Chapter II

2. Performance review relating to a Government company

Orissa Hydro Power Corporation Limited

Operation and Maintenance Activities

Executive summary

In pursuance of the Orissa Electricity Reforms Act, 1995, the Company was incorporated in April 1995 with the main objective of carrying on the generation of hydropower and maintenance of hydro power stations. It has six hydro power stations with aggregate installed capacity of 1,877.50 MW besides share of 34.50 MW in Machkund Hydro Power Station, a joint venture project. The peak hour and off-peak hour demand in the State for the year 2008-09 was 3,021 MW and 1,931 MW respectively against which the installed capacity of power in the state was 2,332 MW. During 2008-09, the total energy drawal was 19,398 MU from different sources including 5,692 MU from hydel power. The Operation and Maintenance activities of the Company were reviewed to assess the adequacy in planning of the Company with regard to future requirement, utilisation of generating capacity as well as water resources in an economical, efficient and effective manner, generation of energy upto the optimum level, timely Renovation, Modernisation and Uprating of the existing units and reservoirs and adequacy of internal control and management of various activities.

Planning of the Company with regard to future requirement

The Government of Orissa (GoO) identified (August 2007) nine hydro power projects of 1,500 MW installed capacity through joint venture with National Hydro Power Corporation Limited and the Company on which further action is awaited. Though the Company planned for capacity addition of 2,171 MW during the Eleventh Plan period in four projects, extension of Balimela Hydro Electric Project (BHEP) (150 MW) was completed by January 2009 and the possibility of addition of balance 2,021 MW during the Eleventh plan period is remote. Further, the capacity addition of 320 MW planned to establish Sindol I, II, III hydro power projects is not executed as Detailed Project Report has not been prepared so far (September 2009). There was unfruitful capacity addition at a cost of Rs. 206.07 crore in BHEP and wasteful expenditure of Rs. 37 crore on Potteru Small Hydro Electric Project.

Utilisation of generating capacity and water reservoir

Though, the achievement against target of the Company for generation was satisfactory yet, the actual generation in four generating stations was less than the design energy resulting in loss of Rs. 71.63 crore. The machine availability of the Company during 2004-09 ranged between 62.75 and 93.90 per cent. Due to non-availability of normative machine hours the Company failed to recover capacity charges of Rs. 15.52 crore during 2005-09 besides non-receipt of incentive of Rs. 16.98 crore from GRIDCO Limited. The Company sustained avoidable generation loss of 4,274 MU valued at Rs. 156.05 crore during 2004-09. As against availability of 2,72,727 MCM of water for generation, the Company could utilise only 1,39,779 MCM (52.25 per cent). The Company did not claim Rs. 28.49 crore from 18 industrial units towards drawal of water from the reservoirs during 2004-09.

Generation of energy upto optimum level

The gross generation during 2004-09 ranged between 5,030 MU and 7,850 MU. The auxiliary consumption was excess by 19.66 MU over the norms fixed by CERC resulting in loss of Rs. 42.44 lakh. The transformation loss was in excess of the norm by 355.28 MU resulting in loss of Rs. 13.39 crore.

Renovation, Modernisation and Uprating (RMU)

The Company did not make any plan for RMU of five units of BHEP which outlived their normal economic life. The upgradation of one unit of Hirakud Power System (HPS), Burla was not effective resulting in generation loss of 6.06 MU per annum. Due to indecisiveness of the Company, the RMU of unit 5 and 6 of HPS, Burla and unit 3 of HPS, Chipilima was not completed till date (July 2009).

The Operation and Maintenance (O&M) expenses was excess over the norms fixed by Orissa Electricity Regulatory Commission (OERC) which ranged between Rs. 12.36 crore and Rs. 94.13 crore during 2006-09. The Company had not standardised the formats for the monthly performance reports and load reports.

Internal Control and Management

The Company failed to comply with CEA regulations with respect to installation and operation of meters. It sustained interest loss of Rs. 3.07 crore during 2004-09 due to blockage of fund in excess inventory. The contract management, environment management and internal control system of the Company was also inadequate. The manpower management of the Company was deficient since its technical manpower position was less than the norms while the non-technical manpower position was higher than the norms fixed in the National Electricity Plan of April 2007.

Conclusion and Recommendations

Proper planning by the Company could have enabled it for capacity addition of 2,341 MW. With proper preventive maintenance and water management, the Company could have generated 9,064 MU during 2004-09. The review contains five recommendations which includes increasing the installed capacity and reducing operating and maintenance expenditure.

Introduction

2.1 In Orissa, the peak hour and off-peak hour demand for the year 2008-09 was 3,021 MW and 1,931 MW respectively against which the installed capacity of power in the State was 2,332 MW. In addition the State's share in central sector power stations was 905 MW. During 2008-09 total energy drawal was 19,398 MU from different sources including 5,692 MU of hydel power.

The Orissa Hydro Power Corporation Limited (Company) was incorporated (21 April 1995) in pursuance of the Orissa Electricity Reforms Act, 1995 with the main objective of carrying on the generation of hydro power and maintenance of hydro power stations in the State. As on 31 March 2009, the Company had six[*] hydro power stations with an aggregate installed capacity of 1,877.50 MW. Besides, the Company also has a share of 34.50 MW in

[*] Balimela (360 MW – excluding 150 MW earmarked for peak hour demand), Hirakud Power System consisting of Burla (275.5 MW) and Chipilima (72 MW), Rengali (250 MW), Upper Indravati (600 MW) and Upper Kolab (320 MW).

Machkund Hydro Power Station, which is a joint venture project of the Governments of Orissa and Andhra Pradesh.

The Management of the Company is vested in a Board of Directors (BoD) comprising the Chairman-cum-Managing Director (CMD) and nine Directors appointed by the Government of Orissa (GoO). The day-to-day operations are carried out by the CMD, who is the Chief Executive of the Company, with the assistance of a Company Secretary, Director (Finance and Human Resource Development) and Director (Operation) at the Corporate Office and six Senior General Managers (GMs) stationed at the six hydro power stations.

Scope of Audit

2.2 The Performance Audit conducted during March to June 2009 covered the operational efficiencies of all the six generating units, planned and routine repair and maintenance of generating stations, renovation, modernisation and uprating of generating stations, dam maintenance, operation and maintenance expenditure, inventory management, contract management, water management, manpower management and environment management, relating to the five years ending 31 March 2009.

Audit objectives

2.3 The Performance Audit was conducted with a view to assess whether:

- the planning of the Company with regard to future requirement was adequate and plans were implemented efficiently;
- the Company had utilised the generating capacity as well as water resources in an economical, efficient and effective manner;
- the Company generated energy upto the optimum level;
- the Renovation, Modernisation and Uprating (RMU) of the existing units and reservoirs was taken up timely; and
- the Company's internal control and management was adequate with regard to various activities.

Audit criteria

2.4 The audit criteria adopted for assessing the achievement of the audit objectives were:

- Hydro electric potentiality in the state as assessed by Central/State Government authorities and its adequacy in meeting the requirement of the State;
- Five year/annual plans of the State Government and the Company for the period under review, targets and achievements, annual budgets for capital and revenue expenditure;

- Procurement policy and standard principles of material management of the Company;
- Detailed Project Reports (DPRs) and performance reports of power stations;
- Approved policy for repair and maintenance of dams/reservoirs/canals, etc.;
- Central Electricity Authority (CEA) guidelines, orders of Orissa Electricity Regulatory Commission (OERC), Central Electricity Regulatory Commission (CERC) and State Load Despatch Centre (SLDC);
- Study on manpower requirement; and
- Rules and regulations for environment protection.

