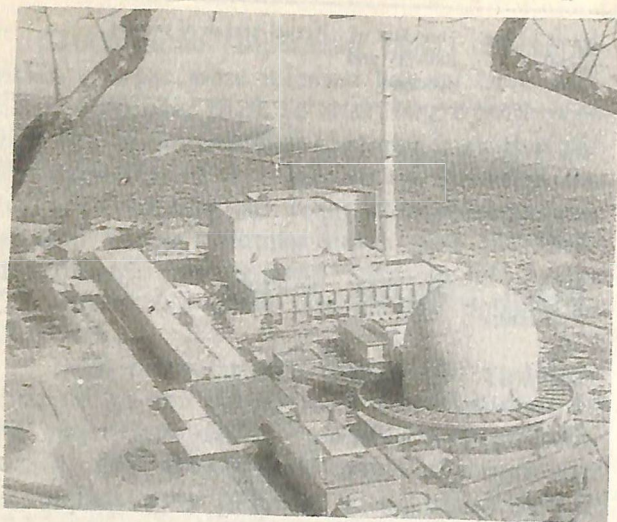
### 3. Bhabha Atomic Research Centre

#### Research Reactor Dhurva

Department of Atomic Energy (DAE) decided in July 1972 that Bhabha Atomic Research Centre (BARC) could set up a natural uranium fuelled and heavy water moderated and cooled thermal research reactor "DHRUVA" at Trombay. The reactor has a rated power of 100 MW with a high neutron flux in the region of 100 trillion neutrons per sq.cm/sec.

The objectives were:

- (i) to provide engineering facilities to test prototype fuel elements for power reactors;
- (ii) to further the scope of research in the fields of physics, chemistry, etc. and
- (iii) to enlarge the isotope production facilities and also produce radio isotopes of specific activity higher than those produced with CIRUS reactor set up earlier.



Dhruva

The estimated cost was Rs.30.84 crores with a foreign exchange component of Rs.4.79 crores. In May 1974 the project data were updated and on that basis the revised cost came to Rs.49.88 crores. Piecemeal financial sanctions to the extent of Rs.4.30 crores were issued during the period January 1973 to April 1975. In June 1977, the project cost was revised to Rs.76.30 crores with a foreign exchange component of Rs.9.07 crores. The project cost included Rs.17.28 crores for heavy water. This was approved by the Government in April 1978. However, by March 1987 Rs.107.85 crores had been expended of which Rs.44.10 crores was debited for heavy water.

The reasons for the extra expenditure of Rs.31.55 crores over the revised project cost of June 1977 are attributable to escalation in cost of heavy water, imported raw materials such as stainless steel plates, etc., increase in the cost of the fuelling machine, additional items found necessary as the design progressed and increase in customs duty.

In September 1972, it was anticipated that the research reactor would be commissioned by December 1976. This was on the premise that the project report would be ready by April 1973 and the major civil construction would be completed by December 1975. This was revised to December 1981 at the time of revising the project cost in June 1977. However, the reactor could become critical only in August 1985.

The delays were due to delays that occurred in completion of reactor building (53 months), service building (20 months), air-conditioning and ventilation for reactor building (61-65 months), supply of fuel assembly (60 months),

fabrication of calandria (49 months), fabrication of shield block (55 months) etc. The Department stated (October 1987) that the project execution had a time overrun of about 57 per cent and a cost over-run of 6.2 per cent (excluding cost of heavy water) as compared to the projections approved by the Government in April 1978. Including cost of heavy water the extra expenditure was 41.42 per cent.

As regards performance, the reactor was commissioned in August 1985 but had to be shut-down in February 1986 on account of vibrational problems and sustained power operation was found not feasible. This necessitated redesigning of fuel assemblies (October 1986) and the reactor was operated only at 40 MW (May 1987).

Department accepted (May/October 1987) this and said it was done as a matter of abundant precaution and also to ensure satisfactory performance of the redesigned fuel assemblies. Subsequently power level of the reactor was upgraded to 75-80 MW (October 1987) and preparations are in progress to reach 100 MW.

Due to vibrational problems mentioned above, a number of fuel assemblies had to be discarded at a low fuel-burn-up. Department stated (May 1987) that those low-burn-up fuel rods may be reprocessed for recovering plutonium and the unburnt natural uranium could be used for new fuel fabrication. Though recovery of plutonium etc. may be attempted in future from discarded fuel assemblies it would be at a cost. Also the original cost of fabricating the fuel assemblies, cost of recovery of by-products etc. less the cost of material recovered will have to be written off.

Due to delay in commissioning the reactor, basic research facilities and isotope technology could not be established. The expenditure on these facilities would also go up as and when these facilities are established. The Department accepted this and stated that some of the basic research facilities could not be established due to budgetary constraints. Apart from the cost escalation it also meant non-fulfilment of objectives even as of date (October 1987).

The proforma accounts maintained by the Department revealed that till 30th June 1986 there was loss of 1.43 tonnes of heavy water in respect of Dhruva. At a notional price of Rs.4200 per kilogram this meant a loss of Rs.60.04 lakhs. The Department stated (May 1987) that the loss of heavy water during opera-

tion between June 1985 and April 1987 together with quantity of below-reactor-grade heavy water used in pre-commissioning stages was normal.

Bhabha Atomic Research Centre (BARC) is the only producer of radio isotopes and equipment in the country and in July 1980 CIRUS reactor (40 MW) had been commissioned for this purpose. The total sale value of radio isotopes produced and the value of services rendered was on an average worth Rs.1.68 crores *per annum* during 1980-81 to 1985-86.

The Department had not fixed the targets of production for radio isotopes of higher specific activity from Dhruva reactor on the plea that their production would depend upon the demand and it would not be possible to give realistic estimates of production. The production of isotope Iodine-125 used in radio immunoassay has not been started so far and the Department stated that the radiation facility necessary for its production has not been installed in the reactor. The Department stated (October 1987) that it is true the production of radio isotopes got delayed due to delayed commissioning of the reactor and that sale value of radio isotopes produced in the reactor would take some years to pick up since longlived radio isotopes like Cobalt-60 require long irradiation time (years) in the reactor.

In sum, the project which was expected to be completed in 4 years 3 months took more than 8 years 3 months to be completed; the actual expenditure upto March 1987 was Rs. 107.85 crores against sanctioned amount of Rs.76.30 crores issued in April 1978, the reactor has not functioned at the designed power level so far; due to delay in commissioning of the reactor; the production of radio isotopes has been delayed; and projects for basic research facilities have not been completed till October 1987.

#### 4. Avoidable payment of customs duty on imported scientific equipments

Scientific/Technical equipments imported for research activities by the Department of Atomic Energy (DAE) can get exemption from payment of customs duty if the required certificates of "Not Manufactured in India" (NMI) is obtained from the Directorate General of Technical

Development (DGTD) before the actual receipt of the equipment.

The Directorate of Purchases and Stores (DPS), the central purchase unit of DAE placed a purchase order for Rs.12.74 lakhs on a foreign firm on 30th June 1982. The DPS applied for NMI Certificate on 18th August 1982. As the application was not duly supported by detailed specifications as well as the catalogue/pamphlet etc., it was returned by the DGTD on 12th October 1982 inviting attention to their instructions issued in March 1979. DPS resubmitted the application with necessary documents on 3rd January 1983 with a request to issue NMI Certificate on "Top Priority Basis". The equipment was however cleared through customs on 15th January 1983. Since the NMI Certificate had not been received by then, customs duty of Rs.18.13 lakhs had to be paid.

The DAE stated in November 1987 that due to pressure of work during the period in question, the application for issue of NMI could not be made immediately after the placement of the order and hence the time lag from June 1982 to August 1982. As regards delay in obtaining the catalogue etc., and furnishing to the DGTD, the DAE stated that these had to be obtained from the supplier and these had not been submitted alongwith the offer of the

supplier. However, since the customs duty involved was substantial i.e. Rs.18.13 lakhs, the DAE should have taken the action to obtain the technical literature from the supplier even when the offers of supply were received i.e. prior to June 1982. Also the extant instructions of the DGTD issued in March 1979 required submission of such literature and the DAE need not have waited till October 1982 to call for these documents.

DAE stated that the NMI has not been received (November 1987) and the Customs Department would not any more entertain the claim as a period of six months provided for producing such certificate had elapsed in July 1983 itself. The DAE also stated that the extra payment of customs duty has not gone outside the Government account and therefore cannot be termed as avoidable expenditure. This is not tenable. Thus, due to non-observance of the relevant instructions and belated action in seeking the technical literature, the department incurred avoidable expenditure of Rs.18.13 lakhs.

## DEPARTMENT OF ELECTRONICS

### 5. National Silicon Facility - Unfruitful expenditure in import of documents for a technology not in use

5.1 In view of the growing importance of silicon, which is a crucial raw material in the electronic industries, the Department of Electronics (DOE) proposed in October 1981 the setting of a National Silicon Facility (NSF) to undertake stock-piling, production, research and development so that the country could become self-sufficient in this critical material. This was approved in November 1981 and a Task Force (TF) of specialists was constituted in January 1982 to configure the NSF for investment proposals.

The TF submitted Part I of its report in August 1982, suggesting the production process to be adopted and setting up a Negotiating Committee (NC) to finalise the collaboration proposals. The TF also assessed that the national demand for silicon would be 100 tonnes *per annum* (TPA) by 1990. No further part of the report was submitted by the TF.

The NC appointed in January 1983 considered the technology transfer offers of three foreign companies, without any global tenders being floated and recommended in December 1983 conclusion of technical collaboration agreement with Hemlock Semi-Conductor Corporation (U.S.A.) for setting up a 100 tonnes silicon plant with infrastructural facilities for a 200 tonnes plant at a project cost of Rs. 65.75 crores. According to the NC, the estimated demand for silicon could be 190 tonnes in 1988-89 and 230 TPA from 1990-91.

After Electronic Commission (EC) had recommended the NC proposals in February 1984, the DOE put up a proposal to Government in March 1984 for a 200 tonnes plant at a cost of Rs. 90.75 crores with foreign exchange component of Rs. 23 crores with technical collaboration from Hemlock. The DOE had recommended 200 tonnes plant since the incremental capital cost for higher capacity plant was marginal and a larger plant would reap economies of scale. The proposal was approved on 29th March 1984.

The agreement with Hemlock was signed on 16th April 1984. As per the agreement, a lumpsum fee of US \$ 6.70 million was payable for process know-how, basic engineering documentation, etc. and US \$ 7.65 million for proprietary equipments. In all, US \$ 14.35 million

(approximately Rs. 18 crores) was payable in instalments.

In addition, Rs. 70 crores was to be spent towards indigenous equipments, buildings, land, etc. for setting up the NSF. The production was to commence after 42 months.

Hemlock obtained the necessary export licence from the US Government in January 1985 and thereafter the agreement was confirmed by the DOE on 18th February 1985. Until June 1987, the first two instalments of Rs. 2.93 crores had been paid to Hemlock. In addition, Rs. 1.56 Crores were paid as Income Tax on behalf of Hemlock and Rs. 15.84 lakhs were paid to Engineers India Limited as consultancy charges for NSF configuration.

