







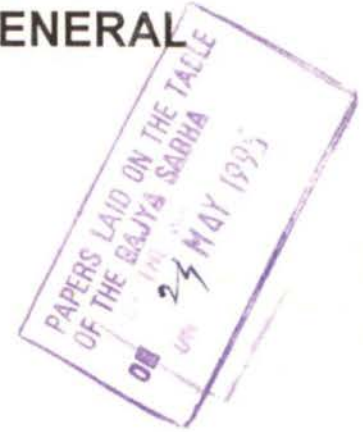
लोक/राज्य सभा सभा वटल पर रखे जाने के लिए
To be laid on the Table of the Lok/Rajya Sabha
अधिप्रमाणित/Authenticated

नई दिल्ली
New Delhi
दिनांक
Date

18.5.95

श्रीमती कृष्णा साही
(Smt. KRISHNA SAHI)
उद्योग मंत्रालय में राज्य मंत्री
Ministry of State in the
Ministry of Industry

**REPORT OF THE
COMPTROLLER AND AUDITOR GENERAL
OF INDIA**



**UNION GOVERNMENT
No. 4 (COMMERCIAL) OF 1995**

BHARAT HEAVY ELECTRICALS LIMITED
(HEEP HARDWAR, EPD BANGALORE AND
INSULATOR PLANT, JAGDISHPUR)

TABLE OF CONTENTS

| <u>Chapter No.</u> | <u>Subject</u> | <u>Page No.</u> |
|--|----------------------------------|-----------------|
| | Preface | (iii) |
| | Overview | (v) |
| <u>Heavy Electrical Equipment Plant (HEEP), Hardwar</u> | | |
| 1. | Introduction of HEEP | 1 |
| 2. | Objectives of HEEP | 2 |
| 3. | Projects in HEEP | 3 |
| 4. | Capacity Utilisation | 12 |
| 5. | Financial Performance of HEEP | 18 |
| 6. | Marketing and Costing | 19 |
| 7. | Central Foundry Forge Plant | 22 |
| <u>Electroporcelains Division (EPD), Bangalore</u> | | |
| 8. | Introduction of EPD | 26 |
| 9 | Objectives of EPD | 27 |
| 10 | Technological Upgradation in EPD | 28 |
| 11 | Expansion of Capacity | 31 |
| 12 | Ceramic Liners(Ceralin) | 34 |
| 13 | Production Performance | 36 |
| 14 | Financial Performance of EPD | 41 |
| 15 | Marketing and Pricing | 44 |
| 16 | Research and Development | 47 |
| <u>Insulator Plant, Jagdishpur</u> | | |
| 17. | Setting Up of Insulator Plant | 48 |
| 18. | Production of Insulators | 50 |
| 19. | Financial Performance | 54 |
| 20. | Marketing | 57 |
| 21. | Manpower | 58 |
| 22. | Diversification | 60 |
| 23. | Other Points Of Interest | 61 |

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100

PREFACE

Audit Boards are set up under the supervision and control of the Comptroller and Auditor General of India(CAG) to undertake comprehensive appraisals of the performance of the Companies and Corporations subject to audit by CAG.

2. The report on Heavy Electrical Equipment Plant, Hardwar, Electroporcelains Division, Bangalore and Insulator Plant, Jagdishpur of Bharat Heavy Electricals Limited was prepared by an Audit Board consisting of the following members:

1. Shri N.Sivasubramanian Deputy Comptroller and Auditor General-cum-Chairman, Audit Board from 1st July 92 to 31st May, 1993 .
2. Shri U.N.Ananthan Deputy Comptroller and Auditor General-cum-Chairman, Audit Board from 1st June 1993 to 30th November, 1993.
3. Shri C.K.Joseph Deputy Comptroller and Auditor General-cum-Chairman, Audit Board from 13th December, 1993 to 20th March 1995
4. Shri A.K.Chakraborti Principal Director of Commercial Audit and Ex-Officio Member, Audit Board-II, New Delhi from 15th July, 1991 to 28th June, 1993.
5. Shri Shailendra Pandey Principal Director of Commercial Audit and Ex-Officio Member, Audit Board-II, New Delhi from 26th July, 1993 till date.
6. Shri Kanwal Nath Principal Director of Commercial Audit and Ex-Officio Member, Audit Board-III, New Delhi.
7. Smt.Sushma Sharma Principal Director of Commercial Audit and Ex-Officio Member, Audit Board, Hyderabad.
8. Shri K.S.Menon Principal Director (Commercial) and Member Secretary, Audit Board from 2nd July, 1990 to 1st August, 1993.
9. Shri R.Chandramouli Asstt.Comptroller and Auditor General (Comml.) and Secretary, Audit Board from 2nd August, 1993 till date.

10. Shri A.K.Sah
Part time Member

Ex-Chairman, Uttar Pradesh
State Electricity Board .

11. Dr.N.Tata Rao
Part time Member

Ex-Chairman, Andhra Pradesh
State Electricity Board.

The part time members are appointed by the Government of India (in the respective Ministry or Department controlling the Company or Corporation) with the concurrence of Comptroller and Auditor General of India.

3. The report was finalised by the Audit Board after taking into consideration the discussions held with the Ministry of Industry on 24th September, 1993.

4. The Comptroller and Auditor General of India wishes to place on record his appreciation of the work done by the Audit Board.

OVERVIEW

HEAVY ELECTRICAL EQUIPMENT PLANT, HARDWAR

1. The actual expenditure incurred on HEEP project was Rs.99.75 crores as against Rs. 90.41 crores sanctioned by Government.

(Para 3.1)

2. In 1977, HEEP switched to "Epoxy Insulation". BHEL incurred avoidable expenditure of Rs.6.48 crores on replacement/repair of the 47 sets rendered defective because of the use of "epoxy insulation". In addition, loss of power generation was suffered by the customers.

(Para 3.2(i))

3. Failure of strainers of HP valves were reported in 210 MW Sets supplied by BHEL due to which the customers suffered loss of generation of power.

(Para 3.2(ii))

4. Motors manufactured by BHEL were higher in cost than those of competitors and the prime position which BHEL enjoyed in the market was substantially eroded. In 1987 BHEL introduced manufacture of motors with German technology at a capital cost of Rs.6.3 crores, but the Soviet design continued to constitute the major share of BHEL's sales in electric motors.

(Paras 3.4 & 3.5(ii))

5. Piecemeal decisions taken to add new manufacturing facilities under various "Capital" and "Modernisation and Renovation Schemes" for production of thermal sets led to delays, cost escalations and loss of production. Against the envisaged return of 40 per cent in respect of Large Size Turbo Generating (LSTG) Project, the average return obtained during the three years ending 1991-92 was 13 per cent on actual capital expenditure incurred.

(Para 3.5(i))

6. The capacity utilisation for thermal sets came down to 47% in 1992-93 from 86% in 1988-89 and that of Hydro sets to 3% in 1992-93 from 44% in 1991-92.

(Para 4.1)

7. HEEP held "non-moving" and "slow-moving" inventory worth Rs.5.18 crores and Rs.3.87 crores respectively as on 31 March, 1993.

(Para 4.6)

8. 184 R&D Projects were completed during the years 1987-88 to 1992-93. The expenditure on R&D ranged between 0.22 to 0.52% of sales.

(Para 4.7)

9. "Import Substitution" planned in HEEP has not been achieved.

(Para 4.8)

10. The capacity developed in HEEP is not going to be utilised fully in the foreseeable future as its order book position has been continuously declining during the past several years.

(Para 6.1)

11. On account of delay in executing an order for 2x500 MW Turbo generators a customer withheld Rs. 3.80 crores as liquidated damages (share of HEEP being Rs.1.56 crores).

(Para 6.3)

12. The capacity utilisation of Central Foundry Forge Plant (CFFP), Hardwar is poor. During the year 1991-92 rejections of forgings and blooms were more than the norms. The order book position of CFFP is lean. In the light of poor capacity

utilisation the manpower deployed is on the higher side. The cost of production of Forgings, N.F. castings was more than their selling price.

(Paras 7.2, 7.3, 7.4 & 7.6)

ELECTROPORCELAINS DIVISION, BANGALORE

13. Mysore Porcelains Limited, taken over by BHEL as a subsidiary in 1976, became in 1980 a unit of BHEL named Electroporcelains Division (EPD).

(Para 8.1)

14. So far BHEL has not been able to create technological capability for alumina body though it was necessary to use alumina composition for higher strength insulators.

(Para 10.6)

15. The technology obtained from a foreign collaborator for higher rating solid-core insulators could not be commercialised; a portion of the technical knowhow fees of Rs.95.33 lakhs paid to collaborator therefore, proved to be unremunerative.

(Para 10.10)

16. Although capacity was created for producing solidcores of 500 MTs per annum, actual production gradually declined to 68 MTs(1992-93).The existing total capacity was 5900 MTs per annum for all products; production could not reach that figures and in recent years the capacity utilisation went down further.

(Paras 11.4 & 11.6)

17. The production of Ceralin, as a result of its own technical efforts become the commercial strength of EPD.

(Para 12.4)

18. The foundry operations have been resulting in losses, year after year. According to the Management rise in cost of raw materials, power and labour were the principal reasons for the losses.

(Paras 13.3 (v) and (vi))

19. The accumulated loss of EPD, which was Rs.2 lakhs at the end of 1983-84, had increased over the years and stood at Rs.1044 lakhs at the end of 1992-93.

(Para 14.1)

20. Efforts are needed to improve the order book position in future years as the installed capacity in the country is three times the demand.

(Paras 15.3 & 15.4)

INSULATOR PLANT, JAGDISHPUR

21. BHEL set up an Insulator Plant (IP) at Jagdishpur in Sultanpur District of U.P. with a capacity to produce 6000 tonnes of disc insulators per annum. The Plant completed at a cost of Rs.19.39 crores, as against the projected cost of Rs. 17.65 crores, started production in March, 1984.

(Para 17)

22. The Feasibility Report of the Plant projected a demand of 30,000 tonnes insulators per year for the country as a whole, but the yearly demand has hardly exceeded 10,000 tonnes.

(Para 18.1)

23. There was mismatch in the capacities of ball mill, jiggering machine and kiln which limited the installed capacity of the plant. Upto the year 1992-93 the maximum annual production achieved was 3581 tonnes only (59.68 per cent of the installed capacity).

(Paras 18.1 & 18.3)

24. The Feasibility Report envisaged the recovery level of insulators to be 64 per cent in the first year of production and to stabilise at 88 per cent by the third year of production. As against this, a recovery level of merely 29.28 per cent could be attained in the first year of production and subsequently the highest recovery level achieved was 80.07 per cent in 1992-93.

(Para 18.2)

25. The Plant has been incurring losses, the cumulative loss upto 1992-93 was Rs.65.42 crores. The Feasibility Report had envisaged 15.60 per cent return on capital invested. Instead, the entire capital invested had been eroded in the first three years of operation itself.

(Para 19.2)

26. The cost of production of insulators has always been much higher than the average selling prices.

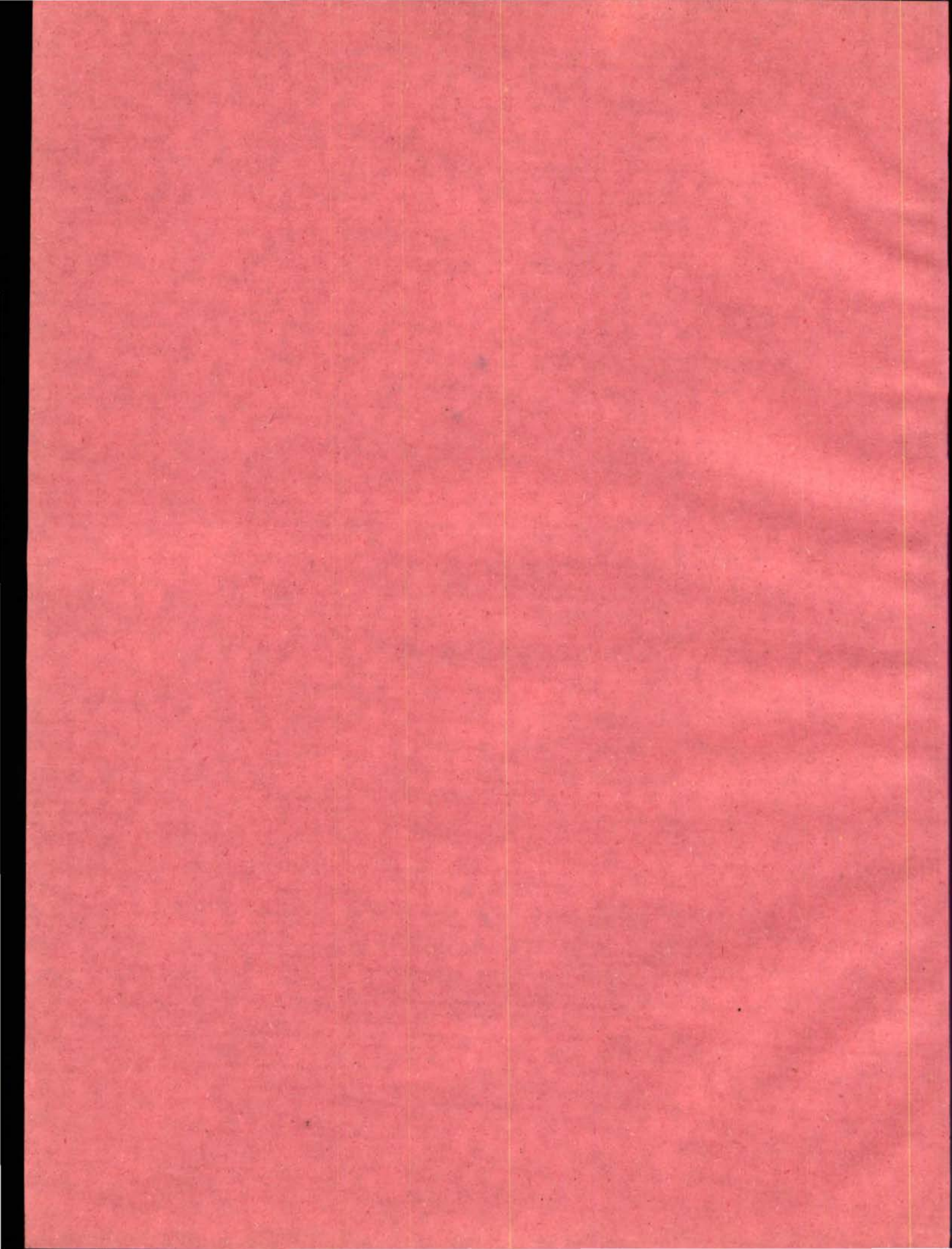
(Para 19.3)

27. The Plant is having the full complement of labour envisaged in the Feasibility Report and engaged contract labour, in addition, though production never exceeded 60% of installed capacity. No action was taken to reduce the surplus manpower. The workers were also paid Rs. 10.17 lakhs as over time and extra wages, Rs. 53.54 lakhs towards plant performance and Rs. 6.11 lakhs as ex-gratia for the years 1987-88 to 1991-92.

(Para 21)

28. As a measure of diversification the Management set up a Ceralin Plant with a capacity of 330 tonnes per year at a cost of Rs. 2.71 crores. Production started from December, 1992. As on December, 1992 the orders booked for supply upto 1994-95 were only for 372 tonnes; subsequently the position was stated to have improved.

(Para 22)



Heavy Electrical Equipment Plant (HEEP), Hardwar

CHAPTER - 1

INTRODUCTION OF HEEP

The Heavy Electrical Equipment Plant(HEEP) at Hardwar was one of the projects set up under the Indo-Soviet Technical Agreement signed on 12th February, 1960.

The execution of HEEP Project was with Heavy Electricals (India) Ltd., Bhopal till November, 1964 when the management and control of the project was transferred to Bharat Heavy Electricals Limited.

The working of HEEP Project was commented upon by the Audit Board in 1970 in the comprehensive appraisal on the working of Bharat Heavy Electricals Limited. The report was considered by the Committee on Public Undertakings (COPU) in its 21st Report (Fifth Lok Sabha - 1971-72) and the action taken by Government was considered in its 43rd Report (Fifth Lok Sabha-December, 1973).

CHAPTER - 2

OBJECTIVES OF HEEP

The main objectives of HEEP are to manufacture Steam Turbines and Turbo Generators, Hydro Turbines and Hydro Generators, Electric Motors and control apparatus for the generators and electric motors. HEEP has now diversified into production of Gas Turbines, Light Aircraft, HVDC Transmission, A.C.Locos and Waste Heat Recovery Boilers.

CHAPTER 3

PROJECTS IN HEEP

3.1 A detailed project report was prepared in 1963 for investment of Rs.74.03 crores for setting up of HEEP. It was revised in December,1966 to Rs.85.99 crores and to Rs.98.32 crores in October,1971. Expenditure incurred upto 31 March,1981 amounted to Rs.99.75 crores excluding expenditure incurred on Stamping Unit (for which a separate Government sanction was issued). The Government of India is stated to have accorded sanction for expenditure of only Rs.90.41 crores.

3.2(i) From 1969-70, HEEP was manufacturing 200 MW Turbo generator sets for power Generation with "bituminous insulations" based on technology received under an earlier foreign collaboration. In 1977, HEEP changed over to "Epoxy Insulation", without consulting the original collaborator and without installing the required testing facilities. The use of epoxy insulation without carrying out certain other associated modifications resulted in leakages in Stator Water Cooling System. These were noticed in 1982. To overcome the hydrogen leakage problem BHEL procured in 1984/1985 technical know-how and documentation and paid Rs.2.10 crores for the know-how and Rs.2.30 crores to the Consultants. It incurred an expenditure of Rs.6.48 crores on replacement and repair of 47 sets, rendered defective because of the use of "Epoxy insulation". According to the Central Electricity Authority (CEA) various Electricity Boards and NTPC suffered loss of power generation on account of stoppage of the 47 sets due to hydrogen leakage. The Ministry stated (July, 1993) that the machines were given for modifications during planned shut down.

(ii) Failure of strainers of High Pressure control valves was also noticed in 210 MW Sets. BHEL undertook modification of 57 sets wherein such failures were reported (upto 89-90:55, 90-91:1, 91-92:1). There were forced outages in power plants on account of the modification undertaken by BHEL resulting in loss of power generation.

Further, in 210 MW generators customer reported rotor earth failure which were attended to by BHEL during the years 1983-84 to 1991-92. Failures also occurred in H.T. Motors.

(iii) In the early sixties HEEP had imported Hydro Blast Equipment to be used for fettling and cleaning of lame castings in the Green Sand Moulding Process. The machines cost Rs.19.47 lakhs but were not used due to a change in the product mix. The

expenditure was charged to the Profit & Loss account of 1980-81 but the machines are yet to be disposed of.

3.3 Technical collaborations with German Parties

(i) On 23 August, 1976, Government of India approved, foreign collaboration with a German party for manufacture of Turbine Generators in the range of 200-1000 MW. A lumpsum payment of D.M. 7.3 million was made for the technical know-how, drawings, designs, documentation, erection and commissioning. The collaboration agreement was for 15 years. In the agreement it was specified that engineering documentation was required for 500 MW set modules although the Government had approved collaboration for manufacture of turbine generator in the range of 200 to 1000 M.W. Subsequently, BHEL signed separate agreements for purchase of engineering documentation for 210 MW set modules and paid DM 1.90 million more.

(ii) The collaboration agreement required information on improvements and modifications to be furnished to BHEL at no extra cost. But, BHEL could not ensure flow of information on further improvements and modifications. During the first two years of the collaboration agreement (upto 1978) only 100 technical papers and reports were received and in all 2484 papers & reports received upto September, 1991. Further, BHEL was to consult the collaborator before implementing any modifications based on its own R&D and on it grant to the collaborator a non-exclusive and non-transferable right free of charge. In August, 1987, BHEL asked the collaborator to provide technology development reports regularly. The collaborator agreed to send only such reports for which technology had been established. In November, 1988 BHEL asked for modified designs on all the turbine modules already purchased by BHEL. Modified designs were received in a phased manner in June, 1989, June, 1990 and March, 1991. Till then BHEL continued to manufacture steam turbine generators according to pre-modified designs only.

The Ministry stated (July, 1993) that in the initial stages emphasis was to get the manufacturing know-how to start manufacturing the turbines generators to establish design. To derive full advantage of the collaboration, technology development reports should have been obtained regularly but BHEL initiated action for this purpose as late as August, 1987.

(iii) In December, 1987 BHEL initiated research and development on 800 MW TG Design at a cost of Rs. 1.5 crores. After spending Rs. 10.31 lakhs (engineering and drafting

charges) in 1988-89, BHEL terminated the scheme in view of a plan to purchase module documentation from the collaborator.

(iv) On the issue of slow technology absorption and why full potential of the technical collaboration agreements had not been made use of, the Ministry stated (September, 1993) that the Company should monitor and ensure that maximum benefits flow to it.

(v) At the time of signing the agreement it was expected that transfer of technology would not call for continuous purchase of components from the collaborator and that the indigenous content would depend on how efficiently the technology was assimilated. (When COPU expressed its concern (1981-82) about the prolonged tie up with another German collaborator, Govt. had stated that BHEL would become self sufficient as early as possible).

Due to the slow pace of absorption of technology, BHEL resorted to frequent import from the collaborator. The CIF value of imports during 1991-92 to 1992-93 was of the order of Rs. 31.15 crores.

Even after 15 years, BHEL had not been able to fully absorb the technology and the agreement was extended for another 10 years upto 2000 AD.

The Ministry stated that the collaboration was extended for having access to further developments in already acquired modules and new modules.

3.4 (i) In 1981, BHEL entered into a foreign technical collaboration with another German Party for transfer of technology on electric motors at a cost of DM 9.6 million effective for 10 years from December, 1981. Royalty at 3.5 per cent of net sale value was payable on all motors manufactured (during the period of the agreement).

(ii) Besides the know how relating to the product included in the agreement, BHEL was to get access to information on design development and R&D relating to motors. It was expected that with this information BHEL would develop total capability in design and technology for motors and become self-reliant. At the time of entering into the collaboration, an impression got created that most of the designs of motors were of the collaborator; but for many designs, the collaborator could not give related documentation as they were designs of others.

(iii) In some areas like heat transfer and ventilation necessary know-how and know-why could not be obtained.

(iv) BHEL was to get information on insulation systems for electric motors, but complete information was not made available, even after persistent efforts. As a result BHEL could not indigenise the insulation system. Thus, BHEL could not avail of the full benefit of DM 9.6 million paid to the collaborator for transfer of technology of electric motors.

(v) Motors manufactured at BHEL were higher in cost than that of competitors and the prime position which BHEL enjoyed in the market was substantially eroded.

The Ministry stated that motors manufactured with the German Collaborator's technology are technically better and more efficient and cost is being reduced by further indigenisation.

While it may be true that the quality of the German Collaborator's motors is better, the fact cannot be denied that the cost was rather high on account of high import content. If BHEL had speeded up the indigenisation it could have kept the cost down and captured a larger market.

3.5 Other Capital Investments

There was no integrated long-term plan for maximum optimal indigenisation of production in HEEP. Piecemeal decisions were taken from time to time to add new manufacturing facilities as and when considered necessary. This led to delays, cost escalation and loss of production.

(i) Large Size Turbo Generator(LSTG) Project

In August, 1978 a Project was drawn up for creating infrastructure facilities at Hardwar to manufacture Large Size Turbo Generators (LSTG) (six 210 MW sets and four 500 MW Sets with Spare/Repair capacity for 240 MW).

The Government of India approved the project in June, 1979 at a cost of Rs.43.08 crores with the stipulation that it should be completed within 50 months i.e. by August, 1983. Some additional facilities were incorporated in the revised estimates (December, 1982); in September, 1983 the Government of India approved the revised cost at Rs.50.86 crores. By 31 March, 1985 expenditure incurred had amounted to Rs.48.95 crores and BHEL informed the Government of India that it had completed the project i.e. after a delay of one year and seven months in execution.

It was, however, noticed that the following machines were commissioned only subsequently:-

| S.No. | Name of the Machine | Value (Rs. in crores) | Commissioned on |
|-------|--|--------------------------|---------------------------------------|
| a) | Overspeed Balancing Test Installation(OSBT) | 7.70 | 3 May, 1985 |
| b) | 500 MGTG test Bed -- | 2.85 | Not commissioned upto 15 May, 1985 |
| c) | C.N.C. Stub Borer DW-1800(NO.8014) | 3.06 | 18 September, 1985 |

Further four machines valuing Rs.0.61 crore were also received after 31 March, 1985 but their cost was not booked under the project on the ground that the Government had already been informed of completion of the project in 1984-85 and, therefore, any further booking under the project would not be appropriate.

The project completion report (February, 1988) mentioned the following shortcomings:-

- a) Facilities for manufacturing components were inadequate because information on components to be manufactured was incomplete at the time of formulation of the project.
- b) Special facilities like electro-chemical machining had not been foreseen.
- c) One spare used rotor slot milling machine was procured but its performance was poor.
- d) The information received from collaborator was incomplete which delayed technology transfer.

At the time of revising the LSTG Project (December, 1982), the Company had not assessed its requirement carefully and had to go in for the following additional projects:

| Schemes | Date of original approval to scheme | Sanctioned cost- (Rs. in lakhs) | Actual expenditure (Rs. in lakhs) | Remarks |
|---|-------------------------------------|------------------------------------|--------------------------------------|---|
| a) Manufacturing of governing assemblies for 500 MW KWU sets. | March, 1985 | 575.00 | 709 | The Scheme due for completion by March, 1987 was completed in Dec. 1988. Board's approval for actual expenditure has stated to have been taken only on 6.9.1993. |
| b) Additional facilities for manufacture of 500 MW sets. | July, 1985 | 291.00 | 424 | The Scheme due for completion by 1986-87 was completed in June, 1988. |
| c) Augmentation of Turbo Generator manufacture facility. | Dec. 1985 | 967.00 | 1195.49 | Expenditure excludes cost of shot blasting machines valuing Rs. 27 lakhs not commissioned upto March, 1993. |
| d) Blade Shop M&R | | 69.00 | 69 | |
| e) Blade Shop M&R | | 156.00 | 160 | |
| f) Blade Shop M&R | | 55.25 | 60 | |
| g) Blade Shop modernisation (500 MW KWU Sets) | Nov., 1985 | 497.00 | 683 | |
| h) CNC Horizontal borer 6c, wotan | March, 1985 | 635.00 | 648 | Delay of 15 months in placement of orders resulted in increase in cost by Rs. 325 lakhs due to increase in exchange rate/custom duty. The machine due to be commissioned in December, 1987 was commissioned in September, 1989. |
| i) M&R on (a) | Dec. 1988 | 59.00 | 59 | |
| Total: | | 3304.25 | 4007.49 | |

The total expenditure on the LSTG project was, thus, Rs.89.90 crores (including Rs.61 lakhs charged to modernisation and rationalisation in 1985-86).

The LSTG project envisaged a return of 40 per cent on the capital investment of Rs.50.86 crores. The average rate of return during the years 1989-90, 1990-91 and 1991-92 was 13 per cent on actual expenditure of Rs.89.90 crores.

The LSTG project envisaged deployment of 10650 employees for full utilisation of installed capacity of 4575 MW. (Thermal:3500, Hydro:625, Motors:450). While 10775, 10738, 10677, 10605 and 10441 employees were deployed during the last five years

ending on 31 March, 1993 and 191, 115, 187 and 169 casual/temporary employees were also deployed in addition the capacity utilisation was only 40 per cent. The wage Bill worked out to 13, 15, 16, 15 and 16 per cent respectively of the Sales in the last five years ending March, 1992. The Company stated (September, 1993) that the matter of employment of excess manpower would be analysed in depth.

The LSTG Project visualised exports of 400-600 MW per annum but there was no export of turbo generators. However, during the years 1987-88 to 1991-92 HEEP exported mining equipment worth Rs.24.06 crores (Haulage winches, Motors, Condensor and Rotors) to USSR.

(ii) Project for modernisation of facilities for manufacturing Electrical Motors

Hardwar Unit started manufacturing large and medium AC and DC electric motors to Soviet collaborators' design from 1967. It introduced German technology under the foreign collaboration agreement signed in December, 1981 for a period of ten years (as mentioned in para 3.4(i)ante).

The Board approved in May, 1984 a project for modernisation and augmentation of facilities for manufacturing electrical motors, at a cost of Rs.4.84 crores to be completed by March, 1985. The cost was revised to Rs.6.4 crores against which Rs.6.31 crores were spent upto 31 March, 1989. The productivity was low and in March, 1989 HEEP proposed purchase of more equipment at a cost of Rs.7.5 crores but the proposal was deferred.

The utilisation of the equipment (press) is indicated below:

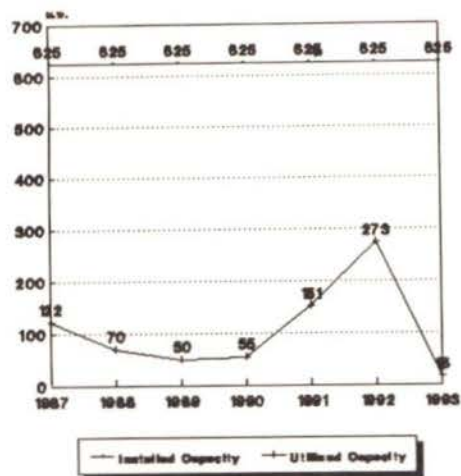
| Press | (Percentage utilisation) | | | | |
|--------|--------------------------|---------|---------|---------|---------|
| | 1988-89 | 1989-90 | 1990-91 | 1991-92 | 1992-93 |
| 16 Ton | 66% | 65% | 93% | 79% | 90% |
| 32 Ton | 76% | 63% | 91% | 71% | 70% |

In the years 1985-86 to 1991-92 electric motors of Soviet design constituted the major share of BHEL's sales in electric motors. For motors of German design BHEL was unable to compete due to its higher cost of production and import content.

| Type of Motor manufactured | (Production) | |
|-------------------------------|-------------------|------------------|
| | Russian design | German design |
| Large A.C. | 146 | 118 |
| Large D.C. | 6 | 52 |
| Medium A.C. | 412 | 125 |
| Medium D.C. | 955 | 75 |
| Total | 1519 | 370 |

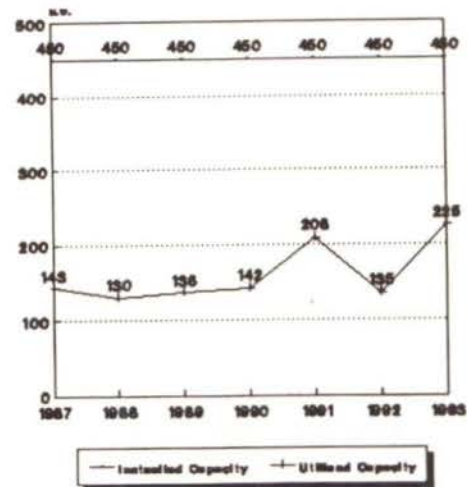
CAPACITY UTILISATION OF HEEP

HYDRO POWER SETS



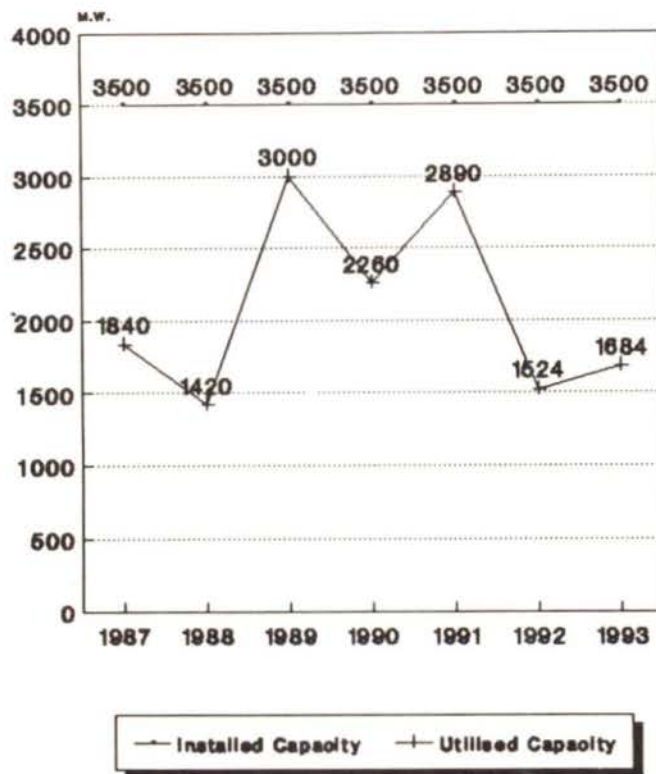
Year ending 31st March of the year

ELECTRIC MOTORS



Year ending 31st March of the year

THERMAL POWER SETS



Year ending 31st March of the year

CHAPTER - 4

CAPACITY UTILISATION

4.1 The table below and Charts indicate the capacity utilisation for major products during the last 7 years ended 31st March, 1993:-

| Product | Installed capacity (MW) | 86-87 Actual | 87-88 Actual | 88-89 Actual | 89-90 Actual | 90-91 Actual | 91-92 Actual | 92-93 Actual |
|------------------------|-------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Thermal sets | 3500 | 1840 | 1420 | 3000 | 2260 | 2890 | 1524 | 1684 |
| Percentage utilisation | 100 | 53% | 41% | 86% | 65% | 83% | 44% | 48% |
| Hydro sets | 625 | 122 | 70 | 50 | 55 | 151 | 273 | 16 |
| Percentage utilisation | 100 | 20% | 11% | 8% | 9% | 24% | 44% | 3% |
| Electric Motors | 450* | 143 | 130 | 136 | 142 | 208 | 135 | 225 |
| Percentage utilisation | 100 | 32% | 29% | 30% | 32% | 46% | 30% | 50% |

* Yet to be revised following introduction of German technology, at a capital cost of Rs. 6.3 crores.

The rated capacity for thermal and hydro sets could not be utilised for want of orders. Paucity of orders for hydro sets was attributed to decline in the share of hydro power in the total generating capacity and to a significant portion of new hydro capacity being created by import of generating plants under bilateral credit arrangements.

In 1974, BHEL made its Bhopal Unit the main producing centre for hydro sets. The Hardwar plant was permitted to manufacture repeat orders and hydro sets for the State Uttar Pradesh only. Government of India sanctioned (in 1980-82) expansion of capacity for hydro sets at BHEL, Bhopal. In September, 1993 the Company stated that it was examining the feasibility of manufacturing smaller size hydel generator sets which was an expanding and lucrative market.

The utilisation of capacity for Electric Motors was low because BHEL could not compete in the market due to its higher cost of production.

In September, 1993 the Ministry stated that the declining capacity utilisation in HEEP due to lack of orders was a cause of serious concern and though BHEL was cost wise competitive both in the domestic and international market, the present poor order book position was mainly due to lack of investments in the power sector by SEBs because of fund constraints. It was also explained that BHEL was aware of these problems and had already taken steps to diversify into other lines of production like Light Commercial Aircraft (LCA), Gas Turbine, etc. With the private sector setting up power projects in India, it was hoped that BHEL would be able to get some of these orders.

4.2 **Stamping & Blade Units**

The Government approved in July, 1976 a Stamping Unit with facilities for die shop and gantry at a cost of Rs.5.03 crores. The stamping unit was set up in March, 1980 at a cost of Rs.5.33 crores and a borer costing Rs.73.47 lakhs was installed in 1981-82. BHEL also purchased machines costing Rs.2.80 crores for the stamping unit in the years 1984 to 1987. The total investment was thus Rs.8.13 crores.

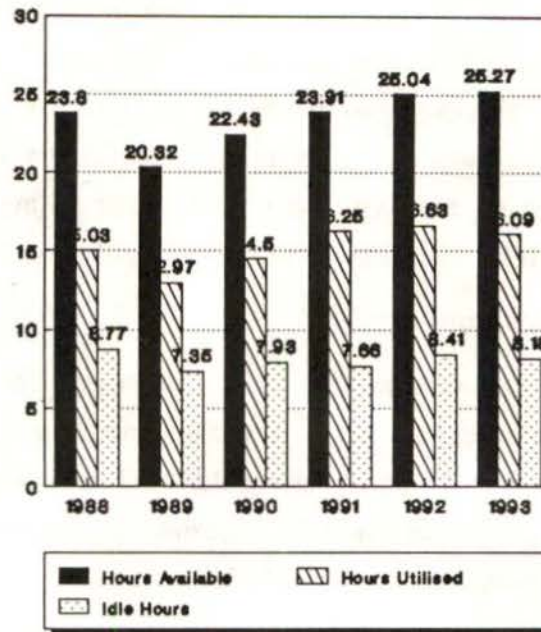
The percentage capacity utilisation in the stamping unit in the last seven years ranged between 23 and 41. The Manpower utilised (260) was in excess of the requirement for the capacity utilised.

The LSTG report envisaged production of 1.54 lakhs blades for 6 sets of 210 MW (KWU), 4 sets of 500 MW (KWU) and 2 sets of 210 MW (USSR). Between 1979 and 1992, BHEL incurred expenditure of Rs. 21.89 crores on its Blade Shop under M&R schemes. As against 17 machines as per norms, only 13 milling machines were installed but the capital expenditure incurred was Rs. 12.17 crores against sanctioned cost of Rs. 9.30 crores.

Though KWU foreign collaborator switched over to T-4 profile blades in 1983-84 from the existing T-2 profile, manufacturing facilities for T-4 profile blades were provided by BHEL in 1989-90 and 1990-91. Due to delay in getting T-4 profile blades from the collaborator, BHEL had to import them in the years 1985-86 to 1988-89.

MACHINE UTILISATION

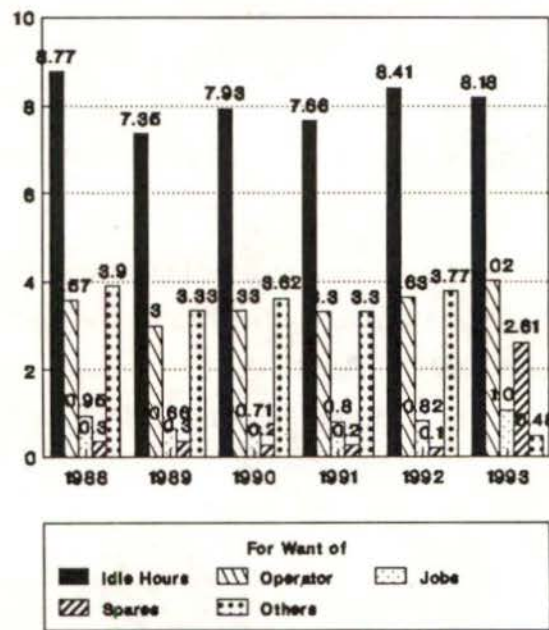
Hours in Lakhs



Year ending 31st March

REASONS OF IDLE HOURS

Hours in Lakhs



Year ending 31st March

4.3 Machine utilisation

The utilisation of machine hours was far below the total hours available as indicated in the following table and the Charts opposite:-

Machine Utilisation

| | (Hours in lakhs) | | | | | |
|-------------------------------------|------------------|--------|--------|--------|--------|--------|
| | 1987-88 | 88-89 | 89-90 | 90-91 | 91-92 | 92-93 |
| i) Hours available | 23.80 | 20.32 | 22.43 | 23.91 | 25.04 | 24.27 |
| ii) Hours utilised | 15.03 | 12.97 | 14.50 | 16.25 | 16.63 | 16.09 |
| iii) Idle hours | 8.77 | 7.35 | 7.93 | 7.66 | 8.41 | 8.18 |
| Percentage of hours utilised | 63.15% | 63.83% | 64.65% | 67.96% | 66.41% | 66.28% |
| Idle hours for want of | | | | | | |
| (a) Operator | 3.57 | 3.00 | 3.33 | 3.30 | 3.63 | 4.02 |
| (b) Jobs | 0.95 | 0.66 | 0.71 | 0.80 | 0.82 | 1.07 |
| (c) Spares, tools, jigs & fixtures | 0.35 | 0.36 | 0.27 | 0.26 | 0.19 | 2.61 |
| (d) Others, powers, technology etc. | 3.90 | 3.33 | 3.62 | 3.30 | 3.77 | 0.48 |
| Total idle hours: | 8.77 | 7.35 | 7.93 | 7.66 | 8.41 | 8.18 |

Eight costly machines valuing Rs.13.86 crores were grossly under utilised during the eight years ending on March, 1992. Further, an old ST-Rotor Slot Milling Machine costing Rs.1.00 crore purchased in 1982-83 was not put to regular use. It was used for 310 hours in 1987-88 and 624 hours in 1991-92. The Ministry stated that most of the machines were special purpose machines and have been used intermittently depending upon the load available.

Till 1987-88 the plant was doing scheduled "preventive maintenance" of all the machines; from 1988-89, this was done on critical machines only. Instead of "preventive maintenance" or "maintenance as per suppliers manual", a system of "condition based

maintenance" was followed; preventive maintenance schedules drawn up were not adhered to. The maintenance plan and achievement are given below:

| Year | Maintenance planned (Nos. of machines) | Maintenance Achieved (Nos. of machines) | Achievement (percentage) (%) | Capital Plan- ned | repair Execu- ted | Achie- vement (%) |
|------------------------------------|---|--|------------------------------------|----------------------|----------------------|-------------------------|
| 1986-87 | 3361 | 210 | 6% | - | - | - |
| 1987-88 | 3669 | 166 | 5% | - | - | - |
| 1988-89) | | | | | | |
| i) April) 88 to) Oct., 88) | Not planned | - | | | 41 | - |
| ii) Nov., 88 to March, 1989 | 24 | 9 | 37% | - | - | - |
| 1989-90 | 62 | 3 | 5% | - | 45 | - |
| 1990-91 | 265 | 194 | 73% | 37 | 30 | 81% |
| 1991-92 | 271 | 201 | 74% | 30 | 25 | 83% |
| 1992-93 | 332 | 298 | 90% | 25 | 23 | 92% |

4.4 Labour utilisation

In HEEP, the labour hours available and utilised during the last five years is indicated below:-

| | (Hours in lakhs) | | | | |
|-------------------------------------|------------------|---------|---------|---------|---------|
| | 1988-89 | 1989-90 | 1990-91 | 1991-92 | 1992-93 |
| (i) Hours available | 26.81 | 27.80 | 26.09 | 26.64 | 26.42 |
| ii) Hours utilised | 22.00 | 23.65 | 22.51 | 23.65 | 22.31 |
| iii) Idle hours | 4.81 | 4.15 | 3.58 | 2.99 | 4.11 |
| iv) Percentage of hours utilised | 82.86% | 85.07% | 86.28% | 88.78% | 84.46% |

Idle hours for want of
(Figures in brackets indicate
percentage of idle hours to
total idle hours).

| | | | | | |
|---------------------------------------|------------------|------------------|------------------|------------------|------------------|
| (a) Jobs | 2.82 (58.63%) | 2.20 (53.01%) | 1.86 (51.95%) | 1.02 (34.11%) | 2.28 (55.47%) |
| (b) Cranes, tools, Jigs & fixture | 0.75 (15.59%) | 0.70 (16.87%) | 0.69 (19.27%) | 0.63 (21.07%) | 0.66 (16.06%) |
| (c) Others, power, technology etc. | 1.24 (25.78%) | 1.25 (30.12%) | 1.03 (28.78%) | 1.34 (44.82%) | 1.17 (28.47%) |
| Total Idle hours | 4.81 | 4.15 | 3.58 | 2.99 | 4.11 |

4.5 Bunching of production

During the years 1987-88 to 1989-90, the production in the last quarter was 60 per cent of the annual production. Despatches made on 31.3.1992 were for 37 per cent of the despatches in the month of March, 1992.

4.6 Inventory

The non-moving and slow moving inventory as on 31 March, 1993 stood at Rs. 5.18 crores and Rs. 3.87 crores respectively.

4.7 Research and Development

The annual expenditure on Research and Development was between Rs. 70 lakhs and Rs.239 lakhs during 1986-87 to 1992-93 which ranged between 0.22 per cent and 0.52 per cent of "Sales". In September, 1993 the Ministry stated that due to the limited resources the Company could not afford to invest substantial amounts in R & D unlike MNCs.

184 R&D Projects were completed during the years 1987-88 to 1992-93. There was delay ranging between 2 months and 48 months in execution of 63 Projects.

4.8 Import substitution

The import content in purchases in HEEP during the last six years ending in March, 1993 is given below:

| Year | Imports | Indigenous | Total | % content of import | (Rs. in lakhs) | |
|---------|---------|------------|-------|---------------------|----------------------|-----------------------|
| | | | | | Substitution planned | Substitution achieved |
| 1987-88 | 6429 | 4445 | 10874 | 59 | NA | NA |
| 1988-89 | 10561 | 4049 | 14610 | 72 | 685 | 388 |
| 1989-90 | 11157 | 6499 | 17656 | 63 | 1100 | 793 |
| 1990-91 | 11501 | 7840 | 19341 | 59 | 1050 | 751 |
| 1991-92 | 10449 | 8437 | 18886 | 55 | 840 | 1190 |
| 1992-93 | 15008 | 9647 | 24655 | 61 | 438 | 359 |

The Project Report on LSTG envisaged indigenisation upto 70 per cent, 80 per cent and 85 per cent for the first two sets, next two sets and fifth set, respectively. However, the indigenisation achieved was only 39 to 80 per cent from 4th set to 13th set.

CHAPTER 5

FINANCIAL PERFORMANCE OF HEEP

5.1 The table below summarises the financial performance of HEEP, Hardwar in the last five years:-

| Particulars | (Rs. in lakhs) | | | | |
|---|----------------|---------|---------|---------|---------|
| | 1988-89 | 1989-90 | 1990-91 | 1991-92 | 1992-93 |
| I. RESOURCES | | | | | |
| A. OWN | | | | | |
| Reserves and Surplus | 10978 | 11929 | 13110 | 12792 | 12203 |
| Funds from Head Office | 6268 | 6058 | 5900 | 5753 | 5635 |
| Inter Divison Account | -16890 | -14470 | -15984 | 570 | 16900 |
| | 356 | 3517 | 3026 | 19115 | 34738 |
| B. From Outside: | | | | | |
| Secured Loans | 2307 | 2935 | 4144 | 1750 | 5224 |
| Unsecured Loans | 2524 | 2711 | 2872 | 0 | 0 |
| Deferred Credit | 1715 | 1270 | 867 | 1684 | 1203 |
| | 6546 | 6916 | 7883 | 3434 | 6427 |
| Total A+B | 6902 | 10433 | 10909 | 22549 | 41165 |
| 2. UTILISATION OF RESOURCES: | | | | | |
| Gross Block | 21850 | 22343 | 23431 | 27948 | 31299 |
| Less: Depreciation | 13241 | 14747 | 16339 | 18003 | 19916 |
| Net Assets | 8609 | 7596 | 7092 | 9945 | 11383 |
| Capital Exp. in progress | 413 | 709 | 3229 | 2728 | 3322 |
| Net Current Assets: | | | | | |
| Current Assets | 28364 | 37331 | 54150 | 60012 | 73323 |
| Loans & Advances | 2047 | 3017 | 3616 | 4353 | 3921 |
| Total: | 30411 | 40348 | 57766 | 64365 | 77244 |
| Less: Current Liabilities | 25721 | 32078 | 50733 | 51691 | 47955 |
| Provisions | 6810 | 6142 | 6445 | 2798 | 2828 |
| Total: | 32531 | 38220 | 57178 | 54489 | 50783 |
| Net Current Assets | -2120 | 2128 | 588 | 9876 | 0 |
| Profit & Loss Account | 0 | 0 | 0 | 0 | 0 |
| Total: | 6902 | 10433 | 10909 | 22549 | 41165 |
| Contingent Liabilities | 1998 | 1694 | 2034 | 1874 | 1788 |
| Capital employed | 23379 | 24194 | 23664 | 19251 | 20943 |
| Net worth | 17246 | 17987 | 19010 | 18545 | 16780 |
| 3. Income: | | | | | |
| a) Sales | 34915 | 37218 | 40764 | 45596 | 45865 |
| b) Other earnings | 1581 | 4982 | 6506 | 5503 | 6295 |
| 4. Expenses | 33400 | 38753 | 44561 | 48252 | 50632 |
| 5. Profit before tax | 3096 | 3447 | 2709 | 2847 | 1528 |
| 6. % of "Profit before tax" to "Sales" | 9% | 9% | 7% | 6% | 3% |
| 7. % of "Profit before tax" to capital employed | 13% | 14% | 11% | 15% | 7% |

Notes:

(a) Capital employed represents net assets plus working capital and Inter division accounts.

(b) Net worth represents paid up capital plus reserves and surplus less intangible assets.

CHAPTER 6

MARKETING AND COSTING

6.1 BHEL's order book has been continuously declining during the past several years. The decline has been attributed mainly to increasing private/foreign participation in power projects.

As on 1 April, 1993, HEEP had the following firm orders on hand:

| Thermal sets | | Hydro Sets | | Motors | Light Aircraft |
|--------------|------|------------|-----|--------|----------------|
| Nos. | MW | Nos. | MW | Nos. | |
| 17 | 4060 | 7 | 180 | 627 | 38 |

Orders for 5 Thermal Sets and 15 Hydro Sets are on hold as the customers are unlikely to clear them for manufacture in the next one or two years.

The following year-wise plan has been drawn up by HEEP for execution of the orders during the next four years:

| Year | Thermal Sets (MW) | Hydro Sets(MW) | Motor (No.) | LAC (No.) |
|---------|-------------------|----------------|-------------|-----------|
| 1993-94 | 2720 | 120 | 550 | 12 |
| 1994-95 | 630 | 60 | 86 | 12 |
| 1995-96 | 250 | | | 12 |
| 1996-97 | 500 | | | 2 |

Thus, capacity developed in HEEP will remain underutilised in the foreseeable future.

In September, 1993, it was stated that to face the situation arising from lack of plan investment and business in the power sector, BHEL has diversified into new business products which include HVDC transmission, AC Locos, diesel and electric shunting locos, waste heat recovery boilers, trainer aircraft, wind generators, simulators and telecom equipment. It was also stated that the company was reorienting its business strategies and

instead of having only technology transfer tie ups with multinationals it was actively considering joint bidding, equity participation and joint ventures.

6.2 On deemed exports during the years 1985-86 to 1992-93 for Rs.460.46 crores HEEP recovered only material cost.

BHEL made losses wherever it had to face competition in international bidding. It was stated (September, 1993) that BHEL offered most competitive prices to retain and protect deemed export market from multinationals.

6.3 On account of delay in execution of an order received in March, 1982 for 2 sets of 500 MW Turbo generators, the customer withheld Rs. 3.80 crores as liquidated damages (share of HEEP being Rs.1.56 crores).

In November, 1985 BHEL received orders from abroad for supply of 30 Nos. Haulage Winches (25 tons each) valued at Rs.4.87 crores. Twenty and ten winches were to be delivered in 1986 and 1987 respectively. But, BHEL delivered only 27 during the years 1987-88 to 1990-91 and 3 are still to be delivered (October, 1993).

Another order for 35 Haulage Winches (16 Tons each) valued at Rs.4.32 crores for supply in 1987, was first sub-contracted but later executed by HEEP in 1989-90.

Another order for 15 Haulage Winches (16 Tons each) valued at Rs.1.85 crores was to be completed in 1987 but was executed only in 1988-89.

Delay in execution of orders eroded the profitability of the Company. On the delay in supply of equipments, the Company stated (September, 1993) that huge outstanding dues from SEBs affected their operation. Moreover, due to delay in obtaining clearances from DGTD etc. the imports of equipment were delayed resulting in time over runs. However, the Company had taken steps and had recently delivered the complete equipment 5 days ahead of schedule to a foreign buyer.

6.4 Loss making orders

(i) In 1985, Maharashtra State Electricity Board (MSEB) invited a global tender for supply of TG sets and Boilers (2x500 MW) for its Chandrapur Project. BHEL's tender bid did not indicate the requirement of foreign exchange to MSEB and quoted the price in Indian currency only.

In November, 1985, BHEL bagged the order at a price of Rs.178.62 crores which included imports worth Rs.124.95 crores. During the execution of the order the value of

imports went up to Rs.200.15 crores due to increase in exchange rates. In the absence of any contractual provision, MSEB refused to reimburse the increase in cost to BHEL. The case was referred to the Arbitrator as provided for in the bid documents. BHEL lost the case (February, 1990) and appealed to the High Court. The case is subjudice.

Government paid cash compensatory support (CCS) at 2.25 per cent only against BHEL's claim at 10.5 per cent. It however, granted BHEL adhoc exemption from payment of custom duty and excise duty.

In October, 1989, BHEL anticipated a loss of Rs.101.20 crores on this order after taking into account the expected receipt of Rs.13.99 crores as CCS from Government. The Hardwar unit anticipated a loss of Rs.41.83 crores which was more than the sale value of Rs.41.49 crores allocated to it.

(ii) In 1982 BHEL placed a purchase order on a foreign Company for supply of two rotor. The second rotor was machined to 1066 mm diameter against the requirement of 1075 mm diameter and was rejected by BHEL. The supplier stated that it was aware that this was unsuitable for 210 MW units since they require finish barrel size of 1075 mm diameter but it was suitable for 236 MW unit which has a diameter of 1065 mm. When BHEL placed another letter of intent on the same supplier, he refused to accept the order unless BHEL accepted the earlier rotor. BHEL purchased the rejected rotor for a 210 MW set for Pounds 62,600. In reply, the Ministry stated (July, 1993) that the rotor has since been tested and delivered to a customer.

6.5 Costing

In HEEP, norms for wastage had not been fixed to enable analysis of actual wastages. Norms for labour utilisation and its cost for various jobs have not been fixed. Quantitative data on materials consumed against each job were not brought in the cost accounts. Labour and machine hours utilisation vis-a-vis norms were not on record for various jobs.

CHAPTER - 7

CENTRAL FOUNDRY FORGE PLANT

7.1 The Central Foundry Forge Plant set up at a total investment of Rs.34.20 crores in 1976 manufactures highly sophisticated steel castings and forgings required for 210 MW thermal sets of Soviet design and other products of BHEL. CFFP can manufacture 2000 T. 1000 T and 2400 T forgings, blooms and steel castings respectively. With a view to meeting the inhouse requirement of BHEL for heavy forgings and castings which are presently being imported and to meet the requirement of Defence and other core sectors the augmentation of the existing facilities in CFFP is being undertaken.

7.2. The capacity utilisation in CFFP was poor as seen from the following table:

Capacity Utilisation

| Product | Installed capacity | (M.T.) | | | | | |
|------------------------------------|--------------------|----------------|--------------|--------------|--------------|--------------|--------------|
| | | 1987-88 Actual | 88-89 Actual | 89-90 Actual | 90-91 Actual | 91-92 Actual | 92-93 Actual |
| Steel casting and steel cast(L.F.) | 6000 | 1631 | 1633 | 2890 | 3765 | 2174 | 2392 |
| Percentage utilisation | 100 | 27% | 27% | 48% | 63% | 36% | 40% |
| Forging | 3000 | 2322 | 2297 | 2622 | 2727 | 2618 | 2628 |
| Percentage utilisation | 100 | 77% | 77% | 87% | 91% | 87% | 88% |
| Blooms | 4000 | 709 | 1090 | 494 | 79 | 362 | 257 |
| Percentage utilisation | 100 | 18% | 27% | 12% | 2% | 9% | 6% |
| CI Cast | 7170 | 131 | 76 | 40 | 146 | 10 | 254 |
| Percentage utilisation | 100 | 2% | 1% | 0.6% | 2% | 0.14% | 4% |
| N.F. Casting | 250 | 40 | 65 | 33 | 20 | 14 | 18 |
| Percentage utilisation | 100 | 16% | 26% | 13% | 8% | 6% | 7% |

The Management attributed (November, 1992) the poor capacity utilisation to the following:

- (a) There was hardly any requirement of black casting, all customers now require castings and forgings in almost fully machined conditions.

(b) While all the castings and forgings for 210 MW thermal sets of Soviet designs were covered under CFFP's manufacturing range, the advent of German designs for thermal sets involved a number of castings and forgings out of the manufacturing range of CFFP.

(c) The technical delivery conditions of castings and forgings have undergone a complete change with customer's insistence on 100 per cent ultra sonic testing and extensive Radiography testing in some cases.

7.3 The rejections in case of steel castings during the last five years ending March, 1993 ranged between 4.6 and 8.5 per cent and are considered normal by the Management. The rejections in the case of forgings and blooms during the same period ranged between 5.4 and 16 per cent. The Management stated that rejection should range between 8 and 12 per cent.

7.4. The DPR of CFFP envisaged deployment of 2146 persons for a full capacity utilisation. Considering the actual capacity utilisation, deployment of 1612 persons is on the high side.

7.5 The table below summarises the financial position and working results of CFFP for the last five years:-

| Particulars | (Rs. in Millions) | | | | |
|------------------------------------|-------------------|---------|---------|---------|---------|
| | 1988-89 | 1989-90 | 1990-91 | 1991-92 | 1992-93 |
| A. RESOURCES | | | | | |
| A. OWN: | | | | | |
| Funds from head office | 189.10 | 182.80 | 178.00 | 173.58 | 170.03 |
| Inter division accounts | 502.80 | 537.00 | 709.80 | 883.98 | 1006.30 |
| Reserves and Surplus | (293.4) | 12.30 | 10.20 | 9.70 | 8.42 |
| | 398.50 | 732.10 | 898.00 | 1067.26 | 1184.75 |
| B. Outside: | | | | | |
| Secured Loans | 5.60 | 14.30 | 20.90 | 14.84 | 2.44 |
| Unsecured Loans | 0.40 | 66.00 | 71.00 | 0.00 | 0.00 |
| Deferred Credits | 1.10 | 0.70 | 0.40 | 0.00 | 0.00 |
| | 7.10 | 81.00 | 92.30 | 14.84 | 2.44 |
| Total A+B | 405.60 | 813.10 | 990.30 | 1082.10 | 1187.19 |
| B. UTILISATION OF RESOURCES | | | | | |
| Gross Block | 460.20 | 466.20 | 487.10 | 518.50 | 538.79 |
| Less: Depreciation | 336.50 | 368.50 | 385.80 | 416.20 | 437.49 |
| Net Assets | 123.70 | 97.70 | 101.30 | 102.30 | 101.30 |
| Capital Exp. in Progress | 9.30 | 87.30 | 194.60 | 357.00 | 442.68 |

| Net Current Assets: | | | | | |
|------------------------------|--------|--------|--------|---------|---------|
| Current Assets | 291.70 | 361.00 | 441.20 | 421.80 | 419.87 |
| Loans & Advances | 26.60 | 32.50 | 55.40 | 42.10 | 57.33 |
| Total: | 318.30 | 393.50 | 496.60 | 463.80 | 477.20 |
| Less: Current Liabilities | 42.20 | 48.90 | 43.00 | 89.20 | 106.51 |
| Provisions | 3.50 | 4.40 | 9.00 | 6.70 | 5.23 |
| Total | 45.70 | 53.30 | 52.00 | 95.90 | 111.74 |
| Net Current Assets | 272.60 | 340.20 | 444.60 | 368.00 | 365.46 |
| Profit & Loss Account | 0.00 | 287.90 | 249.80 | 254.90 | 277.76 |
| TOTAL: | 405.60 | 813.10 | 990.30 | 1082.10 | 1187.19 |
| C.(i) Earnings | 393.50 | 491.20 | 594.90 | 657.80 | 711.90 |
| (ii) Expenses and provisions | 388.00 | 463.90 | 556.90 | 622.20 | 702.74 |
| (iii) Profit before tax | 5.50 | 27.30 | 38.00 | 35.60 | 9.16 |

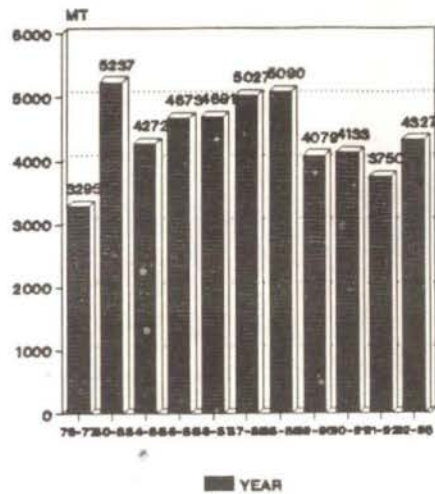
NOTE: During the year 1988-89 debit balance of Profit & Loss Accounts was shown as a deduction from "Reserves and Surplus".

7.6 The cost of production of Forgings and N.F. Casting is more than their selling price and the higher cost has been attributed by the Ministry to the lean order book position. CFFP is earning a profit because 58 per cent of its products are sold to its sister units (including 27% to HEEP) at prices agreed upon between the divisions.

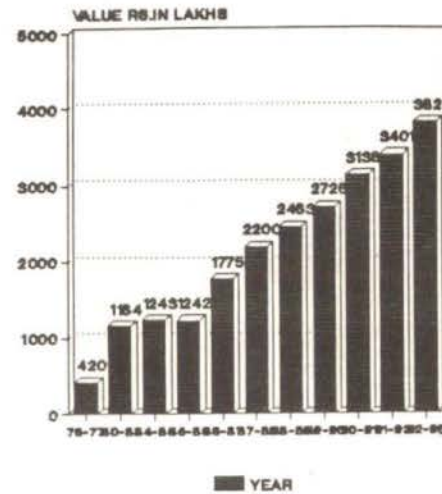
7.7 The order book position was as below:

| (In Tons) | | |
|-----------|---------------|---------------|
| | As on 31.3.92 | As on 31.3.93 |
| Castings | 2069 | 1713 |
| Forgings | 1529 | 1651 |

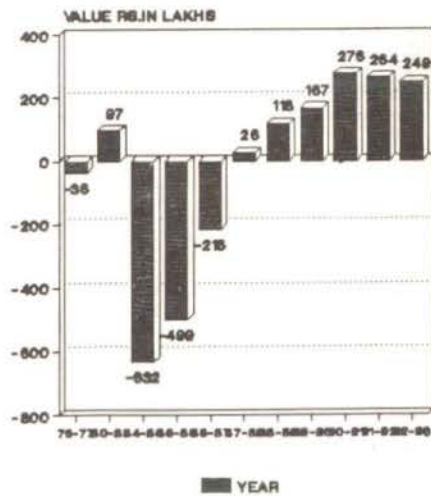
PRODUCTION(PHYSICAL)



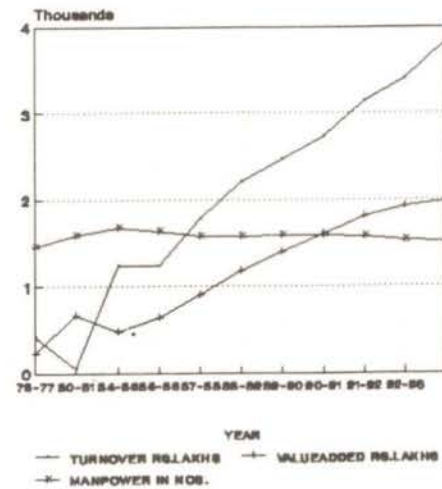
GROWTH IN TURNOVER



GROWTH IN PROFIT



TURNOVER, VALUE ADDED AND MANPOWER



Electroporcelains Division (EPD), Bangalore

CHAPTER - 8

INTRODUCTION OF EPD

8.1 Mysore Porcelains Limited, a Govt. of Karnataka Undertaking engaged in the manufacture of Porcelains Insulators was set up in 1932. Bharat Heavy Electricals Limited (BHEL) took it over in 1976, as a subsidiary. It became a regular unit of BHEL in 1980 and was named Electroporcelains Division (EPD).

8.2 BHEL was importing a considerable quantity of insulators. It was therefore, felt that EPD could be a captive source of supply to meet its long range requirements and to develop higher range insulators and other related products through upgradation of technology.

8.3 After takeover, EPD developed higher rating Bushing & Solidcore insulators, Ceralin (a wear resistant material) and industrial ceramics. Higher rating Bushing with glaze joint technique and Solidcore insulators were developed with technology acquired from NGK, Japan. Ceralin and industrial ceramic products were developed as inhouse R&D efforts.

8.4 The growth in turnover, production and other performance parameters after the take over are depicted in the charts .

CHAPTER - 9

OBJECTIVES OF EPD

9.1 BHEL had laid down the following objectives for EPD:

- (i) to ensure prompt supply of electroporcelain items required by all the units of the company.
- (ii) to develop and meet the requirements of the Indian and export markets for electroporcelain items.

9.2 EPD developed the capability to meet the requirements of sister units for most types of insulators and all special products like bushings and solidcores of silicious composition. The Company produced ceramic liners (Ceralin) as a result of its own technological efforts. However efforts for development of Alumina composition, especially bushing insulators used in SF 6 circuit breakers required by Hyderabad Division, have not been successful so far.

9.3 The value of EPD's supplies to sister Units increased steadily from Rs.1.89 crores in 1984-85 (out of total sales of Rs.12.43 crores) to Rs.20.12 crores in 1991-92, (total sales Rs.34.01 crores). Around 15.21% (1984-85) to 59.16% (1991-92) of supplies of EPD go to sister units, other customers for EPD's products include NTPC, NHPC, Electricity Boards etc.

9.4 EPD exported products valuing Rs.635 lakhs during 1984-85 to 1992-93, and supplied products valuing Rs.1685 lakhs against deemed export contracts during the same period. The Ministry, stated that while no export targets are set, intensive efforts are made in this direction.

CHAPTER - 10

TECHNOLOGICAL UPGRADATION IN EPD

10.1 A Task Force constituted by BHEL in 1978 to undertake a market study in its report (March, 1981) identified constraints in EPD in meeting market demand and suggested modernisation, including collaboration with a reputed foreign manufacturer. The Task Force also stated that since the existing product range of disc insulators with electro mechanical strength (EMS) ratings upto 160 KN was not adequate for the future Ultra High Voltage Systems (above 400 KV) requiring higher EMS, it was necessary to use an alumina composition. For the development of alumina composition technological help from a collaborator was considered necessary.

10.2 Mysore Porcelain Limited had entered into two separate collaboration agreements, with NGK Ltd in 1954 and 1965. After takeover BHEL requested (1977) NGK for collaboration for updated technology transfer. The foreign firm did not agree to a technical tie up. However, it entered into a Technical Assistance Agreement in January, 1983 according to which NGK would provide technical assistance to BHEL for improvement of existing products, development of new products in EPD and setting up a new factory at Jagdishpur in Uttar Pradesh with a capacity to manufacture 5500 MT of disc insulators per annum.

10.3 Under the agreement, Rs.235.38 lakhs including income tax liability of Rs.46.22 lakhs was expended during 1983-84 to 1985-86. However improvement in production yields to be achieved was not quantified in the agreement with NGK. Further despite the recommendation of the Task Force that for higher strength insulators, it was necessary to use alumina composition, development of alumina body was not covered in the agreement. BHEL wanted technology for alumina porcelain to be included in the agreement, but the collaborator insisted upon the need to improve existing products with the existing body so that an adequate technical base would be available for the absorption of alumina technology. Accordingly, the agreement provided for development of alumina porcelain products after three years, on mutually acceptable terms and conditions.

10.4 According to BHEL, improvement in the production yield depends on several important factors besides technical collaboration. NGK's offer received in April, 1986 for

transfer of technical knowhow on alumina body was extremely costly; they asked for 500 million yen (over Rs.3.25 crores) with royalties and also ban on exports by EPD to a number of countries. Another foreign collaborator had asked for 3.1 million DM (i.e Rs.2.62 crores). Considering the intricacies in the development of alumina body composition and its products, efforts were made to get the help of a consultant. Accordingly, the services of a consultant were engaged during June, 1986. He submitted a report on alumina body technology and setting up of facilities at EPD. Later it was felt prudent to have collaboration with an organisation like NGK rather than an individual and hence the consultancy was not pursued.

10.5 BHEL stated that the services of the consultant helped in obtaining vital information on alumina body composition and this information paved the way for the start of in-house development of alumina body composition. Further EPD did succeed in development of alumina body composition, but recoveries were low being 15 percent. Efforts were continuing to improve the rate of recovery to an economic level for commercial production. The company has since (November 1992) engaged another Consultant from UK.

10.6 So far (Sept 1993) BHEL has not been able to create technological capability for alumina body and is unable to meet the market demand for it.

10.7 During June, 1983 to March, 1986 the collaborator's (NGK) engineers visited the Division and submitted 175 recommendations for improvement of the quality of the existing products. As a result, EPD procured additional equipment valued at Rs.66.38 lakhs in addition to equipment valued at Rs.474.67 lakhs purchased by it for the unit.

10.8 Recovery improved from the level of 53% in 1983-84 to 73% in 1992-93 (details in para 13.2). BHEL stated that saving in cost due to increase in overall recovery, effected by implementation of the recommendations of the collaborator, could have amounted to Rs.785.62 lakhs from 1983-84 to 1991-92 against expenditure of Rs.840.52 lakhs (including capital expenditure of Rs.541 lakhs) incurred.

10.9 According to BHEL benefits of improvements arising from the collaboration accrued from the year 1983-84 and continued in the subsequent years. The capital investment helped the unit in developing 220 KV to 400 KV hollow insulator bushings with the technical knowhow obtained from NGK and in starting commercial production from the

year 1987-88. Turnover of these insulators (excluding excise duty) upto 1991-92 amounted to Rs.1055 lakhs. This saved outflow of foreign exchange.

10.10 Technical knowhow for higher rating bushings and solidcore insulators was obtained together at a lumpsum fee of Rs. 95.33 lakhs. EPD developed and commercialised bushings upto 400 KV rating. It also developed 66 KV/110 KV solidcore insulators but commercialisation of production could not be effected mainly due to change in the demand pattern from 66 KV/110 KV rating to 132 KV/220 KV and 400 KV. Thus EPD could not derive the full benefit of the fees paid.

10.11 According to BHEL, keeping in view the demand projections (for disc insulators, pin insulators and HT insulators)made by Central Electricity Authority for transmission lines and railway electrification programme, EPD had undertaken the project for development of higher rating bushings and solidcore insulators with the association of NGK, from 1983-84 to 1988-89. NGK had provided technology for bushings upto 400 KV rating and solidcores upto 66/110 KV rating of a length upto 1 metre as per the agreement. They had also provided technology for 132/220 KV solidcores of 1.5 metres, beyond the scope of agreement. EPD developed and supplied bushings upto 400 KV and solidcore insulators upto 72.5 KV rating in silicious body. However for the development of 132 KV and higher rating solidcore insulators, which needed one and half metres length, besides physical shape, to meet certain product characteristics alumina porcelain is required. In the absence of alumina porcelain, the product could not be commercialised. However, the experience gained would be handy, as and when alumina porcelain body is developed with or without collaboration. Though EPD on its own manufactured the higher rating solidcore insulators, they were lacking in strength. Required strength could be secured only with the use of alumina body. The knowledge gained had been put to use in producing and supplying solidcores of 33 KV to 72.5 KV rating.

CHAPTER 11

EXPANSION OF CAPACITY

11.1 At the time of takeover of Mysore Porcelains Ltd. in 1976 the licensed and installed capacities for production of ceramic insulators were 7500 MT and 7520 MT respectively. The capacity mainly depends on kiln capacity and number of firings in a year. The Task Force had suggested expansion of capacity from 7500 MT to 23500 MT on basis of demand projections. The overseas collaborators recommended that disc insulators be made at the new plant at Jagdishpur and capacity at EPD be expanded suitably for manufacturing higher rated bushings and solid cores utilising its experienced work force. Thereupon, BHEL obtained a licence for 23500 MT with EPD accounting for 18000 MT and Jagdishpur Plant for 5500 MT per annum.

11.2 A project to increase capacity for manufacture of higher rating bushings and solidcore insulators, from 970 MTs to 3500 MTs (1983) was proposed in March, 1983 at a cost of Rs.1790 lakhs. It was revised in May, 1983 and December 1986 as follows:

| | Original Proposal March,83 | Revised Proposal May,83 | Final Proposal Dec,86 |
|--|----------------------------------|-------------------------------|-----------------------------|
| Total capacity planned (MTs) | 3500 | 2400 | 1635 |
| Existing capacity of four Rectangular Kilns (in MT). | 970 | 970 | 970 |
| Proposed addition of Shuttle Kilns: | | | |
| i) Number. | 5 | 3 | 2 |
| ii)Corresponding capacity (MTs) | 2530 | 1430 | 665 |
| Proposed addition of Pugmills (Nos) | 3 | - | 1 |
| Investment proposed (Rs.in lakhs) | 1790 | 460 | 870 |

11.3 The proposal of May, 1983 at a cost of Rs.460 lakhs was for adding only three shuttle kilns in the first phase without any pugmills. This was approved by the Board in March 1984. However, due to delay in obtaining Government approval and the changed market position the proposal was revised again in December 1986. The capacity was reduced from 2400 MTs to 1635 MTs with two shuttle kilns and a pugmill at a cost of Rs.870 lakhs. This was approved by the Board in March, 1987. The project was completed in March, 1989.

11.4 The licenced capacity, the installed capacity and targeted and actual production (excluding Ceralin) from 1983-84 are given below:

| | Production of Insulators (MTs) | | | | | | |
|--|--------------------------------|--------|--------|--------|--------|--------|--------|
| | 83-84 | 87-88 | 88-89 | 89-90 | 90-91 | 91-92 | 92-93 |
| a)Licenced Capacity | 7500 | 18000 | 18000 | 18000 | 18000 | 18000 | 18000 |
| b)Installed Capacity | 7520 | 5900 | 5900 | 5900 | 5900 | 5900 | 5900 |
| c)Targetted production | 6144 | 4685 | 4693 | 4325 | 4717 | 3281 | 3668 |
| d)Actual production | 5814 | 4752 | 4690 | 3619 | 3598 | 3021 | 3715 |
| f)Production as percentage of Installed Capacity | 77.31% | 80.54% | 79.49% | 61.34% | 60.98% | 51.20% | 62.97% |

As could be seen, actual production had decreased from 5814 MTs in 1983-84 to 3021 MTs in 1991-92. Actual production never reached the level of the existing installed capacity of 5900 MTs for insulators. In recent years the capacity utilisation went down further and the actual saleable production in 1991-92 was low at 3021 MTs, inspite of improvements stated to have been effected as a result of collaboration.

The demand forecast came down from 20735 MT in the Sixth Plan period to 17,000 MT in the Seventh Plan period. During the Sixth Plan period, a number of licences for production of insulators were obtained by private parties. Also BHEL had set up the new Insulator Plant at Jagdishpur with capacity of 6000 MT.

Disc insulators continued to be the mainstay and the share of bushings increased. Deliberate phasing out of pins was done considering its low value addition. The improvement in production of bushings, required by the sister units, involving in some cases double firing, resulted in reduced output though enabling maximum capacity

utilisation of the kilns and higher value addition. The demand from sister units and a few other customers for lower range solidcore insulators is also being met.

11.5 The production of various types of products over the years is given below:

| | (METRIC TONNES) | | | | | | |
|---------------------|-----------------|-------|-------|-------|-------|-------|-------|
| Product Gr. | 83-84 | 87-88 | 88-89 | 89-90 | 90-91 | 91-92 | 92-93 |
| Disc | 3227 | 2370 | 2743 | 1620 | 2118 | 1709 | 2143 |
| Bushing | 384 | 479 | 650 | 688 | 750 | 814 | 1142 |
| Solidcore | 242 | 572 | 264 | 494 | 405 | 85 | 68 |
| Post Type | 1278 | 1042 | 1192 | 947 | 557 | 671 | 601 |
| Pin Type | 961 | 620 | 194 | 105 | 36 | - | 14 |
| Total Production | 6092 | 5083 | 5043 | 3854 | 3866 | 3279 | 3968 |
| Rejections | 278 | 331 | 353 | 235 | 268 | 258 | 253 |
| Saleable Production | 5814 | 4752 | 4690 | 3619 | 3598 | 3021 | 3715 |

11.6 Against capacity created for bushings (1135 MTs) the actual production gradually increased from 384 MTs in 1983-84 to 1142 MTs in 1992-93. However, production of solidcores (capacity 500 MTs) gradually declined from 572 MTs in 1987-88 to a mere 68 MTs in 1992-93. The production of discs and posts type insulators is declining.

According to BHEL, the production level achieved was linked to orders received and was not relatable only to improvements resulting from collaboration. The much needed 'Glaze Joint' technique was a direct benefit of collaboration, singularly responsible for the development of high rated bushings. The technological strength acquired by EPD in the manufacture of high rated bushings is a great advantage as it was the need of the day. The Ministry stated that the capacity of 5900 MTs could not be reached for lack of sufficient orders due to keen market competition. Further, capacity utilisation in physical terms was affected as a result of product-mix being chosen with emphasis on products giving higher profit margins though accounting for lesser tonnage, and phasing out of uneconomical products like pin insulators.

CHAPTER 12

CERAMIC LINERS (CERALIN)

12.1 Ceramic liners (Ceralin), a new product developed inhouse by EPD as a part of diversification activities, are used in pulverised fuel bends required by BHEL, Trichy to increase their life. The requirement of BHEL, Trichy was assessed at 700 Tonnes per year against which it was importing cast basalt linings till EPD started supplying Ceralin. Ceralin has application also in ash disposal pipes, mill exhausts, fan casings and mixing nozzles in thermal power plants and in pneumatic and slurry transport systems in cement plants etc.

12.2 BHEL approved a project (1984) for the manufacture of Ceralin, with an installed capacity of 500 MTs per annum, at a cost of Rs.130 lakhs. The project started in 1984-85 was completed in March 1989, at a cost of Rs.123.13 lakhs. However, production started in 1985-86 itself using the facilities available in R&D and those available for other products. Year-wise capacity buildup, production and sales are given below:

| | 1985-86 | 86-87 | 87-88 | 88-89 | 89-90 | 90-91 | 91-92 | 92-93 |
|--|---------|-------|-------|-------|-------|-------|-------|-------|
| Licenced Capacity(MTs) | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 |
| Installed Capacity(MTs) | ----- | ----- | 330 | 330 | 495 | 495 | 745* | 745 |
| Actual Production(MTs) | 140 | 279 | 275 | 400 | 460 | 535 | 729 | 612 |
| Sales including Excise duty (Rs.lakhs) | 109 | 173 | 521 | 744 | 851 | 989 | 1371 | 1555 |

* Increase in installed capacity was due to partial utilisation of OTK II KILN for ceralin production.

12.3 The Management stated that though it had a licence for 1000 MTs, a cautious approach was adopted in creating capacity of 500 MT with the intention to expand capacity depending upon demand. The Ministry was optimistic about retaining the market for Ceralin and expected the demand to increase in the coming years when the proposed use of modified Ceralin tiles in turbines, produced in Hardwar unit of BHEL, materialises.

12.4 The production of Ceralin, as a result of its own technological efforts, has become the commercial strength of EPD.

CHAPTER 13

PRODUCTION PERFORMANCE

13.1 UTILISATION OF KILNS

(i) EPD had two oil tunnel kilns (OTK) and four rectangular Kilns (RK) in 1983-84. OTK I was dismantled in May 1984. One NGK Shuttle Kiln and one Wistra Shuttle Kiln (WSK) were added during January 1985 and March 1987 respectively.

(ii) Insulators in green condition, after they are moulded into required shapes, are fed (loaded) into the kiln for firing. The table below indicates the percentage capacity utilisation of the kilns (i.e. actual feeding to total feeding capacity).

| KILN | Percentage Capacity Utilisation | | | | | | |
|------------------|---------------------------------|-------|-------|-------|---------------------------|-------|-------|
| | 83-84 | 87-88 | 88-89 | 89-90 | 90-91 (Capacity in MT) | 91-92 | 92-93 |
| OTK-I (3257) | 70% | - | - | - | - | - | - |
| OTK-II (4898) | 76% | 92% | 91% | 56% | 71% | 63% | 69% |
| RK-I (315) | 87% | 33% | 59% | 72% | 33% | 63% | 60% |
| RK-II (315) | 73% | 61% | 57% | 75% | 38% | 46% | 59% |
| RK-III (315) | 75% | 81% | 52% | 65% | 56% | 55% | 66% |
| RK-IV (315) | 13% | 44% | 35% | 69% | 49% | 54% | 62% |
| SK-I (600) | - | 74% | 82% | 100% | 103% | 101% | 111% |
| WSK (620) | - | 57% | 45% | 102% | 41% | 14% | 17% |

(iii) Management stated that oil tunnel kilns which are continuously operated are given priority based on available demand. Variations in demand and product mix available at the relevant time lead to shutting down and/or under-utilisation of kilns. Spare capacities in hot kilns were filled with low value added items like 11 KV pins. However, efforts have been made to optimise utilisation to reach the loading capacity of Kilns per firing.

13.2 RECOVERY

(i) The norm for recovery of insulators at firing stage was fixed at 80% by EPD. The recovery at firing stage actually obtained was higher than 80% in different years for certain product groups. BHEL stated that the norm of 80% for fired recovery was reviewed and refixed at 85% from 1990-91.

ii) The product group-wise overall recovery (after rejections at all stages) obtained from 1983-84 was as follows:

PERCENTAGE RECOVERY

| | 83-84 | 87-88 | 88-89 | 89-90 | 90-91 | 91-92 | 92-93 |
|--------------|-------|-------|-------|-------|-------|-------|-------|
| Disc | 54% | 63% | 70% | 68% | 69% | 72% | 73% |
| Bushing | 46% | 47% | 61% | 59% | 52% | 67% | 72% |
| Solidcore | 48% | 62% | 63% | 72% | 66% | 50% | 57% |
| Post | 47% | 70% | 72% | 65% | 78% | 70% | 74% |
| Pin | 62% | 73% | 80% | 60% | 63% | - | 64% |
| All products | 53% | 63% | 69% | 66% | 65% | 69% | 73% |

The Management attributed the increase in recovery from 53% in 1983-84 to 69% in 1988-89 to improvements resulting from collaboration and stated that recovery percentages at pre and post firing stages are monitored in such a way that the resultant overall recovery improves year after year. The overall recovery had, however, declined from 69% in 1988-89 to 66% in 1989-90 and to 65% in 1990-91, but improved in 1992-93 to 73%. Ministry stated that the fall in recovery was due to (i) manufacture of more complicated designs in fog and antifog varieties of disc insulators in large quantity and (ii) production of bushings to customer oriented designs in small quantities and new varieties of solidcore insulators.

13.3 UTILISATION OF FOUNDRY

(i) The foundry produces malleable iron castings (MCI) caps and flanges. These are assembled as metal parts with ceramic shells.

(ii) The capacity of the foundry was based on the facility available for melting. Adopting 60% for yield, 80% for recovery and 288 effective working days, the installed capacity of the foundry was 1600 MT, till 1984-85. Due to disposal of a receiver in 1985-86 and addition of a spare shell in 1986-87 the installed capacity was 1216 MT in 1985-86 and 1440 MT from 1986-87 onwards.

The management considered that yield and recovery would vary depending upon product mix.

(iii) The actual yield and recovery ranged between 56% - 62% and 73% - 82% during 1983-84 to 1991-92.

(iv) The table below gives the installed capacity, targetted and actual production from 1983-84 onwards:

| Year | Installed capacity (MT) | Production | | Percentage of Actual Production to | |
|---------|----------------------------|----------------|-----------------|------------------------------------|----------------------|
| | | Target (MT) | Actuals (MT) | Installed capacity | Targetted production |
| 1983-84 | 1600 | 644 | 645 | 40% | 97% |
| 1987-88 | 1440 | 1410 | 1303 | 90% | 90% |
| 1988-89 | 1440 | 1440 | 1401 | 97% | 97% |
| 1989-90 | 1440 | 1450 | 1306 | 91% | 90% |
| 1990-91 | 1440 | 1401 | 1322 | 92% | 94% |
| 1991-92 | 1440 | 1398 | 1301 | 90% | 93% |
| 1992-93 | 1440 | 1331 | 1152 | 80% | 87% |

(v) The percapita production targets vis-a-vis actuals and operating results of the foundry over the years are indicated below:

| Year | Man power (Nos) | Production per capita | | Profit/ (Loss) (Rs.lakhs) |
|---------|-----------------|-----------------------|--------------|---------------------------|
| | | Target (MT) | Actuals (MT) | |
| 1983-84 | 209 | 3.08 | 3.09 | (30.88) |
| 1987-88 | 228 | 6.18 | 5.71 | (61.60) |
| 1988-89 | 218 | 6.61 | 6.43 | (48.14) |
| 1989-90 | 222 | 6.53 | 5.88 | (45.82) |
| 1990-91 | 215 | 6.52 | 6.15 | (55.66) |
| 1991-92 | 199 | 7.03 | 6.54 | (49.96) |
| 1992-93 | 200 | 6.66 | 5.76 | (64.05) |

Though per capita production in tonnage has been increasing, the foundry has been incurring losses, year after year.

(vi) According to BHEL the rise in cost of raw materials, power and labour was the principal reason for the foundry incurring loss. Quality considerations required that the metallic parts be fabricated in house. However, the management had plans to produce more value added items, as part of diversification of the foundry, in which the cost aspect would be kept in view.

13.4 MANPOWER UTILISATION

At the time of take over, the unit had a total strength of 1418. After take over, some additions were made based on functional needs. On taking up manufacture of 220/400 KV bushings and ceralin, the existing manpower was redeployed. The strength at the end of 1991-92 was 1535. Despite the high technology inputs production of insulators per employee has not increased but has decreased from 3.75 MTs in 1983-84 to 2.81 MTs in 1991-92 because of poor demand and order book position. The Ministry stated that though there had been a drop in per-capita physical production there was an increase in value added/turnover per employee, year after year and that the growth in turnover and profitability could be sustained with out any increase in manpower.

13.5 MACHINE UTILISATION

There was no system of maintaining log books on machine utilisation till 1986-87. Analysis was done in respect of 12 machines out of 37 in 1987-88 and 13 out of 42 from 1988-89. The Management stated that machine utilisation in respect of critical machinery valued at Rs.831 lakhs, out of total plant and machinery valued at Rs.1498 lakhs, was being monitored. It was proposed to cover more number of equipments in a phased manner.

CHAPTER 14

FINANCIAL PERFORMANCE OF EPD

14.1 The financial performance of EPD, over the years, is summarised as under:

(Rs. in lakhs).

| | 83-84 | 87-88 | 88-89 | 89-90 | 90-91 | 91-92 | 92-93 |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| LIABILITIES | | | | | | | |
| a) Funds from Corporate Office | 313 | 233 | 222 | 214 | 208 | 203 | 199 |
| b) Inter Division Account | 476 | 3241 | 2957 | 2972 | 2660 | 2725 | 2661 |
| c) Reserves & surplus | 55 | 103 | 99 | 97 | 97 | 75 | 75 |
| d) Secured loans: | | | | | | | |
| i) Cash credit | 278 | - | - | - | - | - | - |
| ii) Funds from Corporate Office (Centralised Cash credit) | 441 | - | 11 | - | - | - | - |
| e) Unsecured loans | - | 14 | 15 | 15 | 15 | 15 | - |
| f) Trade dues and other current liabilities, including provisions. | 260 | 451 | 487 | 594 | 701 | 790 | 942 |
| TOTAL | 1823 | 4042 | 3791 | 3892 | 3681 | 3808 | 3877 |
| ASSETS | | | | | | | |
| g) Gross Block | 770 | 1973 | 2213 | 2417 | 2481 | 2616 | 2741 |
| Less: Depreciation | 249 | 616 | 813 | 1032 | 1248 | 1463 | 1653 |
| i) Net Block | 521 | 1357 | 1400 | 1385 | 1233 | 1153 | 1088 |
| j) Capital work in progress | 62 | 169 | 121 | 53 | 59 | 84 | 83 |
| k) Investments | 3 | 1 | - | - | - | - | - |
| l) Current Assets, Loans & Advances | 1235 | 1036 | 899 | 1089 | 1225 | 1351 | 1662 |
| m) Capitalised expenditure & accumulated losses. | 2 | 1479 | 1371 | 1365 | 1164 | 1220 | 1044 |
| TOTAL | 1823 | 4042 | 3791 | 3892 | 3681 | 3808 | 3877 |
| n) Capital employed (i+l-f) | 780 | 1943 | 1800 | 1880 | 1757 | 1714 | 1807 |

WORKING RESULTS

| | (Rs. in lakhs) | | | | | | |
|--|----------------|---------|---------|---------|---------|---------|---------|
| | 83-84 | 87-88 | 88-89 | 89-90 | 90-91 | 91-92 | 92-93 |
| Sales excluding excise duty. | 1122 | 1835 | 2063 | 2300 | 2615 | 2753 | 3093 |
| Net value of production | 1162 | 1831 | 2075 | 2366 | 2715 | 2837 | 3086 |
| Value Added | 729 | 1187 | 1396 | 1600 | 1809 | 1924 | 2122 |
| Net conversion cost | 787 | 1161 | 1288 | 1433 | 1533 | 1660 | 1873 |
| Profit (+) /Loss(-) | (-)58 | 26 | 108 | 167 | 276 | 264 | 249 |
| Less Provisions transferred by Corporate Office. | 8 | 55 | 1 | 171 | 75 | 320 | 73 |
| Net Profit | (-)66 | (-)29 | 107 | (-)4 | 201 | (-)56 | 176 |
| Add Balance of Profit/loss from previous year accounts | 64 | (-)1450 | (-)1478 | (-)1361 | (-)1365 | (-)1164 | (-)1220 |
| Accumulated loss at the end of the year | (-)2 | (-)1479 | (-)1371 | (-)1365 | (-)1164 | (-)1220 | (-)1044 |

EPD had been incurring losses upto 1986-87. It made profits during the year 1987-88 to 1992-93 before providing for its share of BHEL's income tax, dividend etc. The accumulated loss, which was Rs.2 lakhs at the end of 1983-84, had increased over the years and stood at Rs. 1220 lakhs at the end of 1991-92, partly due to account of dividends (Rs. 167 lakhs), income tax (Rs. 511 lakhs) and other charges (Rs. 100 lakhs) allocated by the Company's Corporate Office.

14.2 According to the Management at the time of take over, discs upto 90 KN, pins and posts upto 11 KV dominated the product profile but they were contributing to losses. After taking up production of higher rating insulators especially bushings, there had been improvement in quality and technology year after year. In the business of discs, pins and solidcores EPD faces stiff competition in the market and the prices obtained do not fully cover costs.

With the objective of achieving technological excellence EPD developed Ceralin. Ceralin development called for dedicated efforts and employment of specialists in the related areas. This product falls in the area of advanced ceramics and has already started paying dividends. BHEL claimed that EPD has over the years undertaken studies on recovery, palletisation, import substitution, productivity and energy saving all aimed at cost reduction, since production of the items was needed to keep the manpower employed.

14.3 INTERNAL AUDIT

The programme drawn up by the Internal Audit Wing was for audit of purchases, sales, production and accounting. The programmes covered appraisals on new projects also, which was done only piecemeal. The Management stated that internal audit planned to take up the appraisal of new projects, and their implementation.

CHAPTER 15

MARKETING & PRICING

15.1 Prices quoted by EPD were below the estimated cost in some cases. Management stated that company's norm was generally to earn 10% profit over cost; however, based on the market conditions, the unit had sometimes to quote even on marginal cost basis.

15.2 It was further stated by the Management that the rates of foreign suppliers quoting under International Development Agency credit (often with a grant element) were lower. There was no credit or grant available to BHEL from the Government as was available to foreign competitors from their Governments. For post and pin insulators there was competition from several small scale manufacturers. For solidcore, new entrants had deliberately cut the prices so as to enter the market and establish themselves. For bushings, competition was from reputed manufacturers. Also, sister units of BHEL in their effort to reduce the cost of inputs for switchgear and transformers offered minimum prices. Further some of the orders accepted by Jagdishpur plant were transferred to EPD on several occasions, on which EPD had little say regarding the low price terms accepted. All these factors led EPD to accept orders at less than remunerative prices.

15.3 The orders were not growing at the rate necessary for the financial health of a technology intensive unit. Efforts were needed to improve the order book position in future years in the interest of the financial health of the EPD.

15.4 According to the Management, the installed capacity in the country was three times the demand. Market forces had compelled some of the private manufacturers to scale down their operations and in some cases to close down. This fact also had to be kept in view in framing the pricing policy to be adopted by EPD to secure orders. The Ministry was confident that the order book position would improve in the coming years when the proposed marketing plans materialise.

15.5 COSTING

Insulator manufacture is a process oriented industry and the Company is following process costing. Discs, posts, pins, bushings and solidcores insulators are manufactured

from three kinds of body composition. The identification of products starts only from an intermediate stage of process. A standard costing system is not being followed. Historical costing was being done twice a year. Analysis of variances between actual costs and the historical cum budgetted cost estimates were still to be done systematically. Increase in the frequency of revision of historical costs was being contemplated by the Management. The manufacture of each insulator requires a standardised mix of raw materials i.e. quartz, clay, feldspar etc. and it passes through standardised manufacturing process to get a final product. There is a standard weight for every product, item and norms exist in the Division for the number of items to be executed in labour oriented process. Therefore standards for consumption of raw materials, machine/labour time, process losses etc. for each product at each process could have been developed by the company to evaluate the actual performance by comparing it with the standards.

15.6 DUES FROM CUSTOMERS

(i) The yearwise outstanding dues as on 31st March, 1992 and the provision made for doubtful debtors by EPD were as follows:

| Customer Group | Closing Balance as on 31.3.92 | 91-92 | 90-91 | Yearwise origin of dues..... | | 87-88 & earlier |
|------------------------------|-------------------------------|---------------|--------------|------------------------------|--------------|-----------------|
| | | | | 89-90 | 88-89 | |
| State Elec Boards | 96.26 | 30.45 | 30.07 | 7.74 | 3.98 | 24.02 |
| Other Power Projects | 76.42 | 57.81 | 4.84 | 2.63 | 11.14 | - |
| Public Sector Undertakings | 4.40 | 2.57 | 1.82 | - | 0.01 | - |
| Railways | 8.60 | 4.05 | 3.89 | 0.41 | 0.25 | - |
| Government Deptts | 3.08 | - | 0.82 | - | - | 2.26 |
| Other parties | 60.08 | 50.10 | 0.38 | 0.04 | 0.04 | 9.52 |
| TOTAL: | 248.84 | 144.98 | 41.82 | 10.82 | 15.42 | 35.80 |
| Deferred payments | 37.70 | 37.70 | - | - | - | - |
| Price variance claims | 48.78 | 48.78 | - | - | - | - |
| GRAND TOTAL: | 335.32 | 231.46 | 41.82 | 10.82 | 15.42 | 35.80 |
| Provision for doubtful debts | 115.92 | 12.45 | 41.52 | 10.73 | 15.42 | 35.80 |

(ii) An analysis of causes of some debts outstanding as on 31.3.92 revealed that the outstandings related to liquidated damages/penalties levied by customers and some old bills.

The Ministry stated that the provision for doubtful debtors of Rs. 115.92 lakhs was made in terms of Company's accounting policy and does not imply that all these debtors are unrealisable. It was further stated that the figure included bills for last 5%/10% payments (Rs.21.95 lakhs) and related price variance claims (Rs.16.19 lakhs) which would be settled by customers on completion of contract formalities. Cases of liquidated damages/penalties were being followed up with customers, mostly State Electricity Boards, who take a long time to decide on waiver of liquidated damages/penalty; old cases were also being followed up with customers.

CHAPTER-16

RESEARCH & DEVELOPMENT

EPD successfully developed Ceralin, Cerapipe and a few items falling in the category of industrial ceramics. According to the Management, except for one unsuccessful effort (development of Ceramic Sound Absorbers), their in-house R&D efforts were very productive especially in the areas of Ceramic liners and industrial ceramics. They had close interactions with the laboratories of CSIR, CGCRI, RRL, NAL, Industrial Ceramic Society of India. A Ceramic Technological Institute was set up in EPD with assistance from UNDP which was also being used for testing and R&D.

Insulator Plant, Jagdishpur

CHAPTER 17

SETTING UP OF INSULATOR PLANT

In 1982, Government of India approved a project for setting up an Insulator Plant by Bharat Heavy Electricals Limited (BHEL) at a cost of Rs.11.50 crores, with a foreign exchange component of Rs. 3.25 crores, to manufacture 5500 tonnes of insulators of four different types.

BHEL set up the Insulator Plant at Jagdishpur, U.P. since U.P. State Electricity Board was one of the largest customers for electrical insulators and growth was envisaged in power transmission systems in U.P. The State Government provided 160 acres of land free of cost to the Company. Raw materials for making insulators viz., feldspar, quartz, alumina, etc. were expected to be available in adequate quantities in the adjoining States of Bihar, Rajasthan, Orissa and Madhya Pradesh.

As a sequel to a technical assistance agreement between BHEL and NGK of Japan in 1983 (refer para 10.7) for modernization of Electro Porcelain Division (EPD) Bangalore, it was agreed that NGK would provide technical assistance for development of the new plant at Jagdishpur. It was also decided to modify the product profile of the plant to manufacture disc insulators only. BHEL was already manufacturing various types of disc insulators at EPD Bangalore; it was decided that disc insulators of 45 KN, 70 KN, 120 KN, 120 KNSF and 160 KN for normal application would be produced at Jagdishpur and disc insulators with higher electrical mechanical strength would continue to be produced at EPD, Bangalore alongwith other types of insulators.

The plant capacity was raised from 5,500 tonnes to 6000 tonnes to match the optimum size (6000 tonnes) of kiln available.

Revised estimates for the Project in Jagdishpur were approved by the Government of India in 1984 at a cost of Rs.17.65 crores with foreign exchange component of Rs.4.80 crores. The original and revised production mix was as given below:

(M.Ts. per annum)

| <u>Sl. No.</u> | <u>Items</u> | <u>Product Mix</u> | |
|----------------|-----------------------|--------------------|----------------|
| | | <u>Original</u> | <u>Revised</u> |
| 1. | Disc Insulators | 1000 | 6000 |
| 2. | Solid Core Insulators | 3000 | --- |
| 3. | Bushings | 1000 | --- |
| 4. | Pin and Post | 500 | --- |
| Total | | 5500 | 6000 |

The change in the product-mix was advised by NGK Japan in view of the inexperience of the personnel at the Jagdishpur plant. EPD, Bangalore was considered better suited for production of the sophisticated items.

The plant at Jagdishpur started production on 3rd March 1984, but the complete project (including remaining civil work, addition of some equipment, etc.) was completed only in 1986. The actual expenditure was Rs.19.39 crores as against the revised estimate of Rs.17.65 crores. The cost escalation was mainly on civil works and infrastructural facilities, such as drainage system and sewerage pond envisaged to be provided by U.P.State Industrial Development Corporation but not made available and hence arranged by the Company.

CHAPTER 18

PRODUCTION OF INSULATORS

18.1 Plant output

The Feasibility Report projected (1981-82) the demand for insulators in the country at over 30,000 tonnes per year and expected it to be around 33,000 tonnes per year from 1984-85 onwards. However, the actual demand has hardly exceeded 10,000 tonnes per annum; even in the Eighth Plan period the demand is expected to increase to 11,500 tonnes per year only. The figure projected in the Feasibility Report was, thus, over optimistic.

The planned and actual production in the Insulator Plant from 1984-85 onwards is given below.

| Year | Installed capacity | Planned production | Actual production | Percentage of production to Installed capacity |
|---------|--------------------|--------------------|-------------------|--|
| 1984-85 | 6000 | 3750 | 219 | 3.65 |
| 1985-86 | 6000 | 3500 | 989 | 16.48 |
| 1986-87 | 6000 | 3200 | 1179 | 19.65 |
| 1987-88 | 6000 | 3000 | 1431 | 23.85 |
| 1988-89 | 6000 | 3000 | 2190 | 36.50 |
| 1989-90 | 6000 | 3000 | 2130 | 35.50 |
| 1990-91 | 6000 | 3200 | 2283 | 38.05 |
| 1991-92 | 6000 | 3200 | 3276 | 53.45 |
| 1992-93 | 6000 | 3200 | 3581 | 59.68 |

The management attributed (May, 1993) the unsatisfactory performance of the plant to the following reasons :

Actual addition to power generation capacity in the country was less than the projections given by Central Electricity Authority (CEA) at the time of feasibility report of the plant in the year 1981-82.

- Based on the CEA projections many private manufacturers expanded/set up facilities for insulators. As a result, the capacity created exceeded the actual demand in the country.

- The Plant was assessed to be viable taking constant selling and input prices.

-In view of the gestation period of a new plant and in order to retain the customer confidence, orders for discs were distributed between EPD Bangalore and IP Jagdishpur Units.

The reasons advanced by the Management are not tenable as all these factors only indicate poor market sensitivity and improper planning by the management.

Management further stated (October 93) that production in 1992-93 was 3581 MTs and it was expected to be 4000 MTs in 1993-94.

18.2 Recovery level

The recovery levels achieved in production of disc insulators are given below:

| Year | Loading (in Nos.) | Final Products. (in Nos.) | Total Recovery percentage |
|---------|----------------------|------------------------------|---------------------------------|
| 1984-85 | 257640 | 75447 | 29.28 |
| 1985-86 | 481203 | 323475 | 67.22 |
| 1986-87 | 527816 | 315476 | 59.77 |
| 1987-88 | 734484 | 428730 | 58.37 |
| 1988-89 | 887675 | 626569 | 70.59 |
| 1989-90 | 854640 | 603459 | 70.61 |
| 1990-91 | 966207 | 697413 | 72.18 |
| 1991-92 | 1313065 | 1017291 | 77.48 |
| 1992-93 | 1302631 | 1042954 | 80.07 |

The Feasibility Report envisaged a recovery level of 64 per cent in the first year of production and expected recovery to stabilise at 88 per cent by the third year of

production. A recovery level of 29.28 per cent was attained in the first year of production and the subsequent highest recovery level achieved was 80.07 per cent in 1992-93.

The Management attributed (May 1993) the lower recovery at the initial stages to the following reasons :

- The plant took longer to develop skills and achieve the required level of recoveries due to its being set up in a zero industry area.
- The technology was not similar to EPD Bangalore because of hardness of the raw material; continuous trials were necessary which resulted in low recovery in the initial stages.
- Replacement of Karnataka clay and Japan Ball clay by Chaibasa' clay of Bihar resulted in decrease of recovery during the stabilisation period.

18.3 Machine Utilisation

The production capacities of Ball Mill, Jiggering Machine and Kiln were different. Due to mismatch in capacities the installed capacity of the plant was reduced.

The Management stated that in the project report capacities were balanced but during operation the parameters changed. Management further stated (May 1993) that NGK provided their standard machines so some mismatch between related facilities was unavoidable.

The reply of Management's is not tenable as the machines supplied were of standard capacities and from the same manufacturers.

In August, 1992, the Management sent a proposal to augment the capacity by the purchase of a Ball Mill costing Rs.15.00 lakhs, which is yet to be installed. (September 1993)

The percentage of utilisation of different machines was as given below:

| Years | Ball Mill | Jigging Machine | Kiln |
|--------------|------------------|------------------------|-------------|
| 1985-86 | 49.45 | 52.65 | 28.99 |
| 1986-87 | 49.73 | 51.67 | 32.01 |
| 1987-88 | 54.37 | 55.12 | 43.97 |
| 1988-89 | 54.99 | 57.58 | 53.76 |
| 1989-90 | 58.90 | 54.13 | 51.34 |
| 1990-91 | 64.90 | 57.58 | 58.59 |
| 1991-92 | 71.58 | 76.27 | 78.91 |
| 1992-93 | 82.05 | 75.80 | 78.68 |

The utilisation of machines was less than 65 per cent except during 1991-92 and 1992-93.

The General Manager of the plant observed (August 1989) that there were problems in achieving the anticipated output level with equipments like Jigging Machines, Tunnel Drier and Curing Baths and put the achievable capacity of the plant at 4200 tonnes per annum and feasible recovery level at 65-70 per cent. This feasible production is lower than the break even point which was worked out at 4500 tonnes per annum.

Thus the Company has set up a plant the viability of which is very much in doubt.

18.4 During a routine check, on 11th December, 1986, a few insulators were found to have porosity defects which affect the dielectric strength of insulators. A rigorous test was started from 13th December, 1986 but the porosity defects continued till 10th February, 1987. All those insulators, in which porosity was observed, had to be destroyed. The number of insulators loaded for firing during this period was 1,02,023 but only 50,360 shells were found usable which resulted in a loss of Rs. 18.08 lakhs.

The Management stated that high particle size in the raw-material which escaped the normal testing caused porosity. Management stated (May 1993) that in order to reduce the chances of recurrence of such an event, a bedding system to homogenise different lots having bag to bag variation had been introduced and to be further sure of the particle size, the use of sedigraph has also been started.

CHAPTER 19

FINANCIAL PERFORMANCE

19.1 The financial performance of IP over the years, is summarised below:

(Rs. in lakhs)

| | 89-90 | 90-91 | 91-92 | 92-93 |
|---|------------------|------------------|------------------|------------------|
| LIABILITIES | | | | |
| Funds from Head Office | 669.00 | 651.61 | 635.26 | 622.26 |
| Inter Division Accounts | 5162.78 | 5859.20 | 7428.65 | 7910.05 |
| Reserves & Surplus | (-)4090.86 | (-)4871.45 | (-)5823.08 | (-)6670.18 |
| Loans | 88.88 | 174.75 | (-)69.12 | 436.21 |
| Current Liabilities | 229.17 | 300.81 | 395.78 | 558.64 |
| Total | <u>2058.97</u> | <u>2114.62</u> | <u>2567.49</u> | <u>2856.98</u> |
| ASSETS | | | | |
| Gross Block | 2455.47 | 2489.86 | 2521.52 | 2877.63 |
| Less Depreciation | 1144.20 | 1375.35 | 1524.94 | 1646.45 |
| Net Block | <u>1311.27</u> | <u>1114.51</u> | <u>996.58</u> | <u>1231.18</u> |
| Capital work-in-progress | 22.20 | 116.32 | 294.69 | 29.45 |
| Current Assets Loans & Advances | 725.50 | 883.79 | 1276.22 | 1596.35 |
| | <u>2068.97</u> | <u>2114.62</u> | <u>2567.49</u> | <u>2856.98</u> |
| WORKING RESULTS | | | | |
| Sales | 775.70 | 891.29 | 1179.98 | 1558.43 |
| Cost of Sales | 1585.52 | 1663.12 | 2100.14 | 2401.79 |
| Net loss | <u>(-)809.82</u> | <u>(-)771.83</u> | <u>(-)920.16</u> | <u>(-)843.36</u> |
| Cost Of Sales To Sales (In Percentage) | 204 | 187 | 178 | 154 |

19.2 The Feasibility Report had envisaged 15.6 per cent return on the capital invested. Instead, the entire capital invested (Rs. 19.39 crores) has been wiped off in the first three years of operation itself as given below:

(Rs. in Crores)

| Year | Annual Loss | Cumulative Loss |
|---------|-------------|-----------------|
| 1984-85 | 5.64 | 5.64 |
| 1985-86 | 6.18 | 11.82 |
| 1986-87 | 7.37 | 19.19 |
| 1987-88 | 6.30 | 25.49 |
| 1988-89 | 6.50 | 31.99 |
| 1989-90 | 8.09 | 40.08 |
| 1990-91 | 7.71 | 47.79 |
| 1991-92 | 9.20 | 56.99 |
| 1992-93 | 8.43 | 65.42 |

The plant incurred a cumulative loss of Rs.65.42 crores upto 1992-93. The location of the plant, transportation of raw materials from long distances, increase in the prices of raw materials, low selling prices of insulators, low recovery and stiff competition contributed to the losses.

The Management conceded (May 1993) that there was no improvement in financial results and stated that they were looking forward to diversification, cost reduction, value engineering and productivity measures to improve operating results of the unit.

19.3 The cost of production of the entire product range has always been higher than the average selling prices as detailed below:

(Rs. in lakhs)

| Particulars | Types of Insulators | | | | |
|----------------|---------------------|----------|--------|--------|--------|
| | 45 KN | 70/90 KN | 120 KN | 120 SF | 160KN |
| 1989-90 | | | | | |
| Cost | 153.50 | 173.25 | 186.80 | 201.85 | 276.35 |
| Sales realised | 79.50 | 92.15 | 136.50 | 109.50 | 143.50 |
| 1990-91 | | | | | |
| Cost | 161.16 | 185.49 | 200.59 | 218.46 | 292.61 |
| Sales realised | 78.40 | 92.79 | 118.50 | 123.00 | 165.07 |
| 1991-92 | | | | | |
| Cost | 176.63 | 205.23 | 217.29 | 237.19 | 318.64 |
| Sales realised | 78.40 | 88.03 | 118.50 | 123.00 | 165.07 |
| 1992-93 | | | | | |
| Cost | 189.43 | 222.59 | 233.69 | 255.01 | 341.65 |
| Sales realised | 88.18 | 104.27 | 141.45 | 151.77 | 189.25 |

The Management stated (May 1993) that there was acute competition leading to procurement of orders at unremunerative prices, which did not fully cover the input costs.

The selling prices of disc Insulators have remained as low as 50 per cent of the cost of production during all these years. Faced with this market situation the product may not become financially viable in the near future.

CHAPTER 20

MARKETING

20.1 Order Book Position

The following table gives the position of installed capacity, orders received and executed:

| Year | Installed capacity (tonnes) | Orders received (tonnes) | Percentage to Installed capacity | Orders executed (tonnes) |
|---------|-----------------------------|--------------------------|----------------------------------|--------------------------|
| 1984-85 | 6000 | 680.69 | 11.35 | 211 |
| 1985-86 | 6000 | 1793.57 | 29.89 | 915 |
| 1986-87 | 6000 | 2253.75 | 37.56 | 1134 |
| 1987-88 | 6000 | 1493.52 | 24.89 | 1535 |
| 1988-89 | 6000 | 2046.30 | 34.10 | 2047 |
| 1989-90 | 6000 | 1285.72 | 21.42 | 2207 |
| 1990-91 | 6000 | 2276.48 | 37.94 | 2362 |
| 1991-92 | 6000 | 5956.41 | 99.11 | 3207 |
| 1992-93 | 6000 | 2430.15 | 40.50 | 3581 |

Upto 1990-91 the orders received did not exceed 37.94 per cent of the installed capacity. On account of one single order received this figure jumped to 99.11 per cent of the installed capacity during 1991-92, but the planned production remained pegged at 3200 tonnes only. Thus, inspite of the comfortable order book position capacity utilisation was very poor which resulted in lapse of orders.

20.2 Defective supplies

The Plant incurred Rs. 54.42 lakhs as liquidated damages/penalty and Rs.37.50 lakhs for short supplies, excess freight, rejections, loss, etc. during the period from 1986-87 to 1991-92 to National Thermal Power Corporation and Electricity Boards. Management stated (October 1993) that one third of the amount had already been settled and other dues were under active consideration for waiver. Fact remains, however, that liquidated damages were incurred during a period when plants capacity was under-utilised.

CHAPTER 21

MANPOWER

In the Feasibility Report the manpower requirement was estimated at 640 for the various categories.

The men-in-position and contract workers actually employed as at the close of the last eight years is given below:

| As on | Manpower Requirement (as approved) 1 | Actual Men-in-position 2 | Contract workers 3 | Total 4 (2+3) |
|-----------|---|-----------------------------|-----------------------|------------------|
| 31.3.1986 | 630 | 654 | 86 | 740 |
| 31.3.1987 | 630 | 630 | 206 | 836 |
| 31.3.1988 | 630 | 629 | 185 | 817 |
| 31.3.1989 | 630 | 615 | 184 | 799 |
| 31.3.1990 | 630 | 613 | 247 | 860 |
| 31.3.1991 | 630 | 612 | 247 | 859 |
| 31.3.1992 | 630 | *616 | *414 | *1030 |
| 31.3.1993 | 630 | *622 | *344 | *966 |

* including Ceralin Plant.

It would be observed that the manpower deployed was much in excess of the requirement of the plant though plant utilisation did not exceed 60 per cent of installed capacity upto 1992-93. Recommendations of a team (1987) from Corporate Office to reduce manpower had not been implemented. Instead, the engagement of contract workers rose to 247, in addition to 612 regular employees, by the end of March, 1991. Though a ceralin plant has also been started at Jagdishpur by the Company, Management has transferred only 14 surplus manpower from insulator plant to the ceralin plant against their requirement of 44 persons; instead contract labour is being deployed in the ceralin plant.

Management stated (October 1993) that they would analyse the matter in depth with special emphasis on employment of casual labour.

Though the plant was having surplus labour overtime allowance and extra wages of Rs.10.17 lakhs from 1987-88 to 1992-93 (upto December, 1992) were also paid.

Under a plant performance scheme, incentive was admissible to labour whose performance exceeded 85 per cent of their target. The table below indicates the targets fixed, actual production and percentage of actual production to targeted production:

| Year | Target Qty. | Actual Qty. | Percentage |
|---------|-------------|-------------|------------|
| 1986-87 | 3200 | 1179 | 36.84 |
| 1987-88 | 3000 | 1431 | 47.70 |
| 1988-89 | 3000 | 2199 | 73.00 |
| 1989-90 | 3000 | 2130 | 71.00 |
| 1990-91 | 3200 | 2283 | 71.34 |
| 1991-92 | 3200 | 3276 | 102.37 |
| 1992-93 | 3200 | 3581 | 111.90 |

Even though the targets fixed were not achieved during the years 1987-88 to 1991-92, Rs.53.54 lakhs towards plant performance and Rs.6.11 lakhs as ex-gratia were paid during these years. Approval of Government of India which was necessary for the purpose was not obtained.

Ministry stated (May 1993) that it was decided to make payment to sustain the motivation and consistent improvement in the performance in the years to come.

CHAPTER 22

DIVERSIFICATION

EPD, Bangalore was manufacturing 330 MTs of ceramic liners against an annual demand of 1500 MTS in the Country, when it was decided (August 1985) to set up facilities for production of 330 tonnes per annum ceralin at Jagdishpur at a cost of Rs. 271 lakhs. The work was started, however, only in September 1990 i.e. after a period of five years. The expenditure incurred upto March 1992 was Rs. 258.91 lakhs, and the production started from December, 1992. The order book position was as given below.

| Years | Orders booked (MTs) |
|---------|------------------------|
| 1991-92 | NIL |
| 1992-93 | 32 |
| 1993-94 | 140 |
| 1994-95 | 200 |

The orders booked, as stated above, were low as against the capacity of 330 MTs per annum. Thus instead of improving the viability of insulator plant, the ceralin plant may add to the losses.

The Management stated (May, 1993):-

The demand of ceralin had come down due to decline of power plant equipment orders on BHEL, as ceralin was being supplied alongwith main pipings; it had become necessary for BHEL to approach other suppliers of power plant equipment and create a market for the product in industrial plants and efforts in this direction had been initiated. Management further stated (October 1993) that subsequently order book position had improved considerably.

CHAPTER 23
OTHER POINTS OF INTEREST

23.1 Kiln Accident

An accident occurred in the kiln on 3rd November, 1990 as the inside walls had changed in dimensions because of high temperature inside the kiln, thereby reducing the gap between the sides of the cars and the walls of the kiln and other factors which were the result of poor technical management. As a result there was a loss of kiln cars and production amounting to Rs.42 lakhs.

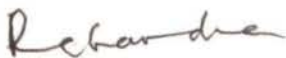
Management stated that corrective measures had been taken since then.

23.2 Excess consumption of Zinc

The Unit was not aware of the quantity of zinc required for caps and pins for various ratings of insulator. On the advice of EPD Bangalore, uniform rate for all ratings at 9 per cent zinc consumption was adopted. The zinc content allowed at 9 per cent was on the high side. Based on a committee's report, norms of zinc consumption were fixed ranging from 3.89 per cent to 8.03 per cent for different ratings of insulator caps and pins. But, by then the Unit had incurred a loss of Rs. 22.53 lakhs due to excess consumption of zinc from 1986 to 1989.

New Delhi
The

- 5 मई 1995
MAY 1995


(RAMESH CHANDRA)
Deputy Comptroller and Auditor General -
cum-Chairman, Audit Board

Countersigned

New Delhi
The

- 5 मई 1995
MAY 1995


(C.G. SOMIAH)
Comptroller and Auditor General of India

18

20
1