Audit methodology

2.5 The audit methodologies adopted for achieving the audit objectives with reference to audit criteria were:

- Examination of records of the Company, Department of Water Resources (DoWR) and Energy Department regarding availability of water resources and maintenance of dams and reservoirs;
- Examination of long term as well as short term plans of the Company for generation, renovation and modernisation of units including capacity expansion;
- Scrutiny of records relating to generation, auxiliary consumption and export of power to the grid including Power Purchase Agreements (PPAs), orders of OERC, CERC, CEA, SLDC, etc.;
- Minutes of BoD and agenda papers;
- Scrutiny of monthly/daily performance reports of the units, maintenance reports, unit log books, meter reading statements, etc;
- Scrutiny of records regarding procurement of plant and machinery, equipment, stores and spares and other inputs; and
- Interaction with the Management and issue of audit queries.

Audit findings

2.6 Audit explained the audit scope, objectives and methodology to the Company during an 'entry conference' held on 19 March 2009. Subsequently, audit findings were reported to the Company and the Government in September 2009 and discussed in an 'exit conference' held on 16 October 2009 which was attended by Additional Secretary, Energy Department of the State Government, Director (Finance) and Director (Operation) of the Company. The Government also replied to the audit findings in October 2009.

The views expressed by them have been considered while finalising this review. The audit findings are discussed below.

Long term planning

2.7 Hydro power is cheaper than thermal power. It is non-polluting and hence environment friendly. Thus, there is a need for development of hydro power stations in the State. The total installed capacity of the Company as on 31 March 2009 was 1,877.50 MW. The Government of Orissa identified (August 2007) the potentiality of developing 1,500 MW of hydro power in the State by installing nine[#] hydro power projects through joint venture with the National Hydro Power Corporation Limited (NHPC) and the Company as partners. Further action on these projects is awaited (August 2009).

The Company planned for capacity addition of 2,171 MW during the Eleventh Plan period in four projects comprising of extension of projects by 171 MW and establishment of a thermal power plant for 2,000 MW through a joint venture project with Orissa Mining Corporation Limited. Out of this, only the extension of Balimela Hydro Electricity Project (150 MW) was completed by January 2009. Thus, the possibility of addition of balance 2,021 MW during the Eleventh Plan period is remote. The Company, however, invested Rs. 1.26 crore in OTPCL up to March 2009 and Rs. 10.01 crore in another joint venture company viz. Baitarni West Coal Company Limited, which will provide coal to OTPCL for running the thermal power plant.

In addition to above, the GoO planned (1994) for capacity addition of 320 MW through establishment of hydro power (run-of-the-river) projects at Sindol-I at Deogaon (100 MW), Sindol-II at Kapasira (100 MW) and Sindol-III at Godhaneswar (120 MW) at a cost of Rs. 674.85 crore, Rs. 818.28 crore and Rs. 938.57 crore respectively. The Company, however, prepared a part of the detailed draft project report (DPR) on Sindol-I only in April 2009 and decided (May 2009) to request the DoWR to invite offers for selection of agencies for preparation of DPRs on the other two units. The works have not been awarded so far (September 2009).

Despite availability of hydro potential and demand for power in the State, the Company did not take proactive steps for capacity addition.

From the above it can be construed that in view of availability of hydro potential as well as requirement of power in the State, there was ample scope for the Company to take proactive steps for capacity addition through establishment of new projects.

In the exit conference the Government accepted that due to financial and other constraints there was delay in implementation of the long term plan for capacity addition.

[#] Baitarni, Baramula, Khadaga (Tributary of Tel), Lower Vansadhara, Mahanadi-Brahmani Link, Middle Kolab, Salki, Tel Integrated Project and Uteiroul (Tributary of Tel).

Unfruitful capacity addition

2.8 Extension of Unit-7 and 8 of Balimela Hydro Electric Project (BHEP) (150 MW) was completed and synchronised on 23 December 2008 and 23 January 2009 at a cost of Rs. 206.07 crore as against the estimated cost of Rs. 90.76 crore sanctioned by CEA (January 1992). The work was proposed to be completed by 2001-02. The time overrun of seven years resulted in cost overrun of Rs. 115.31 crore. The Surlikonda barrage did not have sufficient capacity to accommodate the discharged water of all the eight generating units of 510 MW of BHEP. Thus, the pond capacity of the Surlikonda barrage was to be increased to 216 Hecto Acre Meter (HAM) for which tentative provision for Rs. 9.07 crore was estimated (January 2001) for completion of the work before or along with commissioning of the units. The estimate was revised (2007-08) to Rs. 20 crore. Since the Company decided not to increase the capacity of the Surlikonda barrage, there was no capacity addition despite expenditure of Rs. 206.07 crore.

There was no capacity addition despite expenditure of Rs. 206.07 crore.

The Management stated (October 2009) that since the present capacity can hold water for full generation of 510 MW for three hours there was no need for incurring additional expenditure in increasing the reservoir capacity.

The reply is not convincing as the project report states that the Surlikonda barrage could accommodate discharged water of 510 MW for one hour and fifty minutes only and normal peak hours are six hours. Thus, the Company will not be able to run the unit at full capacity and the expenditure of Rs. 206.07 crore remained partly infructuous.

Wasteful expenditure on Potteru Small Hydro Electric Project

2.9 The Potteru Small Hydro Electric Project (PSHEP) consisting of two canal-based power houses in Malkangiri district was transferred (April 1996) from the GoO to the Company at a cost of Rs. 14.30 crore before completion of the project consequent to unbundling of the Orissa State Electricity Board. As a part of capacity addition (6 MW) during the Eleventh Plan, the Company spent Rs. 22.70 crore during April 1996 to March 2009 for completion of the project without assessing the availability of water in Surlikonda barrage for running the project. Due to non-availability of water, high cost of generation of power, naxal menace and difficulty in evacuation of power owing to right of way problem, etc. the BoD decided (March 2007) to get the approval of the GoO for disposal of the unit. In the meantime, the Company received (May 2009) an offer from Perfect Energy, Jabalpur (Madhya Pradesh) towards (i) outright purchase of PSHEP at a price of Rs. 1.20 crore, (ii) hire purchase of the project on payment of Rs. 12 lakh per annum for a period of 10 years and (iii) lease of the project on payment of lease rent of Rs. 0.20 lakh per month for a period of five years. While the above proposal was under consideration of the Company, the BoD again decided (July 2009) to request the GoO for grant of permission for disposal of the project.

The Company incurred wasteful expenditure of Rs. 37 crore due to taking up the project without assessing the availability of water.

Audit observed that taking up the project without assessing the availability of water in Surlikonda barrage and feasibility of the project resulted in wasteful expenditure of Rs. 37 crore. The Management accepted the audit findings in the exit conference.

Design Energy

2.10 As per Government of India (GoI) notification of June 1992 the Design Energy (DE) is the quantum of energy which could be generated in a 90 *per cent* dependable[#] year with 95 *per cent* availability of installed capacity of the station. The DE set out in the Techno Economic Clearance (TEC) of the CEA was to be considered for fixation of tariff. The DE of the Company was considered at 5676 MU[ℜ] for all stations.

The OERC desired (June 2005) that the reassessment of DE should be done by the Company as there were changed circumstances like less availability of water, changed use of water for irrigation and industrial drawals, etc. Accordingly, the Company appointed (October 2006) Spatial Planning and Analysis Research Centre Private Limited (SPARC) to carry out the job of reassessment of DE of the Company. SPARC revised the DE to 4,903.63 MU[φ] against the existing DE of 5,676 MU. As the re-determination of DE had an important bearing on determination of retail tariff, the OERC decided (March 2009) that the revised DE was to be considered later only after verification of the data.

Audit observed the following:

- There was lack of uniformity in the period of hydrological data adopted for reassessment of DE of the five power stations which varied from 24 to 40 years.
- SPARC adopted the hydrological data for those years also in which there was abnormally low rainfall due to which the assessment of DE was at a lower figure of 4,903.63 MU though the average generation of the Company during the past five years ending March 2009 was 6,491 MU.
- The formula adopted for determination of head was not uniform for all the units. Further, consideration of head for computation of generation in four hydro power stations (except Hirakud Power Station) was below the rated head at which generation is not possible.

[#] The year in which the annual energy generation has the probability of being equal to or in excess of 90 *per cent* of the expected period of operation of the scheme.
[ℜ] HPS-1,174 MU, RHEP-525 MU, UKHEP-832 MU, BHEP-1,183 MU and UIHEP-1962 MU.
[φ] HPS-957.43 MU, RHEP-669.96 MU, UKHEP-643.86 MU, BHEP-928.56 MU and UIHEP-1703.82 MU.

DE assessed by SPARC needs to be re-examined since it has an important bearing on the fixation of retail tariff.

Thus, the DE assessed by SPARC needs to be re-examined early since it has an important bearing on the fixation of retail tariff.

The Management stated in the exit conference that OERC was re-examining the data submitted by SPARC. It further stated that the facts mentioned by audit would be re-examined.

Operational performance

Targets and achievements

2.11 As per the provisions of the Electricity Act, 2003, Central Electricity Authority (CEA) seeks the unit-wise proposed target of generation of each hydro power station of the Company. Considering the availability of water and machines, the Company submits unit-wise annual generation targets, based on which CEA fixes the unit-wise annual generation targets. The Company also fixes unit-wise monthly targets of generation considering availability of water and machines as well as anticipated grid demand in consultation with SLDC for short periods ranging from 4 to 30 days. The tariff of power generated by the Company is, however, fixed by the OERC considering the saleable design energy[&] which is 99 *per cent* of the design energy.

The following table depicts the generation targets fixed by CEA and by the Company vis-à-vis design energy (DE) and the actual generation thereagainst for the five years ending 31 March 2009.

Particulars	2004-05	2005-06	2006-07	2007-08	2008-09	Total
	(In million units)					
DE	5,676	5,676	5,676	5,676	5,676	28,380
Saleable Design Energy fixed by OERC[&]	5,619	5,619	5,619	5,619	5,619	28,095
A. Targets						
Targets as per:						
CEA	5,307	5,349	5,495	5,664	6,060	27,875
Own[¢]	7,317	5,223	7,754	7,895	5,136	33,325
Percentage of CEA's target to DE	***93.50***	***94.24***	***96.81***	***99.79***	***106.77***	***98.22***
Percentage of own target to:						
DE	128.91	92.02	136.61	139.09	90.49	117.42
CEA	137.87	97.64	141.11	139.39	84.75	119.55
B. Achievements						
Gross generation	6,868	5,030	7,198	7,850	5,802	32,748
Percentage of achievement to:						
DE	121.00	88.62	126.81	138.30	102.22	115.39
CEA	129.41	94.04	130.99	138.59	95.74	117.48
Own	93.86	96.30	92.83	99.43	112.97	98.27

[&] Design Energy *less* one *per cent* towards auxiliary consumption and transformation loss.

[¢] These are aggregate short term targets.

Audit observed the following:

- The achievement against the target of the Company was generally satisfactory.
- During the years 2004-05 to 2007-08, the targets fixed by CEA was less than the DE which ranged between 93.50 and 99.79 *per cent*.
- The Company's own target in the years 2005-06 and 2008-09 was 92.02 and 90.49 *per cent* of the DE respectively.

There was loss of revenue of Rs. 71.63 crore since actual generation was less than the saleable DE.

- The tariff of the Company is fixed by the OERC taking into account the saleable design energy of the individual generating stations. In four generating stations, the actual generation was less than the saleable DE fixed by OERC for calculation of tariff. This has resulted in loss of revenue to the extent of Rs. 71.63 crore[#].
- The target fixed for Chipilima power house ranged between 88 MU and 219 MU for the last five years and the achievement ranged between 29 MU (May 2004) and 194 MU (February 2009) against the installed capacity of 72 MW (631 MU). The reasons for fixation of low target was not on record and remedial measures were not taken to augment the generation of the unit.

Capacity utilisation

2.12 During 2005-06, the OERC introduced two part tariff for sale of energy from Upper Indravati Hydro Electric Project (UIHEP) and for other hydropower stations from 2007-08. As per two part tariff, the Company was eligible to receive incentive (capacity charges) from GRIDCO Limited when the capacity index (machine availability) exceeded 85 *per cent* of the power station and the incentive could accrue up to a maximum capacity index of 100 *per cent*. The machine availability of the Company ranged between 62.75 and 93.90 *per cent* during the five years ending 2008-09.

Audit observed the following:

- The shortfall in normative machine availability in HPS, Rengali Hydro Electric Project, Upper Kolab Hydro Electric Project and UIHEP was for five years, three years, two years and one year respectively during the five years ending March 2009.
- The reasons for such shortfall in machine availability, as analysed in audit, was due to weed problem as well as keeping the units under Renovation, Modernisation and Uprating (RMU) for a period of 57 months in HPS and abnormal forced outages. The Company, however, did not take adequate steps to increase the machine availability.

[#] HPS: Rs. 53.51 crore during 2004-05 to 2008-09, BHEP: Rs. 2.87 crore during 2005-06, UKHEP: Rs. 2.91 crore during 2005-06 and UIHEP: Rs. 12.34 crore during 2005-06.

The Company failed to recover capacity charges of Rs. 15.52 crore besides non-receipt of Rs. 16.98 crore during 2005-09.

- Due to non-availability of normative machine hours, the Company failed to recover capacity charges of Rs. 15.52 crore during the period 2005-06 to 2008-09.
- The Company was eligible to receive incentive of Rs. 16.98 crore for machine availability above 85 *per cent* during the years 2006-07 to 2008-09 against which no amount was recovered from GRIDCO Limited so far (July 2009).

The Government stated (October 2009) that there was no financial loss to the Company as all the stations taken together generated the DE and recovered the Annual Revenue Requirement. The reply is not convincing as there was shortfall in achievement of DE in some of the units due to which the Company was not able to recover the capacity charges in these units.

Planned and forced outages

2.13 In order to optimise the generation of power from the hydro power stations it is imperative on the part of the Company to undertake planned maintenance of the plants as per the schedule recommended by the OEM. Failure on the part of the Company to undertake planned maintenance results in forced outages of the plants and machinery resulting in loss of generation. Though the Company fixed a norm of 30 days (720 hours) for annual maintenance of its generating units, no norm was fixed for monthly and quarterly maintenance.

Audit observed that there was delay in completion of annual maintenance of generating units ranging from 22 to 1,563 hours beyond the norms fixed by the Company resulting in loss of generation of 381 MU valued at Rs. 14.43 crore during the five years ending 31 March 2009. Further, as against 1010 monthly, 96 quarterly and 103 annual maintenance operations planned, the actual maintenance carried out by the Company was only 320, 36 and 59 respectively.

The unit-wise planned and forced outages of the generating stations of the Company during the last five years ending 31 March 2009 are shown in the following table.

Sl. No.	Name of the unit	Annual available hours for generation	Forced outage (in hours)	Planned outage for maintenance (in hours)	Percentage of forced outage to annual available hours	Percentage of planned outage to annual available hours
1	UIHEP	1,75,200	1,827	23,894	1.04	13.64
2	RHEP	2,19,000	23,510	17,539	10.74	8.00
3	HPS(Burla)	3,06,600	28,472	56,723	9.29	18.50
4	HPS(Chipilima)	1,31,400	43,963	40,762	33.46	31.02
5	UKHEP	1,75,200	11,945	10,906	6.82	6.22

Sl. No.	Name of the unit	Annual available hours for generation	Forced outage (in hours)	Planned outage for maintenance (in hours)	Percentage of forced outage to annual available hours	Percentage of planned outage to annual available hours
6	BHEP	2,66,806	7,548	25,578	2.83	9.59
Total		**12,74,208**	**1,17,265**	**175,402**	**9.20**	**13.77**

It can be seen from the above table that as against the total available 12,74,208 hours, the total forced outages and planned outages of the Company were 1,17,265 (9.20 per *cent*) and 1,75,402 hours (13.77 *per cent*) respectively during the five years ending March 2009.

The Company sustained avoidable generation loss of 4,274 MU worth Rs. 156.05 crore due to forced outage of 1.17 lakh hours.

The reasons for such high forced outages were mainly attributed to turbine problem (121 times), failure of generator (110 times), protection equipment (186 times) and others (270 times) like excitation problem, stator earth fault, insulator failure of stator winding, intake gate problem, abnormal water/oil leakage in turbine pit, etc., along with lack of internal control measures like non-availability of instruction manual for periodic maintenance of plants and machineries and non-maintenance of history sheets of generating units. Had there been proper preventive maintenance, the forced outages could have been reduced. The Company sustained avoidable generation loss of 4,274 MU worth Rs. 156.05 crore due to forced outage of 1.17 lakh hours.

The Government stated (October 2009) that the shutdown time of 13.62 *per cent* is within the prescribed limit of 15 *per cent*. The reply is not convincing as the actual shutdown time was 22.97 *per cent*.

Evacuation of power

2.14 Power generated from hydro power stations is evacuated through 132 KV /220KV feeders of the switchyard. OERC (2008) observed that evacuation of power from Burla Power House was not effective since capacity of the feeders was only 220 MW, whereas the generation was 275 MW. The BoD proposed (May 2009) for renovation and modernisation of the 132 KV switchyard of Burla Power House and Chipilima Power House at an estimated cost of Rs. 7.10 crore and Rs. 5.96 crore respectively.

The above proposal covered replacement of 132 KV switchyard equipments. Due to non-replacement of those equipments there was unreliability in the operation system, several instances of malfunctioning ranging from 60 to 100 trippings per month and bursting incidents in the switchyard, which resulted in outage of the unit for a longer period of time.

The Management stated (October 2009) in the exit conference that the renovation of the switchyard was in progress.

Loss of generation due to standby hours during monsoon period

2.15 During the monsoon period (July to October) of each year there was neither any constraint in terms of availability of water nor was there any restriction from SLDC for generation of power. The Company, however, did not operate the units to their optimum capacity for reasons not on record. The following table indicates the running hours and standby hours for generation during July to October of each year for the five years ending March 2009.

Name of the Power Station	Standby hours	Running hours during monsoon	Total available hours during monsoon	Percentage of standby hours to total available hours	Loss of generation due to standby hours (in MU)
UIHEP	15,135	39,690	54,825	27.61	1,929
RHEP	11,654	53,364	65,018	17.92	841
HPS	5,967	76,060	82,027	7.27	194
UKHEP	22,370	26,547	48,917	45.73	1,521
BHEP	20,060	57,933	77,992	25.72	1,023
Total	**75,186**	**2,53,594**	**3,28,779**	**22.87**	**5,508**

The Company sustained loss of Rs. 164 crore during 2004-09 on account of keeping the machine idle during monsoon period.

It can be seen from the table above that the Company could not utilise 22.87 *per cent* of the total available hours for generation during the monsoon period despite availability of water and machines, which resulted in loss of generation of 5,508 MU during the five years ending March 2009 considering a load factor of 85 *per cent*. Audit observed that considering the value of 718 MU received by way of capacity charges, the Company sustained loss of Rs. 164 crore for the balance 4,790 MU.

The Government stated (October 2009) that due to restrictions imposed by SLDC, there was less generation during the monsoon period. The reply is not convincing as there were no recorded reasons to confirm the views expressed by the Management.

Water management

2.16 The depth of the reservoir and height of the dam determines the water holding capacity of the reservoir. Flow of water from the catchment areas, however, results in silt deposition and thereby reduces the depth of the reservoir leading to reduction in water holding capacity. Further, availability of water is not uniform throughout the year. Thus, conservation of water in the reservoirs for usage in the months of scarcity is of paramount importance. The deficiencies noticed in usage of water and desiltation of reservoirs are discussed in the following paragraphs.

Utilisation of water

2.17 The Company generates power by drawing water from five reservoirs located at different parts of the State. Only UIHEP reservoir is under the control of the Company while the other four reservoirs are under the control of DoWR. The Company is free to use water from the UIHEP reservoir as per its requirement subject to restrictions imposed by the District Administration for flood control. Usage of water from the other reservoirs is regulated by the Water Co-ordination Committee[#] (WCC). The details of reservoir-wise and year-wise inflow of water and its usage during 2004-09, as furnished by the Company and DoWR, were as follows:

(Figures are in million cubic meters-MCM)

Year	Total water available	Loss of water due to evaporation	Water used for domestic and irrigation purposes	Water drawal by industries[*]	Dead storage[∇]	Water available for generation	Water used for generation of power
(1)	(2)	(3)	(4)	(5)	(6)	(7) (2-3-4-5-6)	(8)
2004-05	56,014.66	1,353.58 (2.42)	2,722.35 (4.86)	91.33 (0.16)	3,809.84 (6.80)	48,037.56 (85.76)	26,640.05 (55.46)
2005-06	62,901.45	1,370.99 (2.18)	2,874.11 (4.57)	91.33 (0.16)	3,809.84 (6.06)	54,755.18 (87.05)	23,978.13 (43.79)
2006-07	66,144.58	1,479.26 (2.24)	3,643.38 (5.51)	91.33 (0.16)	3,809.84 (5.76)	57,120.77 (86.36)	26,359.54 (46.15)
2007-08	73,618.08	1,429.10 (1.94)	3,226.99 (4.38)	91.33 (0.16)	3,809.84 (5.18)	65,060.82 (88.38)	32,770.90 (50.37)
2008-09	55,682.27	1,278.01 (2.30)	2,750.72 (4.94)	91.33 (0.16)	3,809.84 (6.84)	47,752.37 (85.76)	30,029.92 (62.89)
Total	**3,14,361.04**	**6,910.94 (2.20)**	**15,217.55 (4.84)**	**456.65 (0.15)**	**19,049.20 (6.06)**	**2,72,726.70 (86.75)**	**1,39,778.54 (51.25)**

N.B. Figures in bracket indicate percentage with respect to Column-2, except Column-8 where percentages are with reference to Column-7.

It would be observed from the above table that during the period 2004-09, the percentage of total water available in the reservoir to water available for generation ranged from 85.76 to 88.38. In this context, audit observed the following:

- As against availability of 2,72,727 MCM of water for generation during 2004-09, the Company could utilise only 1,39,779 MCM and the percentage of utilisation was only 51.25. The Management, however, had not analysed the reasons for such low utilisation. Audit

[#] Comprised of officers of DoWR, GRIDCO Limited and the Company.

[*] Data in respect of HPS and UKHEP only since the data of RHEP, BHEP and UIHEP were not furnished by the DoWR or by the Company.

[∇] Dead storage is the total storage below the invert level of the lowest discharged outlet from the reservoir.

analysis indicated that factors like high percentage of forced outage, stand-by machine hours and poor maintenance of the water conductor system were responsible for such low utilisation of water.

- No flow meter was installed to measure the water utilised by the Company as well as the industrial consumers and measurement was taken on estimation basis.
- The use of water by industrial consumers was not taken into account by the WCC while allocating water from the reservoirs.
- The evaporation loss during the period 2004-09 was 6,911 MCM which constituted 2.20 *per cent* of total availability of water. The Company, however, did not take any remedial measure to reduce the loss by catchment area treatment and watershed management.

The Management stated in the exit conference that the figures mentioned by audit would be re-examined and steps would be taken for treatment of catchment area, installation of flow meters, etc. in consultation with DoWR.

Drawal of water by industrial units

The Company had not yet claimed Rs. 28.49 crore towards drawal of water by industrial units during 2004-09.

2.18 During the period 2004-09, 19[*] industrial units drew 457 MCM of water from the reservoirs of HPS and UKHEP. Since drawal of water by industrial units affected power generation, the GoO, while according permission to those industrial units to draw water from the reservoirs, directed them to compensate the Company towards loss of generation at the prevailing rate of cost of power. Audit, however, observed that the Company computed loss of generation as 0.50 MU *per annum* in respect of only one[♥] industrial user and received (April 2008) compensation of Rs. 15 lakh. In the remaining cases, the Company had neither calculated the amount of compensation nor raised any claim (May 2009). As per computation made in audit, the Company was to receive Rs. 28.49 crore from 18 industrial units against drawal of water from the reservoirs during 2004-09.

The Government stated (October 2009) that allotment of water to industrial concern is looked after by DoWR, hence the matter is to be taken up with DoWR. The reply is, however, silent about the non-recovery of dues.

Sedimentation in reservoirs

2.19 Sedimentation in reservoirs leads to increase in spread of water body resulting in increase in evaporation loss as well as submergence of flora and fauna. The loss of vegetation in the upper reaches leads to increase in soil erosion and thereby increases the rate of flow of silt into reservoirs which also results in reduction of live storage capacity[$] of the reservoir. The OERC

[*] In 2004-05: 14, 2005-06 and 2006-07: 17 and from 2007-08 to 2008-09: 19.
[♥] Rathi Steel and Power Projects Limited who drew 17.52 MCM in two years
[$] The quantum of water between full reservoir level and minimum draw down level.

advised (July 2008) the Company to maintain the water conductor system regularly and to develop an efficient co-ordination mechanism in consultation with the Forest and Environment Department and DoWR for reduction of siltation by proper conservation of the catchment areas and the foreshore of the reservoirs so that generation could be maintained with effective utilisation of water. The Company, however, did not take up the matter with the Forest and Environment Department and DoWR so far (July 2009).

The Company could not generate 170.428 MU of power worth Rs. 7 crore due to failure to check sedimentation in HPS.

The sedimentation study in respect of the reservoirs of UIHEP and HPS only had been done in 2005 and 2007. In respect of UIHEP, the study revealed that the live storage capacity of the reservoir had been reduced from 1,455.76 MCM in 1995 to 1415.78 MCM in 2005 and from 5,842.88 MCM to 5,153.89 MCM in respect of HPS during the period. Considering the further yearly sedimentation of 4 MCM in UIHEP and 44.38 MCM in HPS per year there was total capacity loss of 882.10 MCM in these two reservoirs as of March 2009. In view of this, the OERC advised (July 2006) for taking up integrated treatment of the catchment and foreshore areas to ensure designed benefits over the life of the project. The Company had been losing 48.38 MCM of water per year from these two power stations which it could have used to generate 170.428 MU of power valued at Rupees seven crore during the five years ended 2008-09. The Company did not take any step to check sedimentation in HPS while steps taken to check siltation of the reservoir of UIHEP were rendered futile.

The Government stated (October 2009) that except UIHEP all other reservoirs are under the control of DoWR, hence the Company had no scope to check the sedimentation. In UIHEP, the Company had initiated steps for annual silt clearance. Further, the afforestation programme involves high cost and thus would be seen at Government level. The fact however, remained that the Company has not taken up the matter with DoWR/Government to check the sedimentation.

Construction of silt check dam at UIHEP

2.20 The consultant, GMS Power Pack Limited, suggested (July 1995) to construct a silt check dam (SCD) upto the height of the reservoir level (RL) of 640 metre and to excavate a link cut channel into depth of RL 630 metre (upto a total length 1,070 metre) to restrict inflow of silt into the intake channel. The construction of SCD upto RL 628 metre only was completed (December 1998) at a cost of Rs. 2.48 crore. The balance work was awarded (December 1998) to DD Builders Limited for an agreed sum of Rs. 11.15 crore with stipulation to complete it by 12 December 2000. The contractor completed (June 2002) construction of SCD upto RL 640 metre and intake channel into depth of RL 634 metre (total length 405 metre) and claimed Rs. 13.28 crore, out of which Rs. 12.15 crore was paid till date (May 2009).

Audit observed that due to non-excavation of the link cut channel to the required depth of RL 630 metre, the floodwater could not be discharged

Expenditure of Rs. 14.63 crore on SCD remained infructuous.

causing damage to the SCD in July 2003. The Company, however, did not take any step thereafter to repair the SCD nor to excavate the link cut channel up to the required depth. Besides, expenditure of Rs. 14.63 crore on SCD also remained infructuous.

The Government stated (October 2009) that the issue would be discussed in the Board for a policy decision.

Non-payment of water cess

2.21 As per decision (August/November 2001) of the GoO, the Company was to pay water cess for the quantum of water used for power generation at the rate of 5 paisa per Kwh of generation of power by the Company. The Company requested (June 2002) GoO for waiver of water cess since water used for generation was non-consumptive and thus, it was not liable to pay water cess. Though the GoO communicated (July 2002) that water cess would be exempted on the quantum of water used by the Company for generation of power, a final decision has not been taken so far (July 2009).

The Company, however, received claims for Rs. 4,356.41 crore towards water cess from the DoWR from 1996-97 up to March 2009. In the event of the Company eventually having to pay the water cess, it would result in huge loss as the Company would not be able to claim this amount through the ARR.

The Management stated in the exit conference that the matter regarding waiver of water cess would be taken up with DoWR shortly.

Generation performance

2.22 The Company is generating electricity from five power stations located at different parts of the State. The year-wise generation performance of these five units during 2004-09 are tabulated below:

(In million units)

Hydro Power Station	2004-05	2005-06	2006-07	2007-08	2008-09
HPS	844	909	862	981	958
RHEP	750	679	668	983	882
UKHEP	896	624	1026	1075	586
BHEP	1526	1055	1621	1832	1076
UIHEP	2852	1763	3021	2979	2300
TOTAL	**6868**	**5030**	**7198**	**7850**	**5802**

From the above it may be observed that the gross generation during 2004-09 ranged between 5030 MU and 7850 MU. The observations relating to generation performance are given below:-

Excess auxiliary consumption

2.23 The CERC fixed (October 2000) a norm of 0.5 *per cent* for auxiliary consumption[&] of surface hydro power generating stations. Audit observed that the auxiliary consumption of the six hydro power stations was excess by 19.66 MU over the norm fixed by CERC during the five years ending March 2009, resulting in loss of revenue of Rs. 42.44 lakh due to non-inclusion in the monthly energy bills. The auxiliary consumption in UIHEP was, however, within the norms during the period under review. The Company had neither analysed the reasons for excess auxiliary consumption nor taken remedial measures to reduce the same in the other hydro power stations.

Excess transformation losses

The Company sustained loss of Rs. 13.39 crore due to excess transformation loss.

2.24 As per guidelines of the CEA and regulations of the CERC (October 2000) transformation losses should be 0.5 *per cent* of the gross generation. This norm is also considered for fixation of tariff. Audit observed that the percentage of loss was in the range of 0.92 to 4.57 *per cent* of gross generation. As a result, the Company sustained loss of Rs. 13.39 crore due to excess transformation loss of 355.28 MU. The Company did not take remedial measures to restrict the transformation loss within the norms.

Renovation, Modernisation and Uprating

2.25 The Company is having six power houses with 31 generating units. The details regarding the designed capacity, dates of installation and the age of each unit is detailed below:

Name of the power house	No. of units	Date of installation of plants	Design capacity	Age of the plant as on 31 March 2009
HPS, Burla	7	Unit-I to VI: May 1958 to August 1963 Unit- VII: September 1990	2 x 49.5 3 x 37.5 2 x 32	46 – 51 years 18 years
HPS, Chipilima	3	Unit-I to III: August 1962 to February 1964	3 x 24	45 – 47 years
BHEP, Balimela	6	Unit-I to VI: August 1973 to January 1977	6 x 60	32 – 36 years
Balimela Extension	2	Unit-VII to VIII: December 2008 to January 2009	2 x 75	1 year
RHEP, Rengali	5	Unit-I to V: August 1985 to August 1992	5 x 50	17 – 24 years
Upper Kolab	4	Unit-I to IV: March 1988 to January 1993	4 x 80	16 – 21 years
Upper Indravati	4	Unit-I to IV: September 1999 to April 2001	4 x 150	8 – 10 years
Total	**31**		**2027.50**[#]	

[&] Quantum of energy consumed by auxiliary equipment of the generating station.
[#] Excluding 34.50 MW of Machkund power.

2.26 The Government of India set up (1987) a National Committee to formulate a strategy for Renovation, Modernisation and Uprating (RMU) of hydro power generating plants, which identified (February 1987) nine generating plants of HPS for RMU since those plants had already outlived their life expectancy. Based on their recommendation, the RMU works of only six units were completed and commissioned between August 1998 and January 2006.

As on 31 March 2009, out of 31 generating plants of the Company, six plants of BHEP (installed capacity: 360 MW) had already outlived their normal economic life and the age of these plants ranged from 32 to 36 years. The Company did not make any plan for RMU of five units of BHEP. The deficiencies in taking up of RMU works were as follows:

- The Company apprised (January 2006) the OERC that as the RHEP units had not completed 30 years of operation, there was no plan for renovation of these units in the near future.

There was generation loss of 6.06 MU due to ineffective upgradation of HPS, Burla.

- Unit-1 and 2 of HPS, Burla were upgraded (April 1998) from 37.5 MW each to 49.5 MW each. The performance testing of these units revealed that the performance of unit-2 was not satisfactory as it could not conform to the guaranteed turbine efficiency. This indicates that the upgradation was not effective resulting in generation loss of 6.06 MU valued at Rs. 24.91 lakh per annum.

- The RMU of unit-3 and 4 of HPS, Burla was started in October 2002 and August 2002 respectively and completed in January 2006. The Company took 38 and 40 months respectively for RMU of these two units. Due to keeping these units under RMU for more than three years, the generation performance of the Company was adversely affected.

- The BoD decided (June 2000) and approved the proposal of RMU of Unit-5 and 6 of HPS, Burla and Unit-3 of Chipilima for which the Company appointed Metallurgical & Engineering Consultants Limited (MECON) as a consultant. The BoD subsequently decided (February 2007) not to go for RMU and instead recommended for purchase of new equipments since the life of the new machine would be more than 35 years against the life span of about 25 years in case of RMU. The BoD, however, again decided (July 2009) to take up the RMU of these units for which National Hydro Power Corporation Limited has been requested for providing consultancy service. Thus, due to indecisiveness of the Company, the RMU of these units as identified by the CEA (February 1987) has not been completed till date (July 2009).

Consultancy fee paid to MECON of Rs. 0.25 crore became infructuous due to cancellation of contract.

- Since the Company decided not to take up RMU of Unit 5 and 6 of HPS, Burla and Unit 3 of Chipilima it cancelled the contract with MECON. Hence, the consultancy fee paid to MECON for Rs. 24.69 lakh became infructuous.

- The RMU of Unit 1 of Chipilima was completed in 1998. It was noticed (December 2008) that there was oil leakage from oil header of Unit-1 of Chipilima. As in Chipilima for three units only two intake gates (one for Units 1 and 3 and the other for Unit 2) are available, the management could not stop the unit for repair work of Unit-1 as the intake gate was also used for Unit 3. It was observed in audit that during the time of RMU, the Company should have made provision for intake gates for each of the units for better management of these units.

The Management stated in the exit conference that the RMU work of BHEP would be taken up in a phased manner and that of RHEP and HPS, Burla in the next annual maintenance and financial year respectively.

Maintenance of dams/ reservoirs

2.27 The Company draws water from the five reservoirs at Hirakud, Balimela, Rengali, Upper Kolab and Upper Indravati. The dams of those reservoirs except at Upper Indravati are maintained by DoWR while the dam at Upper Indravati is maintained by the Company. The DoWR decided (July 1999) that the Company would reimburse the dam maintenance expenditure at Hirakud, Balimela, Rengali and Upper Kolab at the rate of 33, 50, 46 and 50 *per cent* of the maintenance expenditure to the DoWR while it would reimburse 50 *per cent* of the maintenance expenditure to the Company for the Upper Indravati Dam. It was again decided (January 2003) that the Company would reimburse the dam maintenance expenses from 1996-97 onwards and the salaries of staff related to the dam maintenance only would be considered for such reimbursement. The details of the Company's share of dam maintenance as claimed by DoWR for the period from 2004-05 to 2007-08♣ is given in the following table:

Year	Hirakud	Rengali	Kolab	Balimela	Total
2004-05	264.06	227.09	372.52	159.46	1,023.13
2005-06	501.68	227.36	187.87	153.71	1,070.62
2006-07	679.15	411.27	114.35	188.05	1,392.82
2007-08	528.29	461.14	123.23	195.55	1,308.21
Grand total	**1,973.18**	**1,326.86**	**797.97**	**696.77**	**4,794.78**

The total claim with respect to dam maintenance expenditure for the period of 1996-2008 was not analysed by the Company to ascertain its admissibility. The deficiencies observed in audit are discussed as follows.

♣ Figures for 2008-09 are not available.

2.28 The Company adjusted (March 2008) Rs. 75 crore towards the dam maintenance expenses payable to DoWR for the period from 1996-97 to 2005-06 from the amount receivable from DoWR towards the cost of Upper Indravati Dam. In regard to above, audit observed that the Company did not verify the authenticity of the claim of DoWR towards dam maintenance expenses of Rs. 186.03 crore before reimbursement of the amount to them. Hence, expenditure not related to dam maintenance and excess amount claimed by the DoWR over the actual amount of expenditure relating to Hirakud, Rengali and Balimela dams was reimbursed by the Company which resulted in excess expenditure of Rs. 27.06 crore during 1996-97 to 2005-06. Due to non-availability of records relating to Upper Kolab, the genuineness of the claim of DoWR could not be verified in audit. The claim of the Company towards dam maintenance expenditure from DoWR in respect of Upper Indravati Dam is discussed in Paragraph 2.29.

The Company reimbursed excess amount of Rs. 27.06 crore to DoWR towards dam maintenance.

The Government while accepting (October 2009) the fact stated that the matter was under discussion with DoWR and a joint action committee was in the process of finalisation of guiding principles in this regard.

Non-receipt of dam maintenance expenses of Upper Indravati Dam

2.29 As per decision (July 1999) of the DoWR, the dam maintenance expenses of Upper Indravati Dam incurred by the Company was to be shared equally between the DoWR and the Company. The Company was to raise bills of a financial year by 15 June of the succeeding year on the basis of audited figures. Since the commercial operation of the Upper Indravati units started from September 1999 to April 2001 the Company claimed Rs. 30.24 crore from DoWR for the period 2001-07 against which no payment has been received so far (July 2009).

Dam maintenance expenses of Rs. 37.50 crore remained unrealised from DoWR.

Audit observed that the bills for the years 2003-04 to 2006-07 for Rs. 18.10 crore were raised belatedly in October 2007 though the accounts for the said period were finalised in August 2004, July 2005, July 2006 and July 2007 respectively. Further, the Company did not raise (May 2009) the claim for dam maintenance expenses for Rs. 6.21 crore for the year 2007-08 though the accounts for the year were certified in August 2008.

It was further observed in audit that the Company did not claim Rs. 1.05 crore being 50 *per cent* of the expenditure incurred on electricity charges related to dam maintenance during 2004-05 to 2008-09, for reasons not on record.

The Government stated (October 2009) that the discussions are on to handover the dam to DoWR. The reply is, however, silent about the delay in raising the claims.

Delay in taking up grouting work of Muran dam

2.30 The Dam Safety and Review Panel of DoWR suggested (December 2004) to arrest the leakage of water from Muran masonry and concrete dam of UIHEP through drilling and grouting. The Company belatedly (April 2006) prepared an estimate of Rs. 2.13 crore for drill and grout work for six items of the dam and approved (October 2006) works for two items at a cost of Rs. 68.86 lakh. Due to non-participation of bidders for the works, the work was executed departmentally during January to March 2009. As per the measurement taken (October 2007) by the Company, the rate of leakage of water was 44.19 litres per second. Thus, due to delay in execution of the work from January 2005 to December 2008, there was loss of water of 5.58 MCM which would have generated 4.82 MU of electricity valued at Rs. 23.89 lakh.

Delay in execution of work resulted in generation loss of 4.82 MU valued at Rs. 0.24 crore.

Clearance of weeds in Chipilima Power House

2.31 The Chipilima power house (CPH) having installed capacity of 72 MW, generates power by using water released from the Hirakud power house through a 27 KM long open channel. The generation of power is invariably affected due to choking of weeds in the trash rack of the power house.

The CPH being a base load station was generating around 400 MU *per annum* prior to 1993-94 which had come down to hardly 15 MU *per annum* due to weed menace. The Company tried various temporary measures such as weed cutting and manual weed clearance from the trash rack to eradicate the weed problem but no tangible result could be achieved. The weed menace badly affected the commercial interest of the Company as there was generation loss of 0.24 MU per day valued at Rs. 1.20 lakh. The cumulative revenue loss since inception of the Company was about Rs. 50 crore in spite of incurring expenditure of Rs. 0.89 crore on temporary measures. The Company invited (September 2008) open tender for installation of a Trash Rack Cleaning Machine (TRCM), at a cost of Rs. 6.08 crore. Had the Company tried earlier to tackle the weed menace through mechanical means the loss of generation could have been minimised.

The cumulative revenue loss since inception of the Company was about Rs. 50 crore due to non-clearance of weeds.

The Management stated that many attempts were made to tackle the weed menace but no fruitful solution was achieved and now the installation of TRCM is in progress. The fact, however, remained that there was delay on the part of the Company to tackle the problem through installation of TRCM.

Operation and Maintenance Expenditure

Excess expenditure on operation and maintenance

2.32 The Company files Annual Revenue Requirement (ARR) with the OERC for fixation of tariff for the ensuing financial year and the latter fixes the quantum of operation and maintenance (O&M) expenses as a component

of the ARR. Thus, the actual expenditure on O&M expenses was required to be restricted to the amount approved by the OERC. Audit observed that the actual expenditure incurred during 2005-09 was in excess of that approved by the OERC as detailed in the following table.

(Rupees in crore)

Name of power station	**2005-06**		**2006-07**		**2007-08**		**2008-09**		**Total**	
	Approved	*Actual*	*Approved*	*Actual*	*Approved*	*Actual*	*Approved*	*Actual*	*Approved*	*Actual*
RHEP	14.36	13.32	14.94	18.88	14.74	21.76	23.10	33.88	67.14	87.84
UKHEP	9.15	9.88	9.52	14.10	13.23	14.46	17.87	23.49	49.77	61.93
BHEP	19.56	24.71	20.34	20.71	26.10	27.04	26.37	57.28	92.37	129.74
HPS, Burla	33.24	30.52	33.53	33.86	33.29	37.05	34.97	61.67	135.03	163.10
UIHEP	37.25	29.65	38.54	41.67	39.88	43.69	41.12	61.24	156.79	176.25
Total	**113.56**	**108.08**	**116.87**	**129.22**	**127.24**	**144.00**	**143.43**	**237.56**	**501.10**	**618.86**
Excess over approved expenditure		**-5.48**		**12.35**		**16.76**		**94.13**		**117.76**

From the above table it can be seen that there was excess O&M expenses against the expenditure approved by the OERC which ranged between Rs. 12.35 crore and Rs. 94.13 crore during 2006-09.

The Government stated that (October 2009) the expenditure incurred was absolutely necessary to keep the machines operational. The fact, however, remained that the actual expenditure was more than that approved by OERC during 2006-09.

Monitoring

2.33 Effective operation and maintenance of generating stations needs regular monitoring by the top management. The Planning and Monitoring Cell at the Corporate office monitors the performance of the unit offices on a monthly basis through the performance reports and load reports sent by the unit offices. Audit observed the following deficiencies in the monitoring system:

- The Company had not standardised the formats of the monthly performance report and load report, as a result data relating to auxiliary consumption, running hours, planned outage, etc. differs from station to station.
- Unit auxiliary consumption and station auxiliary consumption for each of the months was not submitted by BHEP. Similarly, no information on transformation loss was furnished by HPS and RHEP and that on colony consumption was not furnished by HPS in their monthly performance reports.

- BHEP and RHEP did not furnish the machine availability in their performance reports.
- Reservoir data required for effective management of water resources, was not furnished by BHEP in their monthly performance reports.
- In the monthly load reports, the information on availability and use of water by different units were given using different units of measurement in the absence of a prescribed measurement unit.

Financial Management

Non-realisation of cost of generation

2.34 As per Section 642 read with Section 209 of Companies Act, 1956, the Company being a generating unit is required to maintain cost accounting records in pursuance of GoI notification of December 2001. The Company, however, maintained costing records from 2007-08 onwards. Audit observed that the cost of generation of HPS and UKHEP was Re. 0.76 and Re. 0.28 against the sale price of Re. 0.64 and Re. 0.22 per unit respectively. The high cost of generation was due to high incidence of repair and maintenance as well as administrative and operational expenses as discussed vide Paragraph 2.32. Thus, sale of power at less than cost of generation resulted in loss of Rs. 17.91 crore on sale of 955.78 MU and 1,073.54 MU of HPS and UKHEP respectively in 2007-08.

The Company sustained loss of Rs. 17.91 crore due to high cost of generation in HPS and UKHEP.

Metering of energy

2.35 The CEA (Installation and Operation of Meters) Regulations, 2006, *inter alia*, envisaged that each generating station should install 0.2S accuracy class meters. The BoD assessed (September 2006) requirement of 195[*] meters and decided to procure 74 meters of 0.2S accuracy class for installation at interface points. The Company procured (March 2007) 27 meters of 0.2S accuracy class at a cost of Rs. 71.27 lakh for interface points and the remaining 168 meters are yet to be purchased (May 2009) for reasons not on record.

Audit observed that the meter reading could not be taken, since the installed software was not replaced/ modified by the supplier till date (May 2009). Further, the testing of seven[**] meters could not be done due to non-availability of load. Thus, the performance of these meters remained unestablished. The percentage of error in one of the meters installed at BHEP was 0.22 which had not been recalibrated (May 2009).

In test check of 106 existing meters in three units (RHEP, HPS and BHEP), it was noticed that accuracies of 26 meters were inferior (i.e. 1.0 and 0.5 class)

[*] Interface points – 27, stator terminals – 31, HV – 85 and feeders to auxiliaries – 52.
[**] BHEP-3, UKHEP-2, and UIHEP-2.

to the prescribed standard of 0.2S accuracy class. Testing of 99 meters had not been done for 1 to 45 years and the test reports of three meters were not available on record. Further, 71 out of 106 meters were unsealed till May 2009.

The Company failed to comply with the CEA regulations with respect to installation and operation of meters.

Thus, the Company failed to comply with the CEA regulation with respect to installation and operation of meters. In absence of meters of the prescribed class, the accuracy in measurement of generation, auxiliary consumption and transformation loss could not be ensured.

Excess expenses on insurance premium

2.36 The Company executes insurance policy with the insurance companies annually for insurance coverage of its plants and machineries and stores at gross value under standard risks like fire, special peril, flood, etc. During the period 2004-09, the Company paid Rs. 4.57 crore towards insurance premium against the gross value of insured goods for Rs. 4,248.10 crore.

The Company incurred excess expenditure of Rs. 1.40 crore due to insuring at gross value.

Audit observed that the insurance companies settled the claims at net value of the claimed equipment/ stores for Rs. 3,053.28 crore[#]. Thus, insuring those at gross value resulted in excess expenditure of Rs. 1.40 crore. Further, as on 31 March 2009, insurance claims relating to 22 cases with claim value of Rs. 1.66 crore lodged during the period February 1999 to November 2008 was outstanding for settlement, due to ineffective persuasion by the Company.

Inventory Management

2.37 The inventory of the Company mainly comprises of spares for operation and maintenance of the generating units, consumables including oil and lubricants and surplus construction material like steel, cement, building material and cables maintained separately at each hydro power station. Though the Company is in existence from April 1996 it did not frame any 'Procurement Manual' and 'Inventory Management Policy' so far. The BoD observed (August 2003) that due to non-availability of essential spares, there was inordinate delay in bringing the generating units under outage into operation and emphasised the need for strengthening the stores management suitably by creation of a 'Material Management Cell' in the Corporate office. Despite the above direction, no effective action was taken by the Company.

The Company, however, decided (February 2009) to take the following steps for inventory control and management:

- to prepare procedural modalities for standardisation, codification and computerisation of the stores for its proper accounting;
- to prepare a uniform procedure for receipt and issue of material from stores;

[#] Written down value as per books of accounts.

- to issue separate guidelines for disposal of scrap and obsolete items; and
- to prepare a 'Procurement Manual'.

Further action on the above is awaited. From the above it would be construed that the Company did not give adequate attention towards inventory management in spite of huge unused inventory of Rs. 34.13 crore as on 31 March 2009. The audit observations in this regard are discussed in the succeeding paragraphs.

Loss due to excess holding of inventory over the norm

2.38 The CERC Regulation (March 2004) envisaged that a generator would be entitled to a norm of one *per cent* of historical cost of inventory in the first year of commercial operation with annual six *per cent* increment thereof for determining the carrying cost of inventory for the purpose of calculation of tariff. The following table indicates the actual value of inventory held *vis-à-vis* the norm for the five years ended 31 March 2009.

(Rupees in crore)

Name of the unit	2004-05		2005-06		2006-07		2007-08		2008-09	
	Norm	Actual	Norm	Actual	Norm	Actual	Norm	Actual	Norm	Actual
HPS	2.63	4.14	2.79	4.20	2.95	3.93	3.13	4.80	3.32	5.70
RHEP	1.45	3.83	1.54	5.67	1.63	7.24	1.73	7.41	1.83	7.32
UKHEP	1.73	4.34	1.83	4.23	1.94	4.53	2.06	4.78	2.18	5.28
BHEP	1.84	1.61	1.95	2.17	2.07	2.21	2.19	2.23	2.32	2.24
UIHEP	14.22	5.81	15.07	15.63	15.97	13.28	16.93	13.36	17.95	13.59
Total	**21.87**	**19.73**	**23.18**	**31.90**	**24.56**	**31.19**	**26.04**	**32.58**	**27.60**	**34.13**

The Company sustained interest loss of Rs. 3.07 crore due to blockage of fund in excess inventory.

It would be observed from the above that except for UIHEP for the years 2004-05 and 2006-07 to 2008-09 and BHEP for the years 2004-05 and 2008-09, the inventory holding by the remaining units in all the other years was in excess of the norm prescribed by CERC. As a result, the Company sustained interest loss of Rs. 3.07 crore during the period 2004-09 due to blockage of fund in excess inventory.

The year-wise value of inventory was also increasing from Rs. 19.73 crore (2004-05) to Rs. 34.13 crore (2008-09), resulting in blockage of funds.

Non-maintenance of critical spares

2.39 The Unit-III of RHEP was under forced outage from November 2005 due to development of cracks along the surface brake track of the turbine. At the request (December 2005) of the Company, BHEL (the Original Equipment Manufacturer) inspected and recommended (December 2005/ January 2006) for replacement of the brake track unit alongwith complete overhauling of the

plant. The Company placed (March 2006) order on BHEL for procurement of the brake track unit at a cost of Rs. 60 lakh to be supplied by September 2006. Meanwhile, the overhauling of the plant was started in January 2007 and completed on 15 February 2007. The unit could not be made operational due to non-receipt of the brake track unit. The brake track unit was received in April 2007 and the unit was put to operation with effect from 29 July 2007.

Audit observed that the brake track unit of the plant was critical for operation of the plant. Further, since this spare is proprietary in nature and considering the past experience in securing timely delivery of spares from the OEM, the Company should have maintained the critical spares for meeting the emergent situations. Thus, due to non-maintenance of critical spares despite directions of the BoD, the Company suffered loss of Rs. 2.44 crore towards generation loss of 59.29 MU for 163 days from 15 February to 29 July 2007.

Due to non-maintenance of critical spares the Company suffered loss of Rs. 2.44 crore.

The management stated that if OHPC will procure all such components as spares, the inventory position will be very high which is not desirable. The reply is not convincing as maintaining the critical spares is a judicious decision and should have been purchased by the Company.

Non-disposal of scrap

2.40 The Company had not identified the items, quantity and value of scrap material available in the stores maintained in the different hydro power stations during 2005-09. For disposal of the existing scrap material, the Company had paid (March 2004) Rs. 11 lakh to a consultant♣ for valuation and the consultant had further demanded Rs. 17 lakh. Despite expenditure of Rs. 28 lakh the Company could not sell the scrap worth Rs. 20 crore so far (July 2009).

The Company failed to dispose the scrap valued at Rs. 20 crore.

The Management stated (October 2009) that action for disposal of scrap would be finalised after getting approval of State Government. The fact remained that due to delay on the part of the Company in taking decision for valuation and sale of scrap it could not dispose of the scrap material and thereby the possibility of deterioration in quality of the scrap and consequent reduction in price can not be ruled out.

Other deficiencies

2.41 The following deficiencies were also noticed in inventory management:

- Surplus materials consisting of cables and auxiliary spares valued at Rs. 2.40 crore were lying in UIHEP since April 2002. The Company did not explore the possibility of its use in its other power stations nor were steps taken for its disposal.

♣ Metallurgical & Engineering Consultant Limited (MECON).

Stores and spares valued at Rs. 2.29 crore were damaged due to fire and theft.

- Stores and spares valued at Rs. 2.29 crore were damaged due to fire and theft in March 2002. The Company, however, neither calculated the exact quantum of loss nor fixed responsibility on the erring officials till date (July 2009) even after lapse of seven years.
- Twenty one transformers of different rated capacities found defective/ irreparable are lying in the stockyard of Burla Power House for disposal. As quality will deteriorate because of exposure to sun, rain, etc. early action needs to be taken for their disposal.

Contract Management

2.42 Though the details of works executed during the period from 2004-05 to 2008-09 had been sought for from the Management, the same was not furnished to audit, for which the total number of contracts could not be ascertained in the review. Test check of contracts made available to audit revealed deficiencies in contract management which have been pointed out in Paragraphs 2.20, 2.30 and 2.31 of this report. Other deficiencies noticed in contract management are given below:

Due to lack of coordination as well as absence of procurement policy, there was cost overrun of Rs. 0.89 crore.

- The Burla unit of the Company framed (September 2007) an estimate for Rs. 80.38 lakh for replacement of 11 KV (GT) cables, which was approved (September 2008) by the BoD for Rs. 1.70 crore considering the prevailing market rate. Audit observed that due to lack of co-ordination between the unit office and the Corporate office as well as absence of a procurement policy, there was cost overrun of Rs. 89.37 lakh which would further increase since procