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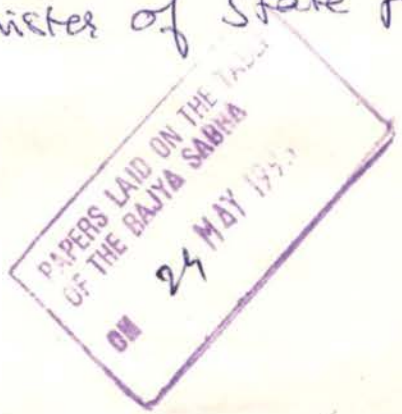
Authenticated

Urmila Patel

New Delhi
Dated: 17th May 1995

(Smt. Urmila C. Patel)
Minister of State for Power.



REPORT OF THE COMPTROLLER AND AUDITOR GENERAL OF INDIA

UNION GOVERNMENT
No. 5 (COMMERCIAL) OF 1995

NATIONAL HYDROELECTRIC POWER CORPORATION LIMITED

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PREFACE

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

2. The report on National Hydroelectric Power Corporation Limited was finalised 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 1992 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 Kanwal Nath	Principal Director of Commercial Audit & Ex-Officio Member,Audit Board-III, New Delhi.
5.	Shri Vijay Kumar	Principal Director of Commercial Audit & Ex-Officio Member, Audit Board-I, New Delhi.
6.	Shri K.S. Menon	Principal Director (Commercial) and Member Secretary, Audit Board from 2nd July 1990 to 1st August 1993.
7.	Shri R. Chandramouli	Asstt. Comptr. & Ar. Genl. (Commercial) and Secretary, Audit Board from 2nd August 1993 till date.
8.	Shri T.A.Deodas Part time Member	Ex-Chief Engineer, Central Electricity Authority
9.	Shri H.C.Kacwaha Part time Member	Ex-Chief Engineer, Central Electricity Authority

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 the Comptroller and Auditor General of India.

3. The report has been finalised after taking into consideration the discussions held on 15th November 1993 with the representatives of the Ministry of Power.

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

OVERVIEW

1. NHPC was incorporated on 7th November,1975 to secure efficient and economic completion and operation of hydro electric projects in the central sector.

(Para 1.3)

2. Micro objectives of the Company were prepared in 1980. The Company sent its corporate plan (1985-2000) to Government in 1988, approval to which was awaited.

(Para 2.2)

3. The Company has set up 5 hydro Electric Projects at Baira Siul (HP), Salal-I, (J&K), Loktak (Manipur), Tanakpur(UP) and Devighat (Nepal). In addition there are 5 ongoing projects i.e. Chamera-I (UP), Dulhasti, Uri, Salal-II (J&K) and Rangit (Sikkim).

(Para 2.3)

4. The long term plan of the Company for the period (1985-2000) envisaged a capacity of 7945 MW by the year 2000, against which the installed capacity till 31.03.1994 was only 865 MW, i.e. less than 11% of the target.

(Para 2.4)

5. During the last ten years, the Company had seven Chairmen-cum-Managing Directors with tenures ranging from 6 to 43 months.

(Para 3.3)

6. In the case of Salal-II H.E. Project, CEA took more than three years for the technical clearance of the project. Total time taken for approval of the projects by the Government was generally high viz.27 months to 47 months.

(Para 4.1.1)

7. The rising construction cost of various completed projects led to a trend of rising cost of production.

(Para 4.4.1)

8. In Tanakpur project significant changes in design resulted in loss of head of 3 meters, loss of generation of power of 41.86 MU per annum valuing Rs.607.35 lakhs and reduction in efficiency of the turbines. Further the cost of the complete project was doubled. The estimated expenditure on generation rose from 35 paise/unit originally estimated to 119 paise.

(Paras 4.5.1, 4.5.3 & 4.5.4)

9. In the Dulhasti Project no global bids were invited to secure competitiveness in financial and commercial offers. Recommendations of the Steering and Negotiating Committee were not given due weightage and the order was given to a consortium against the Committee's recommendations. Most of the apprehensions expressed by this Committee about the consortium creating controversies and disputes during the course of execution of project, came true.

(Paras 5.2.2. & 5.2.3)

10. Chamera Hydroelectric Project (State-I) sanctioned by Government of India in April, 1984 at an estimated cost of Rs.809.29 crores was originally scheduled to be commissioned by March 1990. However, this was revised to March,1994 because of delay in execution of agreements, delay in obtaining various clearances from Ministry of Environment and unprecedented floods resulting in disruption of work at the project.

(Paras 5.3.2 & 5.3.3)

11. The Company's failure to make payment of half yearly instalments of premium for insurance cover on due dates has jeopardised the realisation of an insurance claim of Rs.131.05 lakhs.

It had also to suffer a loss of Rs.62.52 lakhs due to failure to insure a bailey bridge, which was completely washed away in floods in September,1988.

(Paras 5.3.7 & 5.3.8)

12. Government's delay in taking a decision on a Canadian offer for diversion of C $ 310 million (including C $ 287 million unutilised from Chamera Stage-I towards Chamera StageII resulted in payment of avoidable commitment charges of Rs.8.23 Crores in addition to Rs.13.05 crores incurred on infrastructure facilities which remained unproductive. Further, an annual expenditure of Rs.50 lakhs was being incurred on manpower employed at Stage-II though no work was going-on at the project.

(Para 5.3.9)

13. The outlay for the next few years depends heavily on bonds and external commercial borrowings.

(Para 6.3.3)

14. So far no agreements have been signed with the beneficiary States/State Electricity Boards in the case of Loktak and Salal Projects due to non-finalisation of certain issues relating to tariff.

(Para 7.2)

15. The Company has 3166 workers as surplus manpower costing Rs.3928 lakhs during 1984-85 to 1992-93. The introduction of Voluntary Retirement Scheme (VRS) in Bairasiul, and Loktak Projects has not been successful in reducing the surplus manpower.

(Para 8.1.1.)

16. Despite having a substantial surplus workforce, the company had not established any permanent training establishment to reorient skills. The temporary training institute at Bairasiul was also wound up in September,1988 after having trained only 79 workmen in a span of nearly three years.

(Para 8.2)

CHAPTER - 1

INTRODUCTION

1.1 The Electricity (Supply) Act 1948, provides for establishment of State Electricity Boards in the States to construct their own power generating stations. Under the Act, power development in the country was to be done by State Electricity Boards and the role of the Centre was that of a coordinating agency. The Act was amended in 1976 to provide for the establishment of power generating companies in the Central Sector also.

1.2 The energy sector in India is characterised by the development of thermal, hydro and nuclear power sources. Hydel power as a renewable source holds promise of a safe and lasting solution to the energy problem.

The total installed electricity generation capacity in the country at the end of VIIth plan (31-3-1990) was 63,986 MW comprising 18287 MW (28.6%) of hydro, 43404 MW (67.8%) of thermal, 1565 MW (2.4%) of nuclear and 730 MW (1.1%) of other sources (gas based and wind mill). The share of hydel generation in the total electricity generation capacity of the country declined from 34 per cent at the end of VI Plan to 29 percent at the end of VII Plan and further to 27.8 percent at the end of 1991-92.

1.3 To secure speedy, efficient and economical completion and operation of hydro electric projects in the Central Sector, the National Hydroelectric Power Corporation Limited (NHPC) was incorporated on 7th November 1975 as a private limited company under the Companies Act, 1956. The Company was converted into a Public Limited Company with effect from 2nd April 1986.

1.4 This appraisal covers the performance of the company upto the period 1993-94.

CHAPTER - 2

OBJECTIVES AND CORPORATE PLANNING

2.1 The main objectives of the Company are to:-

I) Plan, promote and organise an integrated and efficient system of hydro electric power.

ii) Undertake the construction of inter-state transmission lines and ancillary work.

2.2 The Company prepared its micro objectives in 1980 and in 1988 sent the Corporate Plan (1985-2000) to the Government for approval which is still awaited (December 1993)

2.3 The Company has executed 5 hydro projects, viz. Baira Siul (3x60 MW), commissioned in 1981; Loktak (3x35MW) & Devighat (Nepal) commissioned in 1983, Salal I (3x115 MW) commissioned in 1987, and Tanakpur (3x40MW) commissioned in 1992. In addition there are 5 ongoing (March 1994) projects viz.

i)	Salal-II	3x115 MW (Unit-I Commisssioned in July 1993)
ii)	Chamera-I	3x180 MW
iii)	Dulhasti	3x130 MW
iv)	Uri	4x120 MW
v)	Rangit	3x20 MW

Chamera-I is being executed with Canadian technical assistance while Dulhasti and Uri projects are being executed by foreign consortia on turnkey basis.

2.4 The Corporate Plan of the Company (1985-2000) envisaged a capacity of 7945 MW by the year 2000 against which the installed capacity of all the units of the Company as on 31st March 1994 was only 865 MW, i.e.only 10.9% of the target. Even after completion of the 5 ongoing projects the installed capacity would be only about 2565 MW, leaving a shortfall of 5380 MW (i.e. 68% of the target).

2.5 The Corporate Plan (1985-2000) envisaged exploring possibilities of diversification in related areas as well as starting in-house R&D activities in the hydro field. So far no diversification or R&D has been taken up.

CHAPTER-3

ORGANISATIONAL STRUCTURE

3.1 The Company is headed by a Chairman-cum-Managing Director assisted by Director (Projects), Director (Technical), Director (Finance), Director (Personnel) and Executive Director (Contracts and Materials).

3.2 Completed projects are headed by Chief Engineers who report to the Corporate office. The ongoing projects are supervised by General Managers who report directly to Director (Projects).

3.3 During the last ten years the Company had 7 Chairmen-cum-Managing Directors with tenures ranging from 6 months to 43 months. At present, the post is being managed as an additional charge (March 1994).

CHAPTER-4

IMPLEMENTATION OF COMPLETED PROJECTS

4.1.1 There were considerable delays in approval of the projects by the Government at different stages as indicated below :

Sl.No.	Name of Project	Delay in months
1.	Salal-II, H.E.	47
2.	Dhauliganga (Investigation)	42
3.	Gauriganga (Investigation)	37
4.	Tanakpur H.E.	27

Central Electricity Authority took 3 years for the technical clearance of Salal-II Project.

The Ministry acknowledged (April 1993) that the decision making process could have been faster.

4.1.2 The Company has completed a project in Nepal and four hydro-electric projects in India as detailed below:-

Sl.No.	Project	Year of Completion	Installed capacity (in MW)
1.	Baira Siul	1981	180
2.	Loktak	1983	105
3.	Salal I	1987	345
4.	Tanakpur	1992	120
5.	Salal-II (Unit-I)	1994	115
	Total		**865**

Some aspects of these projects are discussed as follows:

4.2 BAIRA SIUL HYDROELECTRIC PROJECT

4.2.1 Baira Siul Hydroelectric Project with an installed capacity of 180 MW (3 Units of 60 MW each) went into commercial production in April 1982, the time overrun being 75 months. Total cost of the project was Rs.148.34 crores as against the original estimates of Rs.20.49 crores (1970) and revised estimates of Rs.95.52 crores (1979). The construction cost per MW worked-out to Rs.82 lakhs.

Reasons for increase in cost over revised cost of 1979 are given below:-

Sl. No.	Reasons	Amount (Rs. in crores)	Percentage
1.	Price Escalation	09.23	17.4%
2.	Geotechnical/Design changes	23.79	44.9%
3.	Inadequate provision	05.32	10.0%
4.	Incidental Charges	13.87	26.2%
5.	Other	00.82	01.5%
	Total	**53.03**	**100.0%**

4.2.2 The following table shows the actual generation of power against installed capacity, firm capacity and target fixed by Central Electricity Authority (CEA) during last five years.

(Figures in M.U.)

Year	Installed Capacity	Firm Capacity	Targets	Actual
1989-90	1576.80	920.00	750.00	662.25
1990-91	1576.80	920.00	750.00	756.09
1991-92	1734.48	920.00	750.00	826.92
1992-93	1734.48	920.00	750.00	830.01
1993-94	1734.48	920.00	750.00	609.00

The firm capacity assessed by the Company was only 58.34 per cent of the installed capacity; which was also not achieved. The targets were fixed only at 81.52 percent of firm capacity. Generation targets were not revised even after the installation of modified runners (April, 1991) which upgraded the installed capacity from 180 MW (1576.80 MU) to 198 MW (1734.48 MU).

The Management stated that targets are approved by CEA, an independent agency taking into account various factors like inflow of water, silt ejection and grid requirement of the region. Further, the assessed power potential of the project was lower because actual inflow of water was lower than the anticipated inflow which was worked out on inadequate data.

4.2.3 The presence of high quartz and silt content in the water was causing damage to underwater components of generating units which led to frequent repairs and excessive down time. No schedule was laid down by the Management for planned maintenance of turbines. To overcome this problem it was decided to renovate/modernise the project. Accordingly modified runners were installed in all the three generating units during the years 1989 to 1991, and the capacity was uprated from 180 MW to 198 MW at a cost of Rs.923.88 lakhs.

Ministry/Management, stated (April 1993) that schedules were being laid down for planned maintenance of turbines every year; since 1991-92 it was being ensured that major maintenance of units was completed within 70 days.

4.3 LOKTAK PROJECT

4.3.1 The construction work of the Loktak Project was taken up in 1971 by the Ministry of Energy and transferred to the Company from 1st January 1977. The cost of the project was met by the Government of India in the form of equity and loan in the ratio of 1:1. The original estimate of Rs.10.90 crores was sanctioned in 1970 and the project was to be completed by 1973-74. These estimates were revised repeatedly on account of escalation in cost, change in design and increase in quantities. The project was finally completed in March 1983 at a cost of Rs.124.83 crores; thus the construction cost per MW worked out to Rs.119 lakhs. The time overrun was 110 months. The cost overrun of Rs 113.93 crores was for different reasons as indicated below:-

Sr. No.	Reasons	Amount (Rs. in crores)	Percentage
1.	Price Escalation	29.26	25.7%
2.	Geotechnical reasons	62.95	55.3%
3.	Inadequate provision	10.03	08.8%
4.	Natural calamities	11.69	10.2%
	Total	113.93	100.00

4.3.2 According to the project report (1967) the project was to have two units of 35 MW each; later one more unit of 35 MW was envisaged. All the three units were commissioned in April/May 1983 and commercial generation started on 1st June 1983.

The project suffered a setback due to heavy rainfall on 25th July 1983, when a portion of the tunnel collapsed resulting in stoppage of generation. This necessitated re-routing of the tunnel and other remedial measures which were carried out at a cost of

Rs.413 lakhs. In addition, abandonment of tunnel, which had collapsed, resulted in loss of Rs.71.75 lakhs.

The project also suffered loss of generation of power (378 MU) valuing Rs.1682 lakhs from 25th July 1983 to 5th August 1984 on account of the collapse of the tunnel.

An enquiry committee set up to investigate the tunnel collapse observed as under:

a) Geologists had specifically brought out the necessity for taking surface protection measures in the slopes where tunnel was on low cover. Possibility of the cover over crown being washed away from overburden movements over the years was foreseen. This aspect did not appear to have been taken note of by the project or designers till the accident.

b) The project authorities had to be provided with detailed instructions on the procedure to be adopted in an emergent situation, like immediate emptying of the water conductor system.

c) The commissioning of the project in April 1983 was preceded by a Technical Advisory Committee's meeting to finalise the filling schedule and other connected matters. There was, however, no discussion among designers, geologists and the project team on the aspect of design and construction of tunnel lining in the low cover and "no rock reaches".

d) The Loktak Project was taken over by the Company on 1st January 1977. No briefs on the status of the Project, specifically the design aspect seem to have been prepared at that time.

4.3.3 The performance of Unit III was very poor; hence it was dismantled on the recommendation of the Technical Advisory Committee (April,1986) and was recommissioned in March 1987. Though the performance after recommissioning has

improved in comparison to earlier years, it is still not satisfactory. The recommissioning has resulted in additional expenditure of Rs.50 lakhs.

4.3.4 The following table shows the actual generation of power against installed capacity and target fixed by CEA during the last five years.

(Figures in M.U.)

Year	Installed Capacity	Firm Capacity	Targets	Actual
1989-90	919.80	448.00	410.00	449.29.
1990-91	919.80	448.00	410.00	473.26
1991-92	919.80	448.00	410.00	544.21
1992-93	919.80	448.00	410.00	545.56
1993-94	919.80	448.00	410.00	617.00

The targets fixed by CEA were achieved in all the years. In most of the years the actual generation was much higher than the targets fixed by CEA being only 45 percent of installed capacity.

4.4. SALAL-I PROJECT

4.4.1 Salal Hydro-electric Project, located at the Dhyangarh loop of river Chenab about 100 kms. from Jammu, was originally approved and taken up as a State Project at an estimated cost of Rs.55 crores. In August 1970, the project was taken over by the Government of India for execution as a central project; it was handed over to the Company for execution on "Agency Basis" on 15th May,1978 and finally on 1st November, 1987 was transferred on ownership basis.

4.4.2 The project, as approved by the Planning Commission in 1970, envisaged an installed capacity of 270 MW (3x90 MW) in the first stage with an ultimate capacity of 540 MW (6x90 MW). The installed capacity of the project was enhanced from 270 MW to 345 MW (3 x 115 MW) in Stage I and 690 MW in Stage II by increasing the head for the

turbines from 81 metres to 93 metres. Exploitation of this additional head necessitated shifting of the power house. The project estimate was accordingly revised in September 1976 to Rs.222.15 crores for Stage I. These estimates were revised repeatedly and finally all the three units (3x115 MW) of Stage 1 were commissioned in November 1987 at a cost of Rs. 583.57 crores. Hence the construction cost per MW of installed capacity worked out to Rs.169 lakhs. There was an increase of 163 percent in cost over first revised estimates amounting to Rs.361.42 crores. Reasons for the escalation in cost are given below:-

Sl. No.	Reasons	Amount (Rs.in crores)	Percentage
1.	Price Escalation	115.72	32.0%
2.	Geotechnical factors variance	44.74	12.4%
3.	Change in design & plan variance	57.57	15.9%
4.	Inadequate provision	45.52	12.6%
5.	New Items	87.85	24.3%
6.	Others	10.02	02.8%
	Total	**361.42**	**100.0%**

4.4.3 The following table shows the actual generation of power against installed capacity, firm capacity and target fixed by CEA during last five years.

Figures in M.U.

Year	Installed Capacity	Firm Capacity	Targets	Actual
1989-90	3022.2	2243.5	2038	2321.58
1990-91	3022.2	2243.5	2038	2388.11
1991-92	3022.2	2243.5	2038	2195.98
1992-93	3022.2	2243.5	2038	2098.20
1993-94	3022.2	2243.5	2038	1727.00

Initially the performance of the project was good in comparision with the targets fixed by CEA. In 1989-90 and 1990-91 actual generation was even higher than the firm capacity; however power generation has shown a declining trend during 1991-92, 1992-93 and 1993-94. The targets fixed by CEA were only 67 and 91 percent of the installed and firm capacity respectively.

4.5 TANAKPUR HYDROELECTRIC PROJECT

4.5.1 The Tanakpur Project located on river Sharda, in Nainital District of Uttar Pradesh was at an advanced stage of investigation with the Uttar Pradesh Government at the time of its formal transfer to the Company in 1981. The remaining investigation works were carried out by the Company in co-ordination with the U.P. Irrigation Department (UPID). The detailed project report provided for an installed capacity of 120 MW (3x40 MW) . The project envisaged the utilisation of the head of 27 Metres available between the barrage site at Tanakpur and the existing Sharda canal and was expected to generate 525 MU of power per year. However, due to significant changes in design, the head got reduced to 24 Metre with consequent reduction in generation of power by 65 MU per year, about 12% of the projected generation:

4.5.2 In the original proposal (August 1984) the project was scheduled to be commissioned by November 1988 with an estimated cost of Rs.185.85 crores. Subsequently, the commissioning schedule was revised and the generators were finally

synchronised in March and April 1992 with the total cost of Rs. 401.03 crores. The construction cost per MW of installed capacity worked out to Rs.334 lakhs. There was a time overrun of 40 months and cost overrun of Rs.215.18 crores being 116 percent of the original estimates.

The reasons for escalation in cost are given below:

Sl. No.	Reasons	Amount (Rs. in crores)	Percentage
1.	Price escalation	50.91	23.70%
2.	Change in Scope/ Under estimate,	48.19	22.40%
3.	Statutory reasons	3.15	01.50%
4.	Incidental Charges	95.59	44.40%
5.	Other	17.34	08.00%
	Total	**215.18**	**100.00%**

The original milestones slipped because of the following reasons:

- The acquisition of land was delayed by 4 years and 6 months.
- The land for compensatory afforestation was identified late by the State Government, thereby delaying the acquisition of forest land required by the project. There was also considerable delay in acquisition of Defence land belonging to MES.
- Large variation in the scope of diversion and dewatering arrangements to suit the site condition encountered in the course of construction of the barrage and power house.
- Refixing of the alignment of Tail Race Channel (TRC) which took nearly 3 years.

- Poor performance of the contractor entrusted with the construction of the barrage.

The Ministry stated (April 1993) that the original schedule (4 years) of the project was extremely tight considering the national average of completion of hydro projects ranging from six to eight years.

4.5.3. In the detailed project report the generation cost per unit was estimated at 35.43 paise but the actual generation cost worked out to 119.15 paise. The increase in the cost of generation was attributed to the following causes:

a) Reduction in pond level to avoid submergence of Nepalese territory, led to head reduction which resulted in significant loss of generation.

b) Re-alignment of Tail Race Channel.

c) Provision of 12 per cent free power to the home state in accordance with Government's directive of 1.11.90 (as against the earlier provision of 1.5 paise per Kwh as royalty) loading the cost by an additional 12.80 paise per Kwh.

d) Supply of 20 MU of power annually free of cost to Nepal in consideration of land to be utilised in the afflux bund.

4.5.4 **Realignment Of Tail Race Channel**

U.P. Irrigation Department (UPID) agreed to join the tail race channel (TRC) of Tanakpur H.E. Scheme into Sharda Canal. The work was entrusted to UPID itself (October 1985) at an estimated cost of Rs.20 crores as a deposit work. An advance of Rs.20 lakhs for the purpose was released during the years 1985-87.

Subsequently (September 1987) UPID backed out and held that the Sharda canal could not be disturbed. It was decided to realign the TRC, resulting in loss of generation of power to the extent of 41.86 million units and reduction in the efficiency of the turbines.

This led to a recurring loss of revenue of Rs.607.35 lakhs per annum. Further, due to the change in the alignment of the TRC the foundation of the power house had to be raised by 3 Metre by filling the excavation already made with plain concrete to achieve the required foundation level, resulting in an expenditure of Rs.18.52 lakhs on filling apart from the wasted expenditure on excess excavation.

The Ministry stated (April 1993) that the TRC had to be realigned as UPID expressed their inability to close the canal for its regradation and other works; it was also decided that the TRC of Tanakpur Project would be connected to Sharda river upstream of Sharda barrage to ensure the agreed supply of water to the Nepal irrigation system. The Ministry further stated that since realignment of the TRC was to discharge in the Banbassa reservoir, the head loss varied from 1.9 metres to 3 Metres due to variation in the Banbassa reservoir level which resulted in the loss of generation of 35 MUs per year.

4.5.5 **Design Deficiencies in Power Channel.**

The operation of filling and raising of water level met with difficulties/distress (June 1992) in the power channel and forebay. Excessive seepage at various outlet ends, cracking/subsidence of panels, and wasting out of materials through drains were observed.

A Committee of Experts had earlier (April 1992) expressed the apprehension that the weak silty sand layer in the foundation of embankment of the channel not only had a tendency to cause further reduction in the factor of safety, but may also promote catastrophic failure due to piping and liquefaction on further saturation of silty sand layer in the foundation.

The Technical Advisory Committee (TAC) observed (June 1992) that seepage of water was through the joints as the joint filling material was not sufficiently elastic to take care of adjustments during filling of the channel.

The remedial/rectification works were carried out at a cost of Rs.48.59 lakhs (upto September 1992). Besides, the outlet drains with precast reinforced cement concrete boxes which had been laid according to design and which were considered mainly responsible for seepage, had to be plugged rendering the expenditure of Rs.6.16 lakhs incurred on them infructuous. Thus, design defects in the power channel resulted in an avoidable expenditure of Rs.54.75 lakhs.

The Ministry, stated (April 1993) that at the planning stage, the question of type of material to be used came up for consideration. Generally a clay core was provided in the embankment to control the seepage. However, since clay material was not locally available riverbed material (RBM) was decided to be utilised with LDPE film under the lining. Drainage arrangement to direct the seepage flow through the drainage system was provided to take care of sudden draw down conditions. Due to the process of consolidation of embankment material, during the first filling operation and during the monsoons, lining panels got disturbed leading to excessive seepage through lining joints and adversely affecting the under drainage system. It was decided as a matter of abundant caution, to plug the under drainage in the power channel reach and at entry in forebay areas.

It appears from the Ministry's reply that :

(i). the minimum time required for consolidation of embankment material was not allowed partly because of the late start of work on the power channel owing to delay in acquisition of land and partly due to haste in commissioning of the project by the scheduled date of March 1992 and

(ii). a complete study was not carried out before deciding on the provision of the drainage system as regards the type of material used in the embankment and its effect on the drainage system.

4.5.6 **Avoidable payment of dewatering charges**

Construction of barrage, head regulator and other related works of Tanakpur project was awarded (October 1986) to Hindustan Steel Works Construction Ltd. (HSCL) at a total estimated cost of Rs.24.73 crores. The contractor was to complete the entire job by January 1989. The scheduled date of completion was, however, revised to December 1989 but it was actually completed in January 1992.

HSCL's performance was not satisfactory during the entire period of execution of work due to their resources constraint, insufficient cash flow for meeting their liabilities for works, establishment and supplies of construction materials, poor serviceability of equipment brought to the site and installation of innumerable small diesel and electric pumps instead of bigger ones of better efficiency. Despite financial and other assistance from the Company HSCL's performance continued to be far from satisfactory. (Dewatering charges in the case of HSCL worked out to be 16.78 per cent of the total payments made as against only 9.27 per cent in the case of another contractor T.R.G who was engaged on construction of a part of the barrage, head regulator and other appurtenant works).

The contract with HSCL provided as under:

- Contractor was to complete all the works which need dewatering operation in two working seasons, first starting from October 1985 ending June 1986 and second starting from October 1986 ending June 1987.

In case of failure to complete the work which needed dewatering within the scheduled time, the cost of dewatering was to be borne by the contractor unless the contractor was forced to continue dewatering for reasons beyond his control.

As slippage in time was solely due to reasons attributable to the contractor, the payment of dewatering charges beyond 18 months amounting to Rs. 2.97 crores lacked justification.

The Ministry, stated (April 1993) that TRG were awarded the work of 5 bays while HSCL had 17 bays. Dewatering in the TRG portion was done over a period of 27 months and in case of HSCL over a period of 54 months. Increased dewatering work of HSCL was due to the diversion channel flowing adjoining the HSCL working area and the contractor was given time extension on grounds of delay not attributable to him.

The Ministry's reply is not tenable as the slow progress of work of HSCL was compounded by insufficient and inefficient pumps. The pumps deployed by HSCL lacked the capacity which was essential to complete the task of dewatering at the desired speed.

CHAPTER 5

IMPLEMENTATION OF ONGOING PROJECTS

5.1 As mentioned in chapter 2 NHPC has five on going projects - Chamera-I (3 x 180 MW), Dulhasti (3 x 130 MW), Uri (4 x 120 MW), Salal Stage II (3 x 115 MW) and Rangit (3 x 20 MW). Chamera-I has been synchronised and trial run started (April 1994). Dulhasti and Uri projects are being executed on turnkey basis by French and Swedish-British consortia respectively. Salal-II and Rangit projects are being executed by the Company itself. Unit-I of Salal-II project has been commissioned in July 1993 and Units II & III are under construction and Rangit project is in the early stages of construction. Some aspects of Dulhasti and Chamera-I projects are dealt with below;

5.2 DULHASTI HYDROELECTRIC PROJECT

5.2.1 The Dulhasti Hydroelectric Project located on the river Chenab in Jammu and Kashmir envisages installation of 390 MW generating capacity (3x130 MW). The annual energy generation from the project is estimated at 1928 million units.

5.2.2 Award of Contract

The project was initially approved by Government for execution with indigenous resources at a estimated cost of Rs.161.72 crores plus interest during construction of Rs.21.73 crores at March 1980 price level. However, keeping in view the acute power shortage in the country, the resource constraints and the need to induct the latest technologies, it was decided (August 1983) that the Dulhasti Hydroelectric project should be taken up with foreign assistance.

There were two unsolicited offers received from French Consortium (FC) and Indo-Austro-German Consortium (IAG). Government advised the company to accept the offer of FC for execution of the project at the basic quoted price of Rs.496.71 crores. However, no settlement could be reached on arbitration, frustration of contract, income

tax on FC's profit and customs duty liability on FC's construction equipment etc. Looking at the difficulties being encountered in reaching settlement with FC, the Steering and Negotiating Committee was authorised by Government (August 1988) to simultaneously open negotiations with the IAG Consortium also.

The Steering and Negotiating Committee in their Report of November 1988 observed as under:

- Under no circumstances the contract be awarded to FC as they would create controversies and disputes during the course of execution of the project leading to arbitration, extra claims, higher costs and inordinate delays in the completion of the Project.

- The evaluated price of FC based on their latest revised offer of 7th November 1988 was increased by Rs.231.11 crores as compared to the prices finalised with them in April 1986. There could be justification for some price increase due to escalation on off-shore portion but the entire increase in price cannot be justified. Increasing the prices at this stage was a most unethical act on their part. In fact, prolongation of negotiations by the French Consortium due to their indifferent and intransigent attitude had cost us very heavily due to appreciation in the foreign exchange rates and escalation in costs, etc. leading to an increase in the cost of the project.

The Committee therefore recommended that the offer of IAG Consortium, which were lower than that of FC by Rs.105.14 crores may be accepted.

After the submission of the report of the Steering and Negotiating Committee) F.C. submitted a further offer giving a price reduction of Rs.49.80 crores if the payments were made in Japanese Yen. Further they improved (December 1988) their financial package for

the project, by enhancing the grant element. Hence the net evaluated prices of FC became lower than the IAG offer by Rs.100.48 crores. There was nothing on record, however, to show that a similar opportunity was given to IAG, either to offer a concession for Yen payment, or to improve their financial package. The Department of Power constituted (February 1989) an informal group headed by its Secretary, to review the Report of the Steering and Negotiating Committee to ensure timely execution of the contract and to make recommendations on assurances/guarantees needed to be obtained from the consortia. The group recommended (April 1989) acceptance of the FC offer for turn-key execution of the Project.

After approval by the Cabinet Committee on Economic Affairs, the contract was awarded to FC in September 1989 at a basic contract price of 53060.637 million JY plus Rs.1575.3 million. In addition to this basic contract price, contingencies amounting to 3912.76 million JY plus Rs.150.19 million were envisaged in the contract. The price did not include corporate income tax, personal income tax, custom duty and other related taxes/duties, which were to be borne by the company. The project was scheduled to be commissioned in 57 months i.e. in June 1994.

5.2.3 **Post - award developments**

A tunnel boring machine (TBM) was commissioned by FC in April 1991 and was expected to bore at an average rate of 300 metres per month upstream of head race tunnel. As per the original schedule, excavation of 7565 metres of the tunnel was to be completed with the help of TBM by February 1993, but the work was suspended (May 1992) due to a major geological fault encountered in the tunnel when a progress of only 1200 meters had been achieved. FC suspended (August 1992) the relative contractual obligations on the ground of increased militant activities in and around Kishtwar town, which they claimed as a force-majeure event.

It was observed that :

i) Company/Government took more than 6 years to award the contract resulting in additional expenditure of Rs.271 crores besides delay in completion of the project and consequential loss of generation.

ii) No global bids were invited to ensure competitiveness in financial and commercial offers. By considering only two offers, the Company limited its options considerably.

iii) The apprehensions expressed by the Steering and Negotiating Committee against FC were overruled (April 1989) by an informal group and the contract was awarded to FC which ultimately led to the project being inordinately delayed and controversies arising as apprehended by the Committee.

iv) By emphasising only financially evaluated prices while comparing offers, the Company has landed in a situation where the work is lying suspended for almost 22 months.(March 1994).

5.2.4 **Reimbursement for pre-construction works**

Before award of the contract to the FC, the Company had made a beginning on some of the works like adits to inlet and outlet of head-race tunnel, excavation of diversion channel pilot tunnel and adit to surge shaft, etc. costing Rs.42.42 crores. The turnkey contract with FC provided that the cost of such civil works which fit into the design of the project as prepared by the contractor and approved by the company shall be reimbursed by the contractor but no final agreement in this regard had been arrived with FC even 3 years after handing over the site to them.

The Ministry stated (April 1993) that the amount of Rs. 42.42 crores was only a notional amount based on bill of quantity rates and had no relation to actual expenses or fitment in design of project. Pilot tunnel costing Rs.3.77 crores and building costing

Rs.0.40 crore did not fit into the design prepared by the contractor, hence no claim could be made.

5.2.5 Surplus inventory of steel

As on 31st March 1989, the project was having an inventory of 1256.80 tonnes of steel valuing Rs.120 lakhs which was procured during 1984 to 1987. After award of the project (September,1989) to the French consortium on turnkey basis, this steel became surplus. Even after transfer of some steel to other projects during the years 1989-90 to 1991-92, the project was still (December, 1993) left with an inventory of 648 tones of steel valuing Rs.60.00 lakhs, which was surplus to the needs of the project.

5.2.6 MANPOWER

The table below gives the number of men in position in different categories at the project.

		31.3.90	31.3.91	31.3.92	31.3.93	31.3.94
i)	Executives	71	79	81	83	74
ii)	Non-Executives	295	277	309	287	284
iii)	Work charged	768	583	555	574	569
	Total	**1134**	**939**	**945**	**944**	**927**

It was observed that:

a) After the award of the contract to the French Consortium on turn-key basis, the strength of executives increased from 71 to 83 (31-3-1993) and non executives from 277 to 309 (31-3-1992) despite the reduced scope of work for employees.

b) The strength of workcharged labour decreased from 768 to 555(31-3-1992) but there was hardly any work to be done even by the reduced strength.

The Ministry stated (April 1993) that 50 regular staff and 151 work charged staff were declared surplus and they were deployed to workshops, maintenance of stores etc. after imparting necessary training. It was expected that surplus manpower would be reduced after the Company's Golden Handshake Scheme was introduced.

5.3 CHAMERA HYDROELECTRIC PROJECT STAGE-I

5.3.1 The project envisages utilisation of water of Ravi river in Chamba District of Himachal Pradesh with a gross head of 207 metres. It is to have an installed capacity of 540 MW, comprising 3 Units of 180 MW each - the biggest hydro generating capacity units presently under installation by the Company. The project was handed over to the Company by the Ministry of Energy in September 1980.

5.3.2 The project was sanctioned by Government of India in April 1984 at an estimated cost of Rs.809.29 crores. Assistance of C$ 417.53 million through Canadian International Development Agency (CIDA) and Export Development Corporation (EDC) of Canada was also to be received.

The upper limit of assistance was C$ 648.42 million inclusive of consultancy charges. However, assistance worth C$ 287 million remained unutilised after execution of StageI of the Project.

5.3.3 The Government sanction of 1984 stipulated completion of Chamera-I in six years i.e. by March 1990. There was an initial delay of about eight months in execution of agreements with a Canadian firm and EDC/CIDA for financial packages and a delay of six months in obtaining various clearances from the Ministry of Environment. Unprecedented floods also resulted in disruption of work on the project. All the three units of the project were commissioned during 1994.

5.3.4 The unit cost of generation of energy was worked out to 169.44 paise per KWH at the grid station as against 75.90 paise per KWH envisaged in the project report.

5.3.5 **Delay in providing access to works**

The contract for construction of 3755 metres long Power Tunnel (upstream contract package) was awarded to a firm in September, 1985 at a total cost of Rs.1958.60 lakhs. The access to works was required to be provided by the Company. Since the access work was not completed by the time the award was made, Company asked the contractor to complete the access road for adit No.1 by December, 1985. But the contractor could not complete the approach roads by the end of 1985. Hence the Company made contingency arrangements by constructing a temporary bailey bridge across the river. This, however, got washed away during floods in May, 1986. On the advice of Canadian experts, work on adit No.1 at a new location was started in September, 1986 and completed in February, 1987. As a result of the Company's inability to provide the approach road in time, there was a loss of 13 months in construction time.

To keep up the revised commissioning schedule NHPC awarded the contract for construction of adit No.3 to Firm CCL in June 1988 at a cost of Rs.1.52 crores. The work which was required to be completed by December 1988, was completed in July 1989. Inspite of this additional expenditure, the power tunnel, initially scheduled to be completed by July, 1989 was still incomplete (December 1993). Provisional extention of time was granted till December, 1992 however, without levy of any penalty on the contractor.

The Ministry, stated (April 1993) that the work on construction of Chamera Project had begun with the concept of parallel development of infrastructural facilities alongwith the construction of main components to shorten the overall period of construction. But the problems of land acquisition and unstable hill slopes in the dam area delayed the construction of access roads considerably. The Ministry further stated that keeping in view the rate of progress and adverse geology of Face-3 it was proposed to construct a new Adit. Further the power tunnel could not be completed in time even after

construction of adit No.3 because of heavy floods encountered in September, 1988 and poor rock encountered in many reaches.

The fact remains, however, that the Company's failure to provide a regular access to adit No.1 on scheduled date resulted in loss of time of 96 months and also additional expenditure of Rs.1.52 crores.

5.3.6 **Defective construction techniques**

The excavation work which was started in February 1987 on Face 3 of power tunnel encountered the problem of collapse of ribs and subsequent creation of cavity and squeeze of tunnel section. As remedial measures, inclined supports were provided, and extra steel channels and girders were welded between the ribs. This, however, could not stop the deflections.

The Management attributed the failures to the following reasons:

- Parent rock was of poor quality. When charged with water it becomes slippery and there were no binding between the layers making the rock to come down or squeeze causing deflections.

- At some places indigenous 'I' Section of 250 x 125 mm size had been used which was a weaker section in comparison to 200x200mm 'H' Section as provided in the drawings.

The Canadian consultant of the project attributed (May 1990) the failures to the following causes:

- The face and arc had been left completely un -supported, possibly for days, while steel set support was being prepared.

- The rock in the right wall was allowed to relax along the cleavage planes, which are parallel to the right wall, until it collapsed down to the sloping legs of ribs and bent them.

The consultant recommended that the tunnel should be re-mined. The Company decided (December 1990) to re-mine Face-3 of the power tunnel; the work on this front was resumed from January, 1991 departmentally, the Management having already absolved the contractor from bearing the cost of rectification work. The Consultant further observed that the rectification work carried out departmentally was in a manner contrary to recommendations.

The Ministry stated (April, 1993) that excavation on Face-3 of the power tunnel had been done in extremely poor tunnelling medium on account of the rock composition. Due to such poor rock formation, ideal supporting measures of shortcreting and rock bolting could not be adopted and instead steel ribs and back filling were adopted as rock supports which was a time consuming process which eventually led to relaxation of rock. The consultant had recommended use of shortcrete and rockbolting as the main form of support for re-mining also and steel ribs were to be used at some places as required. However, during initial stages of re-mining work it was found that loose rocks were lying in some portions which would fall and injure the people working on the re-mining and, therefore, steel ribs had to be used for the entire length of re-mining as a safety measure.

Thus adoption of improper construction techniques on Face-3 of power tunnel resulted in an additional expenditure of Rs.594.28 lakhs on re-mining besides delay in completion of the tunnel.

5.3.7 **Loss due to non-payment of premium**

NHPC took (22.3.1985) a Contractors' All Risk (CAR) Insurance Policy for an amount of Rs.7.28 crores in respect of civil works for a period of 86 months from 1.12.1984. The project suffered a loss of Rs.131.05 lakhs due to floods in March, July and

September, 1988. Since the Company had not paid the half-yearly instalments of premium in time, the insurance company accepted (April 1992) only partially the claims of the Company for losses to civil works. The insurance company agreed to settle the claim in proportion to premium paid before occurence of loss.

The Ministry stated (April, 1993) that the decision of the insurance company was not accepted on the plea that policy had been running continuously and slippage in payment of an installment should not jeopardise the company's position. The matter was still under discussion (March 1994).

The fact remains, however, that failure on the part of the Company to pay half yearly instalments of premium in time jeopardised the right of the company to a claim of Rs.131.05 lakhs.

5.3.8 **Loss due to failure to insure a bridge**

The company had constructed, across the river Ravi at a cost of Rs.62.52 lakhs, a bailey bridge which was completely washed away in the floods of September 1988.

As roads, bridges, etc. were excluded from the insurance coverage under Contractors' All Risk (CAR) policy the loss could not be recovered from the insurance company.

The Ministry stated (April, 1993) that it was a conscious decision taken by the management not to include office buildings, residential colonies, schools, dispensaries, hospitals and roads in the purview of the CAR policy as these assets were unlikely to suffer any damage/loss during construction period; hence the bailey bridge was not covered under the CAR policy.

The reply of the Ministry is not tenable as a bridge is a distinct item and not the same as a road and it should have been covered under the insurance policy as there was a

probability of damage during construction. Thus, the project suffered a loss of Rs.62.52 lakhs due to failure to insure the bridge.

5.3.9 CHAMERA STAGE-II

As mentioned in Para 5.3.2 Canadian $ 287 million remained unutilised from Stage-I of the project. In March 1987, Government of India approached the Canadian Government for diversion of this amount to Stage-II of the project.

The two Canadian development agencies (CIDA & EDC) offered (August, 1987) assistance upto C$ 310 million (CIDA: C$ 108.50 million and EDC: C$ 201.50 million) on a pro-rata basis of 65% (EDC) and 35% (CIDA) subject to the payment of 0.5% commitment charges on undisbursed amounts of assistance. Despite extension/revision of offers made by these agencies from August 1987 to September 1992, Goverment of India did not take any decision regarding acceptance or otherwise of the offer. In August, 1992, CIDA withdrew its offer of assistance, which included an offer of increasing the grant component of the assistance from the current 35 percent to 38 percent.

Ultimately Government decided to adopt multilateral financing for the project and the Company invited international bidding for execution of the project in January, 1993. Negotiations on technical bids were in progress (December, 1993). Hence an expenditure of Rs.13.05 crores incurred upto March, 1993 on the basis of CIDA/EDC consultancy projections on creation of infrastructure facilities also remained unproductive (December, 1993). An amount of C$ 4.60 million (Rs.8.23 crore) was paid by the Company as commitment charges to EDC upto September, 1992.

Thus Government's delay in taking a decision led to avoidable expenditure of Rs.21.28 crores and also set the clock back on the progress of the project. Further an annual expenditure of Rs.50 lakhs was being incurred on manpower employed for Stage-II though no work was going-on at the project site.

CHAPTER - 6

FINANCIAL PERFORMANCE

6.1 The Company was incorporated with an authorised capital Rs. 200 crores which was increased to Rs. 2500 crores as on 31st March, 1994. The table below summarises the financial position of the company under broad headings for the five years ending 31st March, 1994:

(Rs. in crores)

PARTICULARS	1989-90	1990-91	1991-92	1992-93	1993-94
A.Capital & Govt. fund for Equity	1537.68	2045.33	2322.53	2632.48	2832.48
B.Reserves & Surplus	189.25	241.92	291.22	332.71	398.25
C.Borrowings	1589.69	1841.38	2325.21	2612.97	3315.58
D.Current Liabilities and provisions	297.94	395.14	416.38	344.65	332.89
Total	**3614.56**	**4523.77**	**5355.34**	**5922.81**	**6879.20**
E.Net Fixed Assets including capital work-in-progress.	2925.05	3813.76	4857.81	4981.73	5829.62
F.Current Assets, Loans & Advances.	688.09	709.97	497.53	937.95	1045.02
G.Misc. Expenditure Capitalised	1.42	0.04	---	3.13	4.56
Total	**3614.56**	**4523.77**	**5355.34**	**5922.81**	**6879.20**
Capital employed	1501.12	1549.23	1312.64	1556.42	2024.88
Net worth	1701.16	2278.86	2556.10	2862.92	3085.08
Net worth to paid up capital	1.11	1.11	1.10	1.09	1.09
Debt equity ratio	0.92	0.81	0.91	0.91	1.07

WORKING RESULTS

(Rs.in crores)

PARTICULARS	1989-90	1990-91	1991-92	1992-93	1993-94
Earnings	211.20	247.49	269.71	184.22	238.65
Expenditures	157.66	194.76	219.87	141.87	170.96
Profit for the year	53.54	52.73	49.84	42.35	67.69
Percentage of net profit to earnings	25.35%	21.32%	18.48%	22.99%	28.36%
Percentage of net profit to capital employed	3.57%	3.40%	3.80%	2.72%	3.34%
Percentage of earnings to capital employed	14.07%	15.98%	20.55%	11.84%	11.79%

The earnings, expenditures and profit for the year 1992-93 were reduced as compared to previous years because transmission lines of the company were transferred to the Power Grid Corporation with effect from 1st April, 1992.

Generation of internal resources was almost negligible. Profit earned was almost locked up in sundry debtors, which at the end of the 5 years ending 31st March 1994 were as follows

(Rs. in crores)

As on	Sundry Debtors
31st March 1990	208.34
31st March 1991	147.80
31st March 1992	198.66
31st March 1993	191.79
31st March 1994	250.80

6.2 Financing Pattern

The Company executes various kinds of projects which differ primarily in their financing pattern. These are described below:-

6.2.1 Hydroelectric projects and associated transmission systems

The policy of the Government of India was that release of the funds to Central Government Corporations, executing various projects, were to be in the form of equity and loan in the ratio of 1:1, of which equity was to be released first.

The procedure regarding releases of funds for execution of projects was being strictly followed till 1985-86. From 1986-87, the Company was directed to raise a part of the funds required through loans and by issue of bonds also. In the case of Chamera Project (Stage-I) the Company took (in 1984) direct loans from foreign financing agencies as well.

6.2.2 **Investigation Projects**

The investigation projects are financed by Government of India. Of the 12 projects taken up for investigation by the Company to date grant-in-aid of Rs.1923 lakhs for 10 projects has been received from Government.

6.2.3 **Agency works**

Certain Government Projects were allotted to the Company for execution on agency basis i.e. the expenditure on these projects alongwith Company's overheads were met by Government. Salal Project in J & K was financed by Ministry of Energy and Devighat Project, Nuwakot HE Project & Trishuli Power Resources Investigation Works, Nepal, by Ministry of External Affairs.

6.2.4 **Deposit works and inter-State transmission Lines**

The Company was executing two types of deposit works:

(i) Deposit works (mainly inter-State transmission lines) were allotted to the Company by Central Government for which expenditure was released as loan to the concerned State Government and funds were passed on to the Company. On these deposit works, the Company charged 2 per cent overheads in addition to the actual expenditure including site establishment.

(ii) Deposit works were also allotted to the Company by other public sector undertakings and State Governments which reimbursed the Company actual expenditure plus certain fixed overheads.

Management of transmission lines of NHPC was transferred to Power Grid Corporation of India from 19th November, 1991. From 1st April, 1992, right, title and interest in transmission lines excepting those in the State of J&K vest in Power Grid Corporation of India Limited after promulgation of an ordinance on 8th January, 1993.

6.3 **Funds constraint**

6.3.1 The operations of the Company involve large capital outlays. The generation of internal resources is dependent upon completion of the projects which in turn is dependent upon availability of funds. Initially funds were made available by Government of India by way of equity & loans but from 1986 the Company was asked to raise funds by secured, non-convertible redeemable bonds through public issue and by private placement with financial institutions.

6.3.2 The Company was facing a funds constraint due to reduced budgetary support and weak market response towards bond issues. Repayment liabilities of loans and interest will also be very heavy during the next few years as shown below.

(Rs. in Crores)

Year	Loan Repayment	Interest	Total
1994-95	118.14	209.64	327.78
1995-96	159.16	199.31	358.47
1996-97	231.14	192.62	423.76
1997-98	572.28	162.31	734.59

Further the Company requires Rs.5200 crores for completion of ongoing schemes during the VIIIth plan period. **6.3.3** The Company expects to raise the money required for the repayment of loan and interest through issue of bonds. The heavy dependance (80%) on bonds and external commercial borrowings may affect the progress of ongoing projects. The Company could raise only Rs. 59 crores out of a public issue of Rs. 500 crores in 1992-93, however, during 1993-94 its public issue of Rs.500 crores was oversubscribed and the allotment is still under finalisation (April, 1994).

6.3.4 The Company does not envisage any new projects during the VIIIth Plan which would preclude the achieving of the target of higher hydel capacity even by the end of the corporate plan period.

CHAPTER - 7

TARIFF POLICY

7.1 The Company is engaged in generation of power for which the components of expenditure are more or less of a fixed nature excepting for some portion of O & M expenses. For the purpose of working out the tariff, the rate for a unit of energy is arrived at by adding the budgeted O & M expenses, depreciation, interest on loan, interest on working capital (two months requirement on O & M charges), 1.5 paise per unit compensation to Home State and fair return (i.e. 10 to 12 per cent on equity capital) and dividing by the actual saleable units of energy.

By adopting actual saleable energy for the purpose of calculation of tariff, cost of efficiency or inefficiency is passed on to the beneficiary States/State Electricity Boards. To formulate principles and normative parameters for working-out tariff for sale of power a Committee headed by Shri K.P.Rao was set up, which gave its recommendations in June, 1990, on which NHPC had some reservations. CEA was engaged in working out the tariff leviable in accordance with the formula given by the K.P.Rao Committee .

7.2 The Company is required to enter into contractual agreements with the beneficiary State Electricity Boards for the sale of power from its projects. The present status of the agreements with various respective beneficiaries is given below :

a. **Baira Siul** — Agreements between the Company and PSEB/HSEB for the period from January 1983 to 31st December 1987 were signed in June 1983. There were no subsequent renewals. Agreement with HPSEB could not be signed pending settlement of the disputes about profit sharing, etc. Agreement with DESU for the above period was signed only in April 1990.

b. **Loktak** — No agreements had been signed with the beneficiary States.

c. **Salal** No agreements with the beneficiaries (J&K, Haryana and Punjab) have been signed because of non-finalisation of certain issues relating to tariff.

Wherever tariff agreement have not been signed with the beneficiary States tariffs have been fixed on a provisional basis.

CHAPTER - 8

MANPOWER

8.1 The sanctioned strength of NHPC is 1753 executives & 6215 non-executives against which men-in-position are 1437 executives & 4404 non-executives. In addition 9000 men are in employment on work- charged basis.

8.1.1 The Company normally employs unskilled staff for construction activities. These workers become surplus once the project is completed. Taking into account the fact that 75 per cent of the surplus manpower was of the un-skilled/semi-skilled categories which could not be gainfully redeployed in the new projects on account of practical difficulties/geographical constraints. A liberalised voluntary retrenchment scheme approved by the Bureau of Public Enterprises (BPE) was introduced in Baira Siul and Loktak Projects, but the Company has not been able to retrench/deploy the surplus manpower. The incidence of expenses on surplus staff was Rs. 3928 lakhs from 1984-85 to 1992-93. The details of surplus manpower in different Project were as follows.

Categories	Baira Siul	Loktak	Salal	Total
Supervisory/ skilled	79	107	618	804
Semi skilled	274	199	712	1185
Un-skilled	12	464	701	1177
Total	**365**	**770**	**2031**	**3166**

The policy of the Company is to transfer to Head Office the cost of surplus staff which in turn is distributed over all the projects as Head Office expenses.

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8.2 TRAINING

Proper operation and maintenance of hydroelectric plants are of paramount importance for efficient and safe running of the plant and also for the satisfactory operation of the power system. The Company set up a temporary training institute in January 1986 at Baira Siul Project. A total expenditure of Rs.7.73 lakhs was incurred on setting up and operating the institute which imparted training to 79 workers only in three different courses. The institute was closed in September. 1988. A Committee set up to prepare a detailed project report for establishing an institute at Salal, gave its recommendations in 1991 but these could not materialise because of financial constraints.

R Chandra

New Delhi
The 4 MAY 1995

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

Countersigned

New Delhi
The 4 MAY 1995

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