Since the indigenous capability for producing silicon had, in the meantime, come of age, Government ordered its evaluation and in October 1986, directed that future developments on silicon front should be based only on indigenous technology and the agreement with Hemlock should be terminated in the best possible manner. The agreement was accordingly terminated after further negotiations. In all, Rs. 7.92 crores had been paid and no technology benefit has accrued to the country or the industry. The details are discussed in the following paragraphs.

### 5.2 Technology Arrangement

The TF had concluded in August 1982 that the Silicon Tetrachloride (STC) feedstock was not suitable since the quality of silicon produced therefrom was poor and instead recommended Trichloro Silane (TCS) as feedstock. The STC feedstock was the one adopted by M/s Metkem Silicon, an indigenous producer, who had been issued in March 1982, with the industrial licence for production of electronic grade silicon and silicon wafers. The TCS route was the technology of Hemlock which was recommended for collaboration/import.

The TF had also rejected STC feedstock on the ground that the samples of Metkem silicon had not been fully characterised and therefore the product remained to be proved. However, just before the agreement with Hemlock was confirmed in February 1985, an Evaluation Group appointed by the Department of Non-Conventional Energy Sources (DNES) had concluded that the purity of Metkem silicon as measured in the sample supplied was good for Photo Voltaic (PV) application and for some electronic devices as it had come close to the specification given by DOW Corning and SMIEL (the two



internationally known producers). The Evaluation Group had further opined that Metkem technology was likely to make further improvements and was expected to reach the highest international standards.

M/s Metkem Silicon had also earlier sent their silicon for test report to M/s Silitech, California and their report of January 1985 stated that "we have measured the poly crystalline silicon from India, using the equipment we keep at MIDAC and we were impressed with its purity. The material we have seen is fully the equal of any made by the large poly suppliers". Thus, the quality of silicon produced by the indigenous producer had been established before the agreement with Hemlock was confirmed in February 1985.

Earlier an Experts Committee appointed at the instance of the Ministry of Science and Technology had commended the work done by M/s Metkem Silicon in successfully setting up pilot production. The Committee anticipated stabilised industrial production of 25 TPA to take place by end of 1986 or early 1987, which came true. Also in the 69th Meeting of the EC held in January 1984, the Director General, CSIR had stated that CSIR would guarantee the development and commissioning in four years of a plant upto 200 TPA capacity to make poly silicon both for PV application and other applications.

Yet, the Secretaries Committee which met on 16th February 1985 held that Hemlock technology could be imported since it was largely in use and it could take upto 5 years for a new and better technology to be established on commercial scale. The Government of India confirmed the agreement with Hemlock on 18th February 1985.

### 5.3 Over estimation of demand

Another reason that weighed with the Secretaries Committee to clear the NSF project was the limited capacity available (25 TPA) with the indigenous producer when the country's demand was estimated to be 200 TPA. The estimation proved incorrect. But at that point of time, demand projection of 200 TPA precluded adoption of indigenous technology and led to import of technology.

However, the Evaluation Committee appointed by the DOE had observed (July 1986) that the earlier estimates of demand for silicon needed downward revision in the light of the developments in the field of thin film solar cell te-

chnology. The Committee had also recommended adoption of indigenous technology since M/s Metkem Silicon was able to produce 25 TPA and the capacity could be easily expanded. Thus, the conclusion of the Evaluation Committee was totally different from that of the Secretaries Committee. Since the Secretaries Committee was aware that silicon scenario was fast changing it could have recommended payment of US \$ 2,00,000 to keep the options open for future decision as was offered by Hemlock. Instead, the Secretaries Committee recommended confirmation of the contract and ultimately when the contract was terminated after negotiations, US \$ 2,00,000 was additionally paid to Hemlock. In other words, the payment was ultimately made without the benefit of future option.

Even with incorrect assessment of demand, it was possible to adopt indigenous technology because the NC had indicated earlier that the production of poly silicon was highly modular and scaling up was dependent upon addition of new reactors. In February 1985, before the agreement with Hemlock was confirmed, the DNES had indicated the possibility of adopting indigenous technology without difficulty. This was considered but not accepted and import of technology was resorted to.

### 5.4 Cost of imported technology

The EC, in January 1984, had observed that on the basis of commercial norms, the cost of production of poly silicon at NSF at 75 per cent installed capacity would be in the neighbourhood of Rs.2,600 per kg. or more. As against this, the Metkem cost of production was Rs.850 per kg. without the economies of scale, subsidised financing and subsidised electrical power. The international price ranged between Rs.500 and Rs.600 per kg. Thus, the EC had noted the high price at which NSF was being established but supported it.

The high price for the imported technology was also pointed out by the Secretary, DNES in November 1984 itself. He had indicated that NSF with 200 TPA capacity could be established within Rs. 21 to 25 crores. Yet, establishing NSF with Hemlock technology, at a total cost of Rs. 92 crores was decided upon.

The Evaluation Committee also stated (June 1986) that "Metkem Silicon had done a very commendable job in having installed,

commissioned and operated a plant for high purity silicon in such a short time of less than a year. They have adequate capabilities in the area of process technology, engineering and characterisation. In the context of the proposed National Silicon Facility, involving a production capacity of 200 TPA, the Committee observed that for upscaling of the present Metkem technology, the investment is not likely to exceed Rs. 20 crores if such a plant, if at all required, is situated under similar circumstances prevailing at Metkem”.

This was a total reversal of the earlier assumptions of other Committees and the DOE. It is also noteworthy that apart from the cost of imported technology, the indigenous technology had come of age within one year, whereas Hemlock wanted 4 years to establish the 200 TPA Plant.

### 5.5 Payments to Hemlock

In October 1986, Government ordered that the future development of production facility in the country for poly silicon should be based on indigenous technology and agreement with Hemlock should be given up in the best possible manner. Till then, the DOE had paid Rs. 2.93 crores towards two instalments for the know-how and process package.

By April 1987, when the DOE submitted a further note, another instalment of Rs. 2.15 crores for basic design engineering documentation had become due but remained to be paid.

As per Clause 13.2.2 of the agreement, termination of the agreement would have meant a minimum payment of 60 per cent of lumpsum fee for know-how technology if the training of licensee's personnel had not been completed by the licensor. According to Clause 10.1.1(a), the lumpsum fee was US \$ 6,700,000 net of Indian taxes. Thus, at the time of termination of the agreement, 25 per cent had become due since 35 per cent of the lumpsum fee had already been paid. Instead of paying the balance 25 per cent amounting to US \$ 16.75 lakhs (Rs. 2.15 crores), the department negotiated and paid (June 1987) Rs. 2.15 crores plus US \$ 8,70,000 (Rs. 1.12 crores). This latter amount represented the instalment towards standard operating procedures (US \$ 6,70,000) which was supplied after the Government ordered the annulment of the agreement and US \$ 2,00,000 for agreeing to

terminate the agreement. This was not within the confines of the agreement and was, therefore, irregular.

The department stated (October 1987) that the technology agreement was entered into as an insurance for meeting the demands of strategic silicon. This is not tenable since the demand for strategic silicon was miniscule whereas the amount paid to Hemlock was for 200 TPA plant which was essentially to be used for solar cells application.

Thus, incorrect assessment of demand, partial analysis of potentialities in PV field, non-cognizance of indigenous capability, exercise of wrong option etc. led to conclusion and subsequent termination of a contract with a foreign firm resulting in unfruitful expenditure of Rs. 7.92 crores.

### 6. Non-utilisation of grant for a Hindi computer application programme

Department of Electronics (department) under its Computer Manpower Development Programme released a non-recurring grant-in-aid of Rs. 8.50 lakhs in November 1984 to the Institute of Social Science, Agra University for conducting the 1½ year Post B.Sc. Diploma Course in Computer Application in Hindi medium. The University was to provide the requisite computing facilities as well as teaching faculty of two Readers, two Lecturers and two Technical Assistants for this programme. The University was also to submit six monthly progress-cum-achievement report to enable the department to review the working of the programme and surrender any unutilised grant.

As no progress-cum-achievement report was received the department is stated to have taken up the matter with the University only in March 1986. This was followed up by reminders without any progress.

The department stated (June 1987) that it was gathered from the representatives of Agra University that the course could not be started because of non-availability of teachers and the Hindi medium course was expected to be started from the academic year 1987-88. The University had also been asked to send the statement of accounts and the progress report as per terms of the grant-in-aid.

Thus, grant-in-aid amounting to Rs. 8.50 lakhs released about 2½ years back had not served the purpose so far and remains blocked.

## DEPARTMENT OF ENVIRONMENT

### 7. Unfruitful expenditure on mobile museum

With a view to developing environmental awareness, mainly for the rural population, the National Museum of Natural History, New Delhi (NMNH) proposed the setting up of a mobile museum in April 1980 for showing exhibits, dioramas, films relating to forest eco-system, hazards of over-exploitation of forests, etc. The proposal to acquire a vehicle with a trailer and generator and to put up exhibits therein was approved in principle by the Department of Environment (department) in May 1980. Accordingly, a Tractor Chassis and a Trailer Chassis were purchased in February/March 1982 at a cost of Rs. 3.49 lakhs. The work of body building in both the cases was completed in June 1984 at an additional cost of Rs. 2.22 lakhs. Taking into account the cost of 2 generator sets, cost of replacement of tyres, tubes, rims and other towing charges, the total cost of mobile museum worked out to Rs. 6.18 lakhs.

The mobile museum, though got completed in June 1984, could not be put to use till date (May 1987) except for a small period of one month during November-December 1986. The department observed in August 1986 that the idea of mobile museum, originally intended as a token measure to cater to rural areas did not take off and it had also advised the NMNH to dispose off the mobile museum at the earliest. The NMNH, in turn, had suggested to the department (December 1986) that the mobile museum could be fruitfully put to use for regular school services in and around Delhi, instead of using it for rural extension service. The NMNH asked for additional staff of a driver and two educational assistants for this purpose. The department did not agree (April 1987) to sanction additional staff and directed that the mobile museum may either be disposed off or operated with the existing staff.

The department stated (September 1987) that though no staff had been sanctioned for this scheme, the Director, NMNH had been making use of other available staff under the School Loan Kit Scheme and other general staff and that the museum was put to full use during November-December 1986 as part of the environmental awareness campaign activities. It was also stated that a post of driver was being sanctioned exclusively for the scheme after reviewing the whole position so that the

museum would be put to more effective use.

The mobile museum originally set up for developing environmental awareness mainly amongst the rural population is now proposed to be used for urban school children and the actual use remains to be seen. The entire expenditure of Rs. 6.18 lakhs incurred has not yielded the intended benefit so far, besides blocking up the resources for the last 3 to 5 years.

## DEPARTMENT OF SPACE

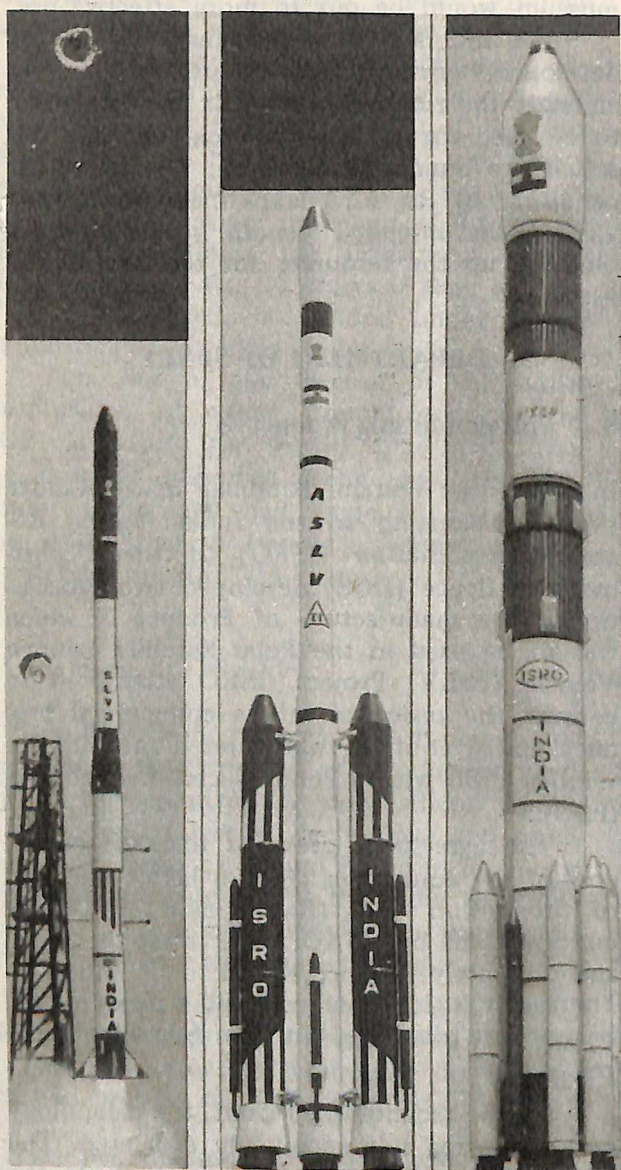
### 8. Productionising Product 'X'

In 1978-79, Vikram Sarabhai Space Centre (VSSC) belonging to the Indian Space Research Organisation (ISRO) of the Department of Space (DOS) developed two processes for the manufacture of Product X which was to be used in the Polar Satellite Launch Vehicle (PSLV) Project. ISRO attempted to convert the processes into a commercial product and a contract was entered into in November 1980 with a Public Sector Undertaking (PSU).

The agreement provided that the capital cost of the equipment (Rs. 25 lakhs) and cost of production trials (Rs. 5 lakhs) would be underwritten by ISRO. The attempt failed and ultimately Product X had to be imported. The technological, financial and developmental aspects are discussed in the following paragraphs.

On the technological front, the technology developed was not adequately evaluated. The Expert Committee appointed to evaluate the two processes did not submit any formal report of evaluation on either of the two processes. Instead, the Committee suggested that the PSU could be approached to productionise either of the processes amenable to their existing production plants. The DOS stated in August 1987 that the Expert Committee left the final choice to the chosen industry. A detailed search led to the PSU who had the necessary experience and the PSU chose the route where the incremental investment was lower. Their basic approach was to augment the existing plant which would enable co-production of Product X with other products of the PSU.

Further the technology developed by ISRO had been worked out only on laboratory scale and normally a new process can be stabilised only at the pilot plant scale after



studying the problems of scaling up. However, in this case, the pilot plant stage was omitted to avoid delays. Consequently production snags developed when technology was scaled up. The PSU had made the following observation in April 1982:

‘In view of the urgency of requirement this intermediate stage of pilot plant was not carried out by ISRO. The technology having been scaled up from gram scale to tonnage scale and when such scale up of such magnitude has been taken up there is every possibility to forecast technological production snags, during plant operation.’

In addition there were also problems of process identification within the technology

developed. The technology transfer contract provided for a certain process but all the studies in the laboratory/plant involved the use of another sub-process. After detailed discussions, an alternative process was adopted in July 1981. This inevitably resulted in delays. Similarly, the technology transfer provided for recovery of two chemicals as by-products. However, plant scale production established the recovery of these chemicals to be sub-economical. Ultimately the non-recovery of these two chemicals necessitated certain process changes and absorption of these chemicals within the processes to prevent air pollution. All these led to delays and cost escalation. DOS admitted that technology had not been fully developed in VSSC.

Apart from technology evaluation, process identification and scaling up problem, the PSU also encountered problems of yield. The DOS admitted that the process yields were formulated as target yields to work for. Ultimately, it was seen that these were not realistic.

On the financial front, the agreement had provided that Rs. 25 lakhs would be necessary for capital equipment and Rs. 5 lakhs for production trials. These hopes were belied for a variety of reasons as given below:

- (i) the original estimate was on ad hoc basis without relevance to the process and equipment required;
- (ii) cost of equipment was assessed on the lower side;
- (iii) the process ultimately selected needed additional equipments which were not included in the initial estimate;
- (iv) detailed sizing of equipments had not been done earlier; and
- (v) detailed instrumentation and electrical items had not been taken into consideration.

Consequently in April 1982 the PSU revised the costs to Rs. 50.40 lakhs. In the above revision, the equipment cost had gone up because of the change in process. In addition, the PSU had also included carrying costs and interest costs which had not been provided for earlier. In September 1982, the PSU further revised its claim for capital equipments to

Rs. 44.17 lakhs. Additional capital equipments, namely evaporator, chiller units and filters were ordered for at a cost of Rs. 5 lakhs. In January 1983, the PSU again hiked up the demand by another Rs. 2 lakhs for additional machinery to be purchased to reduce the recovery losses to the minimum. Consolidating the periodical revisions, the PSU in April 1983, estimated the total capital cost as Rs. 58.78 lakhs.

Since there were differences of opinion on the various items of cost, a meeting was arranged between ISRO and the PSU in August 1983 and the total capital cost was pegged at Rs. 45.82 lakhs. The cost on production trials, which was originally estimated at Rs. 5 lakhs was revised to Rs. 9.18 lakhs in August 1983. A revised agreement was entered into between the PSU and ISRO in November 1983 to include these two revisions of cost.

The PSU also faced working capital problem and requested ISRO to provide the working capital. This was turned down by ISRO as it was not contracted for but when the agreement was amended in November 1983, Rs. 10 lakhs for working capital was also provided.

On the developmental side the Product X was agreed to be manufactured as an industrial product at a cost of Rs. 86 per kilogram. However, in August 1983 the PSU demanded a higher price of Rs. 268.33 per kilogram on account of reduction in yields, process changes and escalation in the cost of raw materials and utilities. As regards delivery of Product X the terms of the original agreement could not be achieved and the delivery schedule was revised in November 1983. This was also not achieved.

Since the arrangements failed a public notice was issued by ISRO inviting tenders for establishing plants to produce Product X through the alternative process. This resulted in an agreement with firm 'A' in March 1985. In this case only an advance of Rs. 10 lakhs was paid towards cost of equipments and erection of a pilot plant and the firm agreed to make the necessary additional investments which was estimated to be around Rs. 20 lakhs. Trial production was completed by March 1986/October 1986. The Department accepted the facts and stated ( August 1987) "based on the earlier development experience it was decided to first set up a pilot plant and the production scale plant is slated for the end of the year."

ISRO had to resort to import so that

PSLV Programme went ahead unimpaired. During the period September 1985 to February 1987, Product X worth Rs. 161.95 lakhs had been ordered for. Thus the developmental effort did not succeed as anticipated, resulting in delay, cost escalation, non-delivery and ultimately in costly import.

DOS stated that the production cost by the first method would have been far in excess of the production cost by the second method and so it was mutually decided to terminate the contract with the PSU. As regards capital invested with the PSU the DOS stated that a substantial part of the investment is in the form of storage vessels, reaction vessels, etc. which remain the property of ISRO and are usable in ISRO's own multi-purpose pilot plant and other chemical production facilities. Some of them can also be used by firm 'A'. But this remains to be done (October 1987). DOS had, however, admitted that their experience in skipping the first plant stage in productionising a new technology was educative and so while putting through the productionising programme of the second process they first set up the pilot plant. In the attempt to save time by skipping the pilot plant stage the Department lost 5 years. The pilot plant for the second process had been set up within a year itself and trial runs had been achieved. Thus the loss of 5 years could have been avoided if for the earlier attempt also a pilot plant had been set up. It is also noteworthy that the agreement with firm 'A' is more commercial in nature, in that money was not invested by ISRO but was given as advance. Firm 'A' was also required to invest substantially thereby achieving its commitment to the success of the project.

Thus DOS had lost five years in attempting to productionise a product without complete technology and Rs. 65 lakhs invested for the purpose did not yield any benefit to DOS.

#### 9. Infructuous expenditure and blockage of funds on Rocket Sled Facility

Government of India accorded sanction (September 1971) for establishment of a Rocket Sled Facility (RSF) at SHAR Centre at an estimated cost of Rs. 63.36 lakhs. RSF consisted of a test specimen sliding on a high speed track of four kilometers of continuously welded dual rails over reinforced concrete beams. RSF was to enable dynamic testing of a large number of systems required for rockets, missi-

les, aircraft etc., as also for Satellite Launch Vehicle (SLV-3). RSF which was originally expected to be commissioned in 1974 was postponed to August 1977 in view of the time taken for finalising the various designs and location of the supplier for special quality rails. The estimated cost was also revised (April 1974) to Rs. 161.85 lakhs with foreign exchange component of 9.60 lakhs.

In August/September 1974, the SHAR Board while considering the budget for 1974-75, reviewed the necessity of having RSF for SLV-3 programme and asked the project manager to investigate the utility of RSF for SLV-3. The project manager reported that RSF was desirable but not essential. The Board thereupon decided to obtain expert's view on the utility of this facility not only for SLV-3 but for future programmes of ISRO also and constituted a Review Committee on 13th January 1975. The Committee was to submit its report by 10th February 1975.

However, on the very next day (14th January 1975), the procurement of rails for RSF was authorised in view of the fact that if the special rails were not ordered immediately they might not be available for many months thereafter. The Review Committee which met on 24th February 1975 recorded as under:

"Since the formation of the Committee, Chairman, ISRO has approved the procurement of the rails from Hindustan Steel Limited. Therefore, the terms of reference of the Committee have to be modified a little since the question of whether to establish the Rocket Sled Facility or not does not arise in view of the large expenditure incurred in the project. The aspects primarily considered are the technical requirements and time schedule"

In conclusion the Committee recommended the establishment of RSF. However, on 5th May 1975 the SHAR Board came to the conclusion that the facility could not be treated as a priority project for SLV-3 and if sufficient funds were not made available, RSF could be deferred/cancelled. In January 1976, the Department of Space decided that no further expenditure should be incurred on RSF in view of the continuing constraints on the budgetary resources. It was also decided that the existing staff of RSF should be re-

deployed and machinery/equipment purchased for the facility should be disposed off.

The total expenditure incurred on the facility till March 1976 was Rs. 22.61 lakhs which included expenditure of Rs. 4.87 lakhs on salaries, Rs. 1.76 lakhs on consumable stores and Rs. 2.81 lakhs on other charges. An expenditure of Rs. 2 lakhs had also been incurred on machinery and equipment, out of which Rs. 1.86 lakhs worth of machinery had been transferred to other units leaving a balance of Rs. 0.14 lakhs remaining in stock (March 1987). The Department had also received 524.52 tonnes of rails at a cost of Rs. 9.27 lakhs. The Department stated (August 1987) that 265.4 tonnes of rails had been distributed amongst various units and the balance 259.1 tonnes was in stock.

The Department also stated that the stock of the rails had proved to be an important asset in their ongoing programmes inspite of these rails not being used for the original purpose for which they were procured. According to the Department the philosophy of testing facility is continuously changing with more reliable methods of testing becoming available. Further, the Department added that the expenditure on salaries, consumables and other charges incurred under RSF is not infructuous and the experience and know-how gained in the design, development and engineering aspects of RSF would stand in good stead in other areas of testing technology.

The non-establishment of RSF and the consequential infructuous expenditure was first noticed in Audit in August 1978. At that time, the Department had replied that the project had not been abandoned but only postponed. The project was therefore reviewed again in March 1987 and it was noticed that no headway had been made even after a lapse of 12 years. However, the Department continued to say that the project had not been abandoned but only postponed. On the other hand, the Department had also stated that the testing facilities are continuously changing with more reliable methods coming out. In view thereof RSF may not be installed. As regards the contention of the Department that certain experience and know-how have been gained in establishing RSF, it is to be noted that it is an extenuating reason since RSF has not been established. The ordering for special steel just after one day after the Experts Committee was appointed to review the utility of RSF was incorrect. Thus, an infructuous expenditure of Rs. 9.44

lakhs had been incurred in setting up RSF. In addition, there was a blockage of capital of Rs. 4.72 lakhs on account of unutilised rails and consumables.

#### 10. Infructuous expenditure in establishing Teflon bladder manufacturing facility

Bladders made of Teflon are required for reaction control system in rockets where there is use of red fuming nitric acid. Vikram Sarabhai Space Centre (VSSC) of the Department of Space imported 50 Teflon bladders duty free from USA in February 1979 at a cost of Rs. 2.51 lakhs. On inspection it was found that 22 bladders were defective and rejected. These were returned to the supplier in March 1979 for free replacement. The proportionate replacement cost of the 22 rejected bladders was Rs. 1.13 lakhs. Against replacement, the supplier offered to transfer process technology for manufacturing bladders free of charge to the VSSC. It was decided to accept the offer as the only manufacturing firm had ceased production and accordingly the then Deputy Manager, Rocket Propellant Plant (RPP) was sent for the necessary training (25th January 1980 to 25th February 1980).

On his return from training, VSSC carried out minor modifications to their existing set up at a cost of Rs. 1.21 lakhs so as to enable manufacture of Teflon bladders. 37 Teflon bladders were manufactured during the period 1981-1984 and thereafter no production had taken place. These 37 bladders passed all the qualification tests except the air-drop test. According to the Department, significant additional investments were necessary to upgrade the quality of the bladders manufactured to pass the last test also and so further investments were not undertaken. No separate account of the actual expenditure in the manufacture of these 37 bladders was maintained and quantum of additional investments was not indicated by the Department.

In October 1983, the Department imported 50 such bladders from the same supplier at a cost of Rs. 15.60 lakhs including customs duty and other charges. The Department stated in September 1987 that in view of the limited requirements and comparatively low value of the item, it was decided to import one final lot of Teflon bladders instead of investing on the additional facility for upgrading the quality of the bladders manufactured to pass the final test. It is noteworthy that the last

batch of the bladders was paid for at six times more than the cost paid in 1979. The Department could have decided to indigenise manufacture after considering the total project cost for all the facilities needed and traded it off against import of bladders instead of taking piecemeal decisions in deputing an Engineer abroad, attempting part manufacture of 37 bladders which could not pass through all the stages of qualification trials and ultimately resorting to import of one batch of Teflon bladders at a cost of Rs. 15.60 lakhs. The expenditure of Rs. 2.34 lakhs spent on the facilities for indigenous production and the cost of 37 bladders partially manufactured were infructuous.

#### 11. Avoidable expenditure on hiring of premises

Department of Space (DOS) informed the Satellite Centre, ISAC (April 1982) that they could hire necessary living accommodation for housing the security personnel of Central Industrial Security Force (CISF). ISAC acquired sheds (4990 sq. feet) on lease for providing accommodation to about 45 persons on a monthly rent of Rs. 8732 with effect from 14th October 1982 from a private party. As per the agreement, the rent was to increase by 10 per cent after a lapse of 18 months and Rs. 0.52 lakh was paid as advance to the landlord. The sheds were surrendered on 30th June 1984 as CISF personnel could not be inducted by then and the advance paid was recovered/adjusted. The avoidable expenditure was Rs. 1.81 lakhs.

The induction of CISF could not take place from October 1982 to June 1984 because there was no agreement between DOS, CISF and Ministry of Home Affairs on the number of security personnel to be inducted. While initially CISF recommended a number of 88 after conducting a survey, DOS recommended 60 as strength in December 1982. The number became 65 in February 1983 and 71 in May 1983. In the meanwhile permanent building for ISAC became ready and ISAC moved over to the new premises in June/July 1984. But a joint survey of the new ISAC complex was done in July 1983 and CISF indicated atleast 81 persons were needed. Subsequently in February 1984 the DOS agreed to 83 persons being deployed and necessary sanction was issued.

The Department stated (October 1987) that with major satellite projects like Indian Remote Sensing Satellite Project being taken up in 1982, security arrangements could no longer be managed by the skeleton security staff of ISRO and induction of CISF was thought of. However, the Department also stated that "if DOS had inducted the full strength of 88 as suggested by CISF initially without detailed discussion merely to utilise the barracks accommodation, the extra recurring cost would alone have been over Rs. 8.00 lakhs per annum. As against this, the rentals for the sheds was only Rs. 1.10 lakhs per annum for a period of 1½ years".

These are contradictory. If high security for major satellite projects was necessary cost could not have been an inhibiting factor. Further even though the continued operation of ISAC from its old complex was not certain, induction of CISF was considered essential. Ultimately the induction of the force was delayed on the question of number of personnel to be deployed. In sum, private accommodation was hired and continued for 1½ years even though the number of personnel of CISF to be inducted was under negotiation and ISAC was to shortly to move to a new complex. Eventually the accommodation had to be surrendered without being put to use and the avoidable expenditure was Rs. 1.81 lakhs.

12. Excess payment of agency commission due to non-observance of purchase procedure

As per Department of Space purchase procedure issued in January 1983 and further amen-

ded from time to time agency commission to the Indian agents of the foreign firm was payable in Indian Rupees worked out on the basis of Telegraphic Transfer buying rate of exchange prevailing on the date of placement of the order/contract and within 30 days from the date of receipt and acceptance of stores.

However, the Polar Satellite Launch Vehicle (PSLV) Project authorities of the Department of Space had paid the agency commission to the Indian agents on the basis of Telegraphic Transfer selling rate prevailing on the date of payment to the foreign firm. By not observing the laid down procedure, excess commission amounting to Rs. 1.20 lakhs had been paid in 14 cases during September 1983 to June 1984. Cases involving excess payment of less than Rs. 1,000 have not been taken into account.

Department of Space stated (September 1987) "PSLV has reviewed the matter thoroughly and taken appropriate action for recovery of the over-payments. From 1st July 1986, the payments are being regulated strictly as provided in the purchase procedure. In addition to this, Internal Financial Adviser, PSLV has also written to the Indian agents to whom overpayments have been made. He has been able to withhold payment of agency commission bills amounting to Rs. 0.40 lakh to an Indian agent. Another Indian agent has refunded excess payment by Demand Draft. Other parties have agreed to adjust the over-payment if any, from their future bills".



## CHAPTER IV

### AUTONOMOUS BODIES

#### 13. General

The Accounts of autonomous bodies pertaining to Scientific Departments and which are receiving financial assistance from Government are being audited by the Comptroller and Auditor General of India under various provisions of the Comptroller and Auditor General's (Duties, Powers and Conditions of Service) Act, 1971.

As on 31st March 1987, there were 25 Central autonomous bodies of Scientific Departments whose annual accounts were to be audited by the Comptroller and Auditor General of India under Section 14(1) and (2) of the Comptroller and Auditor General's (Duties, Powers and Conditions of Service) Act, 1971. During 1986-87 grants amounting to Rs. 5418.09 lakhs were paid by the Union Government to 15 bodies. The annual accounts for 1986-87 in respect of 10 bodies had not been received (September 1987).

As on 31st March 1987, there were 5 Central autonomous bodies which are under scientific departments and whose annual accounts were to be audited by the Comptroller and Auditor General as sole auditor of these bodies under Section 19(2) and 20(1) of the Comptroller and Auditor General's (Duties, Powers and Conditions of Service) Act, 1971. During 1986-87 grants and loans amounting to Rs.38601.39 lakhs were paid by the Union Government to 5 autonomous bodies. The audited accounts of these autonomous bodies along with the Separate Audit Reports on each individual body/organisation are presented to the Government of India every year for being placed before parliament.

#### *13.1 Delay in submission of accounts by autonomous bodies*

"The Committee on papers laid on the Table of the House" recommended in its First Report (5th Lok Sabha) 1975-76 that after the close of the accounting year every autonomous body should complete its accounts within a period of 3 months and make them available for audit and that the reports and the audited accounts should be laid before parliament within 9 months of the close of the accounting year. For the year 1985-86 audited accounts together with Separate Audit Reports thereon of 4 autonomous bodies (Scientific Departments) which were under audit by the Comptroller and Auditor General of India, were to be placed before Parliament. Out of these, the accounts of one autonomous body only were made available for audit within the prescribed time limit of 3 months of the close of the accounting year. Submission of - in two cases upto one month and in one case upto three months.

#### *13.2 Outstanding utilisation certificates of grants*

Consequent on the departmentalisation of accounts in the year 1976, certificates of utilisation of grants were required to be furnished by the Ministries/Departments concerned to the Controllers of Accounts in respect of grants released to statutory bodies, non-government institutions, etc. for specific purposes indicating that the grants had been properly utilised on the purposes for which they were sanctioned, and that, where the grants were conditional, the prescribed conditions had been fulfilled. The Ministry/Department-wise details indicating the position of outstanding utilisation certificates are given in Appendix-I.

MINISTRY OF AGRICULTURE  
DEPARTMENT OF AGRICULTURAL  
RESEARCH AND EDUCATION

*Indian Council of Agricultural Research*

14. Avoidable expenditure on acquisition and operation of a sub-standard research vessel

The Central Marine Fisheries Research Institute, Cochin one of the constituent units of the Indian Council of Agricultural Research (ICAR), acquired a research vessel in December 1982 from an Indian Shipyard at a cost of Rs. 170.28 lakhs. The final cost is yet to be determined since there is a dispute regarding escalation cost between the supplier and the buyer. Initially, there was delay in placing the purchase order for the vessel which resulted in avoidable expenditure of Rs. 48.80 lakhs apart from the research programme suffering considerable setback. This had been commented upon in para 19 of the Advance Report of the Comptroller and Auditor General of India for the year 1979-80 - Union Government (Civil).

Due to design and equipment defects, the performance of the vessel was below specifications and the engine could attain only a speed of 7 knots as against the designed speed of 11 knots. The loss of speed hindered the shooting of the fishing nets to the required depths. Such defects had been noticed even during customer's trial of the vessel and the defects were being periodically set right.

Since delivery and upto March 1987, the vessel had operated only for 444 days and during this period, Rs. 43.33 lakhs had been spent on repairs and maintenance. Thus, for each day of operation, the expenditure on repairs and maintenance worked out to Rs. 9,759. The establishment charges on crew members of the vessel, irrespective of the number of operational days, were Rs. 14.30 lakhs during the above period.

In the light of the poor performance of the vessel and high cost, the Director of the Institute had recommended in January 1987 to the ICAR as under.

"The vessel has been run for the last 4 years at a very high cost of maintenance and repairs without any significant achievements. It would be highly uneconomical to continue to maintain and run the vessel in this manner"

The ICAR accepted the facts (August 1987) and are in the process of deciding the

future of the vessel. Thus, the acquisition and operation of the sub-standard vessel had resulted in heavy repair and maintenance cost and due to poor utilisation of the vessel (about 28 per cent) the full benefit had not been derived from the engagement of the crew and no significant achievement on the research front was possible. The future operation of the vessel and the escalation cost payable to the builder remain to be decided.

15. Infertuous expenditure on purchase of Agar Agar Plant

Directorate of Fisheries Technology, Government of Tamil Nadu purchased (1967) Agar Agar Plant including utensils and furniture at a cost of Rs. 0.83 lakh. The plant was to be utilised for extracting a chemical called Agar Agar by processing sea-weeds. The plant had the capacity to produce 10 kgs. of Agar Agar per day and the chemical was stated to be widely consumed by various indigenous industries.

The plant was not put to use and the Directorate of Fisheries offered to sell the plant to the Central Marine Fisheries Research Institute (CMFRI), Cochin in December 1978. The CMFRI, with an intention to give training on sea-weed culture under Lab to Land programme to some families adopted by the Institute from amongst the poor and landless labourers in and around Mandapam camp decided to purchase the plant in November 1979.

The CMFRI sanctioned the purchase (September 1980) at Rs. 0.82 lakh except two items of furniture which were retained by the Directorate of Fisheries, Government of Tamil Nadu. The machinery was brought to the Regional Centre, CMFRI, Mandapam in January 1980. One mini-boiler was also purchased at a cost of Rs. 0.07 lakh as a component of the plant. The plant including the mini-boiler was stored in a van shed and its installation could not take place for want of technical advice.

Meanwhile, due to erratic and discouraging response to the Lab to Land Programme, the training on sea-weed culture was abandoned in 1982 and the plant remained idle without being installed. Consequently, the Officer-in-Charge of the CMFRI expressed apprehension (April 1986) that the plant might become unserviceable by keeping the same stored in idle condition and recommended for its disposal.

The Indian Council of Agricultural Research (Council) admitted the facts (August 1987) and stated that the returns from fish were higher than the returns from sea-weeds and so the fisherman were more interested in catching fish. It was also stated that the fishermen were also not sure of the returns from processed Agar Agar and therefore their response was erratic and discouraging and that due to the above reasons the machinery could not be put to use as planned earlier and the programme was accordingly abandoned in 1982.

With the approval of the Council the plant had been transferred to the Central Institute of Fisheries Technology, Cochin on 20th May 1987 for utilising the same in their fish processing division.

Thus, the plant originally purchased in 1967 by the State Government at a cost of Rs. 0.83 lakh after being kept idle for 13 years was sold to the CMFRI where it had remained uninstalled for more than 7 years and now it had been transferred to another Institute when it is already 20 years old. Rs. 0.89 lakh invested in the purchase of the plant had become infructuous.

#### 16. Blockade of capital and avoidable expenditure on import of Mass Spectrometer

The Central Rice Research Institute, Cuttack, a constituent unit of the Indian Council of Agricultural Research (ICAR), imported one unit of 622 Mass Spectrometer with accessories at a cost of Rs.6.81 lakhs from firm 'A' for a research programme. An irrevocable letter of credit, Rs.6.81 lakhs was opened in February 1984 and the "Not Manufactured in India" (NMI) and the "Customs Duty Exemption" (CDE) certificates were also obtained. The consignment arrived at Calcutta Airport in July 1984.

The Assistant Director, Shipping, Calcutta who was requested (26th July 1984) to clear the consignment by the Institute declined to do so on the ground that (i) the import of a computer system equipment valuing more than Rs.5 lakhs, required clearance of the Department of Electronics (DOE), which had not been obtained and (ii) the equipment contained seven gold ring seals as spares for which 'No Objection' Certificate from the Reserve Bank of India was required which had not been obtained.

The Institute held that the import of the equipment was under open general licence for research and development purposes and there-

fore no further clearances were called for. However, the Institute took up the case for obtaining the clearance from the DOE in August 1984 and with the Reserve Bank of India (RBI) in January 1985. The clearance from DOE was obtained in March 1985 and that of the RBI clearance in January 1985. The Institute also came to know in September 1984 that the supply included EPSON HX-20 Computer as one of the equipments instead of Hewlett-Packard HP-97-S Calculator which had been included in the proforma invoice. This necessitated fresh clearance from the DOE and fresh certificates of NMI and CDE. The fresh clearance from the DOE was obtained in April 1985 and the clearance from the RBI also had to be got extended as the validity period was over and this was got done in April 1985. The consignment was ultimately cleared in July 1985, by paying a terminal charge for storage at airport of Rs.0.51 lakh and customs duty of Rs.0.07 lakh.

The equipment after its arrival at the Institute was jointly inspected with the Indian Agent in October 1985 and it was found that certain parts were missing/broken. Thereafter, on the advice of the Indian Agent, the Institute awaited the service engineer from the foreign supplier for commissioning the equipment. In March 1986, the Service Engineer of the supplier, while attempting installation of the equipment discovered a fault in the Microprocessor Board. A fresh Microprocessor Board and the missing parts were replaced by the supplier in October 1986/May 1987. In August 1987, the Engineers from the supplying firm attempted to install the equipment but failed due to problem of proper interface between the Mass Spectrometer and the computer. The ICAR stated (October 1987) that in case the supplier failed to complete the satisfactory installation within a period of three months, legal action would be initiated against the Indian Agent for the recovery of the equipment cost.

The case revealed that the equipment cost of Rs.6.81 lakhs had remained blocked since February 1984 to-date and additional terminal charge of Rs.0.51 lakh had been incurred which was avoidable.

#### 17. Inordinate delay in operation of a machine acquired for training purpose - Blocking up of funds

In March 1980, the National Dairy Research Institute (NDRI), Southern Regional Station, Bangalore placed an indent on the Directorate

National Dairy Research Institute  
Southern Regional Station  
Bangalore  
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General of Supplies and Disposals (DGSD) for an automatic machine to pack milk in poly pouches along with a demand draft for Rs.2 lakhs. The DGSD called for tenders and placed an order in November 1980 at a cost of Rs.2.14 lakhs with delivery by 30th November 1980. The machine carried a guarantee of 18 months from the date of delivery or 12 months from the date of commissioning whichever was sooner.

The machine was received at the station on 14th November 1980 and was commissioned on 4th March 1982. On 26th May 1982, the Institute wrote to the DGSD to arrange for final inspection of the machine but the DGSD did not respond. Subsequently, in September 1982, some parts of the machine were sent for repairs since the machine was not working. The machine gave satisfactory trial-run only once on 3rd March 1983. The Institute contended (June 1983) that the machine had not been finally inspected at Madras and the earlier inspection at Pune by the DGSD was only an initial inspection and the commissioning in March 1982 was only a trial run. The Institute held that the machine had not been finally delivered and invoked guarantees. According to the supplier, the machine was inspected by the DGSD before delivery and was commissioned satisfactorily on 4th March 1982. Further, according to the supplier, the guarantee period had elapsed both from the dates of delivery and commissioning. However, the DGSD requested the supplier in April 1983 to replace the machine within 45 days or refund its cost. The supplier refused (May 1983) to replace the machine or refund the cost. The matter was taken up in Audit in May 1987 for the blocking up of the capital. The Institute stated on 9th November 1987 that the machine had been repaired and had started working since the last 20 days. Thus, Rs. 2 lakhs deposited for the purchase of the machine in March 1980 remained locked up for more than 7½ years without any benefit accruing to the Institute.

#### 18. Excess payment for electricity consumed

The National Dairy Research Institute, Bangalore (NDRI) a constituent unit of the Indian Council of Agricultural Research (ICAR), has a farm for raising high yielding fodder crops and dairy herd for training and for research work. The NDRI entered into a contract with Karnataka Electricity Board (KEB) in 1976 for supply of 400 KVA high transmission power for a period of 5 years. The NDRI declared in April 1978 a maximum demand of 400 KVA. How-

ever, the demand was higher in comparison to actual consumption and the average monthly consumption was within 250 KVA. The NDRI, therefore, requested the KEB in November 1982 to reduce their contracted demand to 300 KVA with immediate effect.

Further as per the Tariff Act, the consumer had to pay for a minimum of 60 *per cent* of the contracted power irrespective of the actual consumption upto November 1983 and 75 *per cent* thereof from December 1983. A review of the payment showed that there was avoidable expenditure since the average monthly actual consumption was only 140 KVA (approx.) till 1984. The ICAR admitted that the maximum average monthly demand was 213, 185 and 210 KVA during 1985, 1986 and 1987 respectively. Audit had pointed out that the demand for power was in excess during 1980-81 and the ICAR had then stated (August 1982) that the higher level of power had been contracted to avoid any difficulties arising out of power cut and also because more electricity would be required in the years to come on account of the Sixth Plan activities. No effective action was, however, taken to synchronise demand for power and actual consumption level.

A further review conducted by Audit in January 1987 indicated that the NDRI had neither expanded to scale up consumption of electricity to any appreciable extent nor had been able to get its contracted demand reduced. The NDRI continued to pay for the 75 *per cent* of the contracted demand which had resulted in avoidable expenditure of Rs.2.86 lakhs for the unconsumed power from May 1978 to December 1986. At the instance of Audit, the matter was again taken up with the KEB in February 1987. The KEB informed (April 1987) the NDRI that the contracted demand would be reduced to 300 KVA with effect from August 1987.

The ICAR stated (September 1987) that the KEB was requested to reduce the contracted demand to 300 KVA and matter was pursued with the KEB authorities through personal contacts and it could not be given effect to on account of lack of proper response from the KEB authorities. It was also stated that on account of erratic power supply and power cut as well as doubling the tariff by KEB the Institute was forced to reduce the maximum contracted demand in spite of the expansion activities.

Thus, due to unrealistic assessment of power consumption, the NDRI had to pay for

unconsumed power for more than 8½ years. the matter regarding reduction of the contracted demand initiated in November 1982 could only materialise in August 1987 and the avoidable expenditure upto December 1986 was Rs.2.86 lakhs.

#### 19. Acquisition of Motor Fishing Vessel - Sunderbans - Heavy expenditure thereon to make it operative

M.V. Sunderbans, a motor fishing vessel, built in 1958, was transferred free of cost (Book value: Rs.1.20 lakhs) from Exploratory Fisheries Project, Government of India to the Central Institute of Fisheries Education (CIFE), a constituent unit of the Indian Council of Agricultural Research (ICAR) in March 1979. The vessel was transferred for carrying out estuarine research programmes and for training purposes.

Even at the time of take over of the vessel, it was known that extensive repairs and dry-docking was required for the vessel and maintenance cost would be high. It was even stated that the vessel was not worth the book value, the original spares had been used up and further availability of spares was doubtful. It was also reported that the vessel was not suited for training purposes since there was no accommodation for the trainees and some of the essential equipments necessary for training were to be fitted in. However, the vessel was taken over and 219 trainees have been given training in the last 8 years. The vessel has been dry-docked since August 1985 for repairs and a sum of Rs.11.35 lakhs have been paid as repair charges upto July 1987. The approximate total expenditure on repairs was indicated as Rs.12.18 lakhs.

The Garden Reach Shipbuilders and Engineers Limited (GRSE) who had undertaken to repair the vessel demanded an advance payment of Rs.10 lakhs in November 1985 for the expenses incurred by them. Since this was not paid, the GRSE intimated the CIFE that the repair work had been stopped since December 1985 and the vessel was lying idle in the slip-way. The CIFE thereafter made payment of Rs.1.20 lakhs in February 1986, Rs. 5 lakhs in August 1986 and Rs.5.15 lakhs in April 1987. The delay in making payment to the GRSE and consequent delay in completing the repairs resulted in the staff on board the vessel remaining idle. They were reported to be engaged only in supervision of the works and on watch and ward of the vessel. Rs. 2.48 lakhs had been paid including messing allowance to the floating staff during the period 30th August 1985 to 31st July 1987.

In addition, slip-way charges had to be paid to the GRSE at the rate of Rs.500 per day for repairing the vessel. So far Rs.0.92 lakh have been paid for 183 days (30th August 1985 to 28th February 1986) and another bill for Rs.1.54 lakhs being charges for 308 days (1st March 1986 to 2nd January 1987) was stated to be under scrutiny. Originally, the repairs were expected to be completed in 109 days and the slip-way charges would have been only Rs.0.55 lakh in all.

The ICAR stated (September 1987) that though the vessel had been unlocked, the repairs had not been completed since the GRSE were not able to procure an equipment to complete the repairs and take the vessel out for trial run.

Thus, taking over a vessel which was already 21 years old and when it was foreseen that the repairs and maintenance cost would be high was administratively wrong. Rs.11.35 lakhs have so far been paid as repair charges and further charges are payable for a vessel whose book value was only Rs.1.20 lakhs in 1958.

#### 20. Unfruitful expenditure on purchase of a movie camera

The Directorate of Oil Seeds Research, Hyderabad, a unit of the Indian Council of Agricultural Research (ICAR), purchased a 16mm Movie Camera in March 1985 and its accessories in June 1985 at a total cost of Rs.3.21 lakhs. The films required for the camera were not available with the supplier firm even at the time of purchase of the camera as the import of the film had been stopped since 1984. The Institute also had doubts about the operational worthiness of the camera owing to non-availability of films till September 1987.

In response to Audit observation, the ICAR stated (December 1987) that supplier had given a live demonstration of the camera on 28th October 1987 using a 16mm black and white negative film and that the movie camera together with its accessories was found to be satisfactory and fully operational worthy. It was further stated by the ICAR that considering the wide scope of the camera and its accessories, recurrent costs and problems involved in the procurement and processing of the films, etc., they were attempting to transfer the equipment to the Films Division, Government of India. Thus, the movie camera was not being put to use for want of films and could not even be tested. It was only tested in the print films. After remaining idle for more than 2 years, an attempt is being

made to transfer it to a different department. The entire expenditure of Rs.3.21 lakhs has, thus, proved unfruitful.

## 21. Non-deployment of surplus staff - Infructuous expenditure thereon

The Rihand Centre (U.P.) of the All India Coordinated Research Project on the Ecology and Fisheries of Fresh Water Reservoirs was established by the Indian Council of Agricultural Research, New Delhi (Council) in May 1971. The Project Coordinator (Reservoir Fisheries) of the Central Inland Fisheries Research Institute, Barrackpore, West Bengal (CIFRI) informed the Council in December 1980 that the Centre had completed the envisaged work programme and the VI Workshop held at Shimla in November 1980 had recommended closure of the Centre and opening of a new Centre in its place in the State of Maharashtra. The Project Coordinator further stated (December 1980) that the final report on the working of this Centre would be submitted to the Government of Uttar Pradesh on 31st March 1981 and an interim report had already been submitted in November 1979. In August 1981, the Council requested the State Government to communicate its concurrence for

the closure of the Centre. While agreeing to the proposal, the State Government suggested (November 1981) opening of a new Centre in the Tarai Region of Uttar Pradesh.

The Council appointed in May 1982 a Mid-term Appraisal Committee to appraise the activities, achievements and future programmes of all the projects including that at Rihand Centre. But the recommendations (1984) of the Mid-term Appraisal Committee were silent about the closure of the Rihand Centre. However, the Council informed the Director, CIFRI in January 1985 that since the objective of the project had been achieved and the work was completed in most of the aspects, the project be closed with effect from 1st April 1985 and requested the Institute to take necessary action for re-deployment of the surplus staff. Rihand Centre was actually closed in September 1986 and the staff continued to be in position till that date. Consequently, the Council incurred an expenditure of Rs.5.19 lakhs on pay and allowances on the surplus staff for the period January 1981 to August 1986.

The Council stated (July 1987) that "since the Coordinated Project Centre continued be-

yond 1981 and till April 1985 the Centre undertook a second phase of a definite work programme on the ramified problems in regard to ecology and fishery..... It may be appreciated that dynamic eco system of the reservoir in the form of a vast water body necessarily requires continuous monitoring with changing patterns of decisions periodically. There could be nothing like a final report on the ecology and fishery of a given reservoir.... Therefore, the contention that once the final report on Rihand was over based on the work till 1981 does not hold good. The presence of the coordinated project centre at Rihand initially till 1981 and later till 1985 resulted in the generation of a substantial information pertinent to the fishery management of the resources".

The above contention is not tenable because it was the expert's contention, namely the Project Coordinator (Reservoir Fisheries) that the Centre had completed the envisaged programme in December 1980. In August 1981 and January 1985, the Council had also written regarding the closure of the Centre. Thus, retention of entire staff numbering 6 including 3 fishermen for post closure formalities for more than 1½ years especially when the final report was stated to be under preparation in December 1980 itself seems untenable. Further, since interim report had already been submitted in November 1979, timely action should have been taken for gainfully employing the surplus staff elsewhere.

Thus, the expenditure of Rs.5.19 lakhs was without resultant benefit and as such infructuous.

## DEPARTMENT OF ELECTRONICS *Regional Computer Centre, Chandigarh*

### 22. Short accountal of Government money

The Department of Electronics (DOE) had registered the Regional Computer Centre (RCC), Chandigarh as a Society in March 1978 under the Societies Registration Act, 1860 to impart training on computer sciences. The Centre which became operational in May 1979 was to be managed by a Board of Trustees. Its day-to-day affairs were to be looked after by an Executive Council and by a full time Director appointed by the Board, who was also to be its Ex-officio Secretary. He was responsible to the Executive Council for the efficient working and safe custody of funds, assets, etc.

The Executive Director, in consultation with the Chairman was required to call the meetings of the Executive Council at least once a year. Since no meeting of the Council was called for after April 1979, the DOE sent two of its officers to the Centre in August 1980 for inspection of the records. They were, however, denied access to the records including cash book. Thereupon the Council decided in February 1981 that cash book upto March 1980 be written up by March 1981. The Council again noted in May 1981 that no action had been taken by the Executive Director and so the Board of Trustees decided that the Executive Director should have the audited accounts ready within a period of 3 months. As no action was initiated by the Executive Director, this time also the Executive Council/Board of Trustees withdrew the financial and administrative powers of the Executive Director and appointed a Financial Controller in February 1982. The Executive Director, however, produced the audited accounts for 1977-78 in the Council meeting of April 1982 and wanted a period of 2 months for producing the audited accounts of the subsequent years. However, the Council desired the Director to submit the audited accounts for all the years before expiry of his tenure i.e. 17th May 1982. This was not done and it was noted that audit beyond 1978-79 had been suspended by the Executive Director. Thereupon, the Council decided in the June 1982 to take over the records.

The accounts were thereafter reconstructed upto 1981-82 and it was noticed that Rs.1.26 lakhs were yet to be accounted for. A civil suit for recovery of the amount was filed against the Executive Director in October 1984.

The department stated in April 1987 that considerable progress had been made in the case as the ex-Director had made available some more records and after taking into account the terminal benefits and salary due to him, the unaccounted amount of Rs.1.26 lakhs would be accounted for. However, the department itself had stated in June 1987 that only an amount of Rs.0.22 lakh would be due to the Executive Director on account of difference of salary due to pay fixation and terminal benefit.

The Executive Council did not meet for almost 2 years and this was indirectly responsible for short accountal of the cash. Financial records had not been maintained and the Executive Director was not made to account for the cash periodically. The submission of the accounts was neither watched nor insisted upon.

After April 1979 the next meeting of the Council was not convened till January 1981. The Ex-officio Chairman of the Council, a representative of the Government of India, also took no initiative to convene the meetings and to keep the accounts in order. In short, the various failures resulted in the short accountal of cash to the tune of Rs.1.26 lakhs which remains to be recovered since May 1982.

**MINISTRY OF SCIENCE AND TECHNOLOGY  
DEPARTMENT OF SCIENCE AND  
TECHNOLOGY**

*Bose Institute Calcutta*

**23. Blocking up of capital due to non-installation of imported equipments**

(a) The Bose Institute, Calcutta (Institute), a Society registered under Societies Registration Act, 1860, is wholly financed by the Central Government. The Institute placed an order in July 1978 for import of one EPR Spectrometer at a cost of Rs.11.84 lakhs for its Regional Sophisticated Instrumentation Centre (RSIC). The Spectrometer arrived in July 1979 and was cleared in October 1979, after paying the clearing charges of Rs.0.24 lakh. The laboratory space for installing the equipment was made available only in February 1984 and the laboratory was made ready by March 1985. The installation of the equipment was taken up in May 1985 and completed in June 1985. However, the equipment could not be commissioned immediately due to certain defects. These were removed in August 1985 and trial runs of the equipment commenced in September 1985. The equipment was fully commissioned in July 1986 after a lapse of 7 years. Despite the delay the Institute had released the agency commission of Rs.1.10 lakhs in January 1980 itself, since the delay was attributable to the Institute.

To an audit observation regarding delayed commissioning, the Institute stated that some small items like integrated circuits, transistors etc. were found defective and these had since been replaced from the surplus spares supplied with the instrument. Further, rust formation due to long storage had also caused a major problem during installation which was taken care of through prolonged treatment procedures. The Institute also stated in May 1987 that the normal life span of the above equipment was about 10 years and attempts would be made to prolong the life of the equipment through indige-

nous and improved methods. The Institute was also aware that the manufacturer had stopped manufacturing EPR instrument since these had become obsolete and yet the delay of 7 years in commissioning the instrument had not been avoided.

(b) In another case, the Institute placed an order for one set of JEM 200 CX Transmission Electron Microscope with accessories on a Japanese firm in February 1983 at a cost of Rs.18.06 lakhs. The equipment was received in September 1983 with one crate damaged on one side. A sum of Rs.0.09 lakh was also paid as interest for 10 days at the rate of 18 *per cent* covering the period between the date of receipt of the equipment and the date of payment. A sum of Rs.0.23 lakh was paid as clearing charges. Due to non-availability of space this equipment also could not be installed immediately and was completely installed only by September 1985.

In April 1985, during pre-installation phase, the Service Engineer had noticed certain damages and these were rectified by the local agent. The equipment started working since July 1986. Thus, the procurement of this equipment yielded no benefit to the Institute for about 2 years 10 months.

The Review Committee of the Institute had adversely commented (January 1985) on the Institute and stated that the Microscope had been ordered without prior planning, without the sites being firmed up and the instruments were lying in crates for several years creating uncertainties. The Committee had added that utilisation and maintenance procedures for most of the equipments in the Institute were poor.

(c) In July 1979, the Institute imported one Atomic Absorption Spectrophotometer with spares and accessories at a cost of Rs.3.79 lakhs. The instrument could not be installed immediately for want of suitable space. In the meantime, the warranty period expired in April 1980. The Institute stated (August 1987) that the supplier had extended the warranty period, on verbal negotiations, on the assumption that space would be made available, but since this did not materialise within a reasonable period, the instrument had to be installed for checking performance of the system, in a make-shift manner so that warranty claims, if any, could be made. It was also stated that the installation of the equipment after location of suitable space was done in March 1985 and many faults had developed and that these could not

be overcome with the available spares and the Institute had accordingly ordered in January 1985 for additional set of spares worth Rs. 1.08 lakhs and got them in May 1985. The instrument was, thus, back to normal functioning in February 1987 after necessary repairs.

The Institute also stated in April 1987 that the life of the equipment in the circumstances of obsolescence and non-availability of spares could be taken as 4/5 years but efforts could be made to prolong the life with improvisation of indigenous components. According to the Institute, the purchase of additional spares was inevitable considering that the instrument had been declared obsolete and sufficient stock of spares would be needed to keep the instrument running for its specified lifetime, at least.

The equipment procured without earmarking suitable space for installation resulted in the instrument lying idle for 7½ years. Also, there was avoidable expenditure of Rs.1.08 lakhs incurred towards additional spares since the equipment was commissioned after the expiry of the warranty period.

(d) The Department of Science and Technology released a grant of Rs.48 lakhs to the Institute in February 1982 for purchase of NMR-FT Bruker CXP Spectrometer. An irrevocable letter of credit for Swiss Francs 852,070.40 (Rs.44.15 lakhs) was hurriedly opened by the Institute on 27th February 1982 in favour of firm 'A' of Zurich, Switzerland without any condition for preshipment inspection of the equipment, since the Institute wanted to place the order before the expiry of open general licence on 28th February 1982. Formal purchase order was issued subsequently on 15th March 1982 incorporating the condition of preshipment inspection and delivery within 9 months after receipt of letter of credit even though the condition for preshipment inspection was not in the quotation of the firm. Letter of confirmation was received from the supplier on 26th March 1982 without any condition regarding preshipment inspection.

The equipment arrived at the Calcutta Airport on 31st December 1982. The firm had not intimated the despatch of equipment to the Institute but intimated the bankers, since the Institute had not responded to earlier communications from the supplier. The Institute came to know about the arrival of the equipment on 6th January 1983. On 15th January 1983, the Institute informed the supplier about the non-observance of the condition of preshipment ins-



pection and expressed their inability to take delivery of the equipment. Simultaneously, the Institute requested the bank on 18th January 1983 to get refund of the letter of credit amount. The bank expressed their inability since the letter of credit did not contain any condition for preshipment inspection. The supplier also clarified (March 1983) that preshipment inspection condition had not been included by them in their letter of confirmation and was not acceptable to them. Thereafter the Institute cleared the equipment in December 1983 after incurring demurrage charges of Rs.1.26 lakhs and handling charges of Rs.0.53 lakh. The department stated in July 1987 that the demurrage charges would be recovered from Indian Agent's commission in consultation with the concerned party.

The Institute could not install the equipment for want of laboratory space and it was made available only in March 1985. The equipment was installed and trial run was attempted on 15th May 1986. During the trial run, the equipment failed owing to various faults and damage to components but by that time the guarantee period had expired. The equipment still remained to be set right.

Non-settlement of preshipment inspection condition prior to the placement of purchase order, delay in taking delivery of the equipment for about a year and delay in making the infrastructure ready before the arrival of the equipment resulted in blockade of capital of Rs.44.15 lakhs for about 4 years. Besides, Rs.1.26 lakhs paid as demurrage charges would also be blocked till recovery from the Indian Agent's commission. The Institute admitted that the letter of credit was opened in a hurry prior to the placement of purchase order to meet the deadline of 28th February 1982. Thus there was rush of expenditure also.

The department stated (August 1987) that the necessary building programme to enable the housing of the equipment was completed as per the prescribed time schedule but some infrastructural facilities, such as, installation of gas plant, electrical hotline installation, water supply system, precaution against fire etc. could not be provided in time. Only in the early part of 1984, after the completion of infrastructural facilities, space was made available to the RSIC for undertaking necessary remodelling, keeping in view the necessity for the proper installation of the instruments. Consequently, the instruments procured were lying in crates for several years.

In sum, there was inadequate pre-planning in all the above cases and the costly imported equipments remained idle for periods ranging from 2½ to 7½ years when the life-span of the equipments themselves was limited. There was blockage of funds to the tune of Rs.81.20 lakhs besides additional avoidable expenditure of Rs.1.17 lakhs.

## DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH

*Council of Scientific and Industrial Research*

### 24. Recurring loss on production of magnesium — Blockade of capital and unproductive expenditure

In February 1972, the National Metallurgical Laboratory (NML), Jamshedpur, a constituent unit of the Council of Scientific and Industrial Research (CSIR), commissioned a demonstration-cum-semi-commercial plant for the production of magnesium from indigenous raw material based on know-how developed by it. The installed capacity of the plant was 200 tonnes *per annum*, against which the plant could achieve, by August 1977, production of 15.13 tonnes *per month*.

Since according to the bye-laws of the CSIR, it was not supposed to run or manage a regular production unit, operation of the above plant was intermittent and from March 1985 the plant had been in suspended animation due to paucity of funds. During the period 1972 to 1985, the total production was only 238.36 tonnes against the installed capacity of 2600 tonnes. The production has been very marginal in the last 5 years of the running of the plant and the average annual production was only 5.2 tonnes.

Though the plant is in suspended animation since March 1985, it was employing 121 persons including 11 security personnel. The recurring expenditure on maintenance of personnel on an average was Rs.39.66 lakhs *per annum* and during last 30 months Rs.99.15 lakhs had been so spent which was unproductive.

The plant was established with a capital investment of Rs.114.15 lakhs and had incurred production expenditure of Rs.538.17 lakhs till March 1987. The plant had realised Rs.95.85 lakhs by way of sale of magnesium etc. and the cost of magnesium on hand as on 31st March 1987 was Rs.0.08 lakh. Thus the total loss on the plant was Rs.442.24 lakhs till 31st March 1987.

The CSIR had been attempting to transfer the know-how to a public/private sector agency since 1975. In 1976, the Bharat Aluminium Company (BALCO) operated the plant for a period of six months and came to the conclusion that the plant was not viable. In June 1986, a meeting was held in the Department of Mines for handing over the plant to the BALCO. In that meeting also, the BALCO declined to take over the plant since the cost of production of magnesium at the NML plant was very high.

Subsequent to an Audit observation, open tenders were invited by the CSIR in April 1987 for outright sale of the plant. The CSIR stated in October 1987 that one of the tenders was under active consideration.

In sum, the CSIR had been operating the semi-commercial plant for about 13 years though it was outside its charter. The total infructuous expenditure till March 1987 was Rs.442.24 lakhs besides idle capital investment of Rs.114.15 lakhs.

#### **25. Blocking up of funds for 24 years due to unnecessary acquisition of land**

The Indian Institute of Bio-Chemistry, Jadavpur, a constituent unit of the Council of Scientific and Industrial Research (CSIR), proposed shifting the Institute to Kalyani, a satellite town 49 kms. away from Calcutta. To that end, 39 acres of land were purchased from the Government of West Bengal at a cost of Rs.10.02 lakhs in September 1963. However, the Ministry of Finance who were requested in December 1963 to approve the expenditure declined to do so as establishment of the Institute at Kalyani had not been considered by the Finance Sub-Committee of the CSIR. Subsequently, the governing body of the CSIR approved the shifting and construction of laboratories etc. at Kalyani in September 1964. Meanwhile, the Institute went ahead with expansion of its existing buildings at Jadavpur and no construction work was started at Kalyani and the land was lying vacant till December 1968. This was commented upon in the Audit Report (Civil) for the year 1969. Since the land had not been utilised, the Government of West Bengal requested the CSIR in March 1968 to surrender the land if it was not possible to go ahead with the project. The State Government promised to refund the amount deposited by the CSIR. The CSIR finally decided (January 1973) to surrender the land. The matter was taken up with the State Government in January 1973 and the land was re-transferred in January 1976.

In October 1977, the Government of West Bengal informed the Institute that on resuming the possession of land it was found to have been under unauthorised cultivation leading to extensive damage to the internal roads, sewage and water-lines and estimated the cost of damage as Rs. 4 lakhs. This was to be recovered from the cost of land payable to CSIR. The CSIR has not so far got back either the full or reduced amount from the West Bengal Government.

The CSIR stated (August 1987) that the land was surrendered on the clear understanding that the CSIR would get refund but so far the West Bengal Government had not been able to decide as to what amount would be refunded to the CSIR. The CSIR further stated that the land had been occupied by the Army in consultation with the State Government for the East Bengal refugees and CSIR's permission was never sought to occupy the land. Neither did they inform the CSIR of the date of its vacation. The CSIR therefore contended that it was hardly responsible for the damages caused, if any to sewer, water lines, internal roads etc. However, this issue regarding damages remains to be settled.

Thus, the acquisition of land made 24 years back had proved futile and the money paid remained blocked for all these years. There is also a contingent liability of Rs.4 lakhs payable to the Government of West Bengal.

#### **26. Administrative lapses in the import of equipment and resultant blockage of capital and avoidable expenditure**

The Central Mining Research Station, Dhanbad (CMRS), a constituent unit of the Council of Scientific and Industrial Research (CSIR), placed an order in February 1985 on a foreign firm for supply of Quantasorb Surface Area Analyser with accessories used in the study of gases, gas emission, etc. at a cost of US \$ 23120 (about Rs. 3 lakhs) plus agency commission (Rs.0.28 lakh). The supplier was chosen on the basis of global tenders and the rate quoted by the supplier was inclusive of freight charges by air. However, CMRS had indicated in the supply order of February 1985 to send the equipment by ship. The Letter of Credit, subsequently opened in February 1985 in favour of the supplier, also indicated that shipment was to be made by sea. CMRS did not correct the order even after the supplier advised in March 1985 that their c.i.f. charges included air freight and that the equipment was very delicate to be sent by sea.

The CSIR stated (July 1987) that the seaworthy clause was not initially scored out in the purchase order as per normal practice in the laboratory in the matter of foreign purchases. Subsequently when the foreign supplier informed the laboratory that shipment would be made by air since the instrument was delicate and charges quoted by the firm were for air-shipment, it was taken for granted by CMRS that the equipment would be sent by air instead of by sea and no further action was taken. The CMRS had earlier stated that shipment by sea was preferred due to wrong interpretation of the instructions issued by the CSIR which provided that all such imports should be by sea as a matter of policy to effect economy.

Contrary to the presumptions of CMRS, the equipment reached Calcutta by sea instead of by air in September 1985. It could not be cleared immediately thereafter because 'Not Manufactured in India' certificate (NMIC) issued by the Director General, Technical Development was only initialled and not properly signed by the competent authority. The equipment was shifted to a warehouse only in March 1986 after completing joint inspection formalities by CMRS and the surveyors. Only on 20th February 1986, a defect-free NMIC with full signature could be given to the clearing agent. Till then, the equipment had been lying in the open and was damaged due to dust and rain water.

In July 1986, CMRS preferred insurance claim amounting to Rs.2.86 lakhs for damages as the consignment was insured from warehouse to warehouse. In the absence of the surveyor's report, which was an essential pre-requisite, the claim had not been honoured. The insurance company has been reminded in July 1987.

The CMRS had sent the equipment to the Indian agent in September 1986 for repairs at an additional cost of Rs.0.22 lakh. The Indian agent informed the centre in June 1987 that the equipment was ready after repairs except for recorder and its delivery be taken after making payment of repair charges of Rs.0.22 lakh. The CMRS, however, felt that pending settlement of insurance claim lodged at the advice of the firm, the repair charges might not be paid. The delivery of the equipment after repairs was, thus, still due (July 1987).

The CSIR admitted the facts in December 1986 and stated that the administrative responsibility was being fixed. Subsequently in May 1987, the CMRS apprised CSIR that wrong procedure of scoring out airworthy clause in all foreign import cases had been in vogue since

1980 and earlier and so the practice had continued inadvertently.

In sum, the administrative lapses in interpreting instructions, delay in clearing the goods, mistake in presuming the intention of the supplier etc. led to damages to the equipment and blockage of capital of about Rs. 3 lakhs. The CMRS would also be incurring avoidable additional expenditure on account of repairs to the machine.

## **27. Administrative lapses resulting in overpayment to a contractor.**

The Council of Scientific and Industrial Research (CSIR) approved in December 1978, the award of construction of 32 staff quarters in the Central Food Technological Research Institute (CFTRI), Mysore to contractor 'A' for Rs.14.77 lakhs on lowest tender basis. The work was to be completed by 24th January 1980. By the target date, the contractor could execute only 33 per cent of the work and by November 1982, the work came to a stand-still due to financial problems of the contractor.

In June 1983, the CSIR and the contractor reached an agreement for completion of the remaining part of the work on the condition that the CSIR would pay for the materials purchased and labour engaged on behalf of the contractor. The contractor on his part offered a bank guarantee for Rs. 1.27 lakhs as security deposit as well as guarantee for defects-free workmanship. In addition, he had also offered to pledge his immovable property valued at Rs.3 lakhs against the facility offered by CSIR to complete the work. The work was to be completed by September 1983. However, it was completed by November 1983 after the CSIR granted an extension of time.

When the final bill was prepared in August 1984, it was found that the contractor had been overpaid to the extent of Rs.3.22 lakhs. The overpayment had occurred as the CSIR had paid for materials purchased and labour employed on actual basis instead of at the rates quoted in the original tender. Such overpayments continued over a period of 5 months.

In order to retrieve the overpayment, the CSIR invoked the bank guarantee in March/June 1984 but the bank rejected the claim in August 1984 on the ground that the guarantee was only a security deposit for completion of work and for defect-free workmanship and did not cover overpayments. The bank also stated that by

August 1984, the guarantee had expired. The CSIR then sent a legal notice to the contractor in May 1985, which was also rejected in July 1985. Thereupon, the CSIR filed a suit in December 1985 which remains to be disposed off. The CSIR has so far incurred Rs.0.45 lakh on legal expenses.

The CSIR stated (December 1987) that the matter was also being enquired into departmentally.

Thus, due to administrative lapses in not restricting the advance payments to the tendered rate of the contract, in not getting the bank guarantee properly executed and keeping it alive and in not getting the personal immovable property pledged to the CSIR as offered by the contractor, the recovery of the overpaid amount of Rs.3.22 lakhs has become uncertain. In addition, the CSIR had also incurred legal expenses of Rs.0.45 lakh so far.

#### 28. Purchase of IBM Electronic Selectric Composer

The Central Mechanical Engineering Research Institute, Durgapur, procured for its research work, one IBM Electronic Selectric Composer, in April 1986 from a firm in Hongkong at a cost of Rs.0.74 lakh. It had also paid Rs.1000 as terminal charges at Calcutta.

On inspection, in the presence of the Indian agent, the machine was found defective. The date of manufacture of the machine was

indicated as May 1980. Even after replacement of a number of parts/components, the performance of the machine was found not satisfactory.

The Indian agent, the firm in Hongkong and M/s IBM World Trade Corporation, New York disowned their responsibility for the defective machine. The Institute has withheld the payment of Indian agent's commission of Rs.0.17 lakh.

The Institute stated in January 1987 that these IBM off-the-shelf machines were not warranted and as such warranty clause could not be insisted upon. The Institute further stated (June 1987) that the supplier firm had taken the plea that it was only a shipping agent for the IBM product though it had executed the sale invoice and Letter of Credit was also opened in its favour. The Indian agent had also intimated that he was pursuing the matter continuously with the IBM, Australia who controlled the overseas operation for IBM products for Asia and the East. The IBM, USA with whom the matter was taken up earlier had informed that the product remained withdrawn from the market from February 1984. Legal action against the supplier was not deemed appropriate at this juncture since the matter had already been taken up with the High Commission of India at Hongkong and other Trade Development and Control Authorities at Hongkong. The defective machine remains with the Institute without being replaced and Rs.0.75 lakh spent on the machine has not benefitted the Institute so far.

CHAPTER V

DEPARTMENTALLY MANAGED  
UNDERTAKINGS

29. General

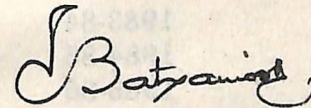
On 31st March 1987, there were 5 departmentally managed Government Undertakings of commercial and quasi-commercial nature under the scientific departments.

The financial results of these Undertakings are ascertained annually by preparing proforma accounts outside the general accounts of Government.

Proforma accounts for the year 1985-86 have been received (January 1987) in respect of only one Undertaking. A synoptic statement showing the summarised financial results of all the departmental undertakings on the basis of their latest available accounts is given in Appendix-II. It will be seen therefrom that in a number of cases, proforma accounts are in arrears for a number of years. The delays in the compilation of accounts have been brought to the notice of the Administrative Ministries concerned.

New Delhi  
The

3 MAR 1988



(S. SATHYAMOORTHY)  
Director of Audit-II, Commerce, Works & Misc.

Countersigned

New Delhi  
The

3 MAR 1988



(T.N. CHATURVEDI)  
Comptroller and Auditor General of India

Ministry/Department	Period to which grant relates (Upto September 1985)	Number of utilisation certificates outstanding at the end of March 1986	Amount (In lakhs of rupees)
1	2	3	4
Science and Technology	1976-77	123	209.62
	1977-78	283	415.12
	1978-79	355	456.19
	1979-80	387	637.24
	1980-81	448	533.97
	1981-82	362	496.36
	1982-83	493	693.36
	1983-84	569	310.53
	1984-85	685	1346.49
	1985-86	519	1323.82
		<u>4224</u>	<u>6422.70</u>
(i) Non-Conventional Energy Sources	1983-84	470	1618.22
	1984-85	740	1717.60
	1985-86	860	10598.47
		<u>2070</u>	<u>13934.29</u>
(ii) Indian Meteorological Dept.	1985-86	6	1091.50
Space	1976-77	1	0.05
	1977-78	1	0.15
	1978-79	2	0.08
	1979-80	5	0.39
	1980-81	14	1.63
	1981-82	17	8.16
	1982-83	54	37.49
	1983-84	70	48.88
	1984-85	95	50.52
	1985-86	79	61.49
		<u>338</u>	<u>208.84</u>

## APPENDIX-II

(vide sub-paragraph-29)

Summarised Financial results of departmentally managed Government Undertakings  
(Figures in lakhs of rupees)

Sl. No.	Name of the Undertakings	Period of Accounts	Government Capital	Block Assets (Nets)	Depre- ciation todate	Profit (+) Loss (-)	Interest on Govt. Capital	Total return	Percentage of total return to Mean Capital	Remarks
Department of Atomic Energy										
1.	Tarapur Atomic Power Station, Bombay	1984-85	8,415.01	3,861.43	3,864.85	(+) 128.65	1,054.09	1,182.74	6.36	The proforma accounts have been certified and issued on 28.10.1987.
		1985-86	8,618.31	3,768.21	4,147.08	(+) 2,003.63	1,044.87	3,078.50	17.26	The initial accounts have been checked during June 1987 and the observations thereon communicated in July 1987 and compliance is awaited. The department was reminded on 17.12.1987.
2.	Heavy Water Pool Management, Bombay	1981-82	9,829.11	1.10	0.84	(+) 148.10	550.78	698.88	7.99	The proforma accounts from 1982-83 are awaited and the department has been reminded.
3.	Madras Atomic Power Station, Kalpakkam	1984-85	11,605.31	9,868.18	435.04	(+) 748.75	909.92	1,658.67	13.36	
4.	Nuclear Fuel Complex, Hyderabad	1984-85	4,679.58	3,718.92	134.07	(-) 518.03	958.52	440.49	3.43	The initial accounts submitted by NFC have been checked in November 1987 and the Local Audit Report is under issue to the Unit.
5.	Rajasthan Atomic Power Station, Kota	1984-85	17,518.05	12,860.68	3,761.33	(-) 1,852.66	1,736.02	(-) 116.64		Revised Accounts under security.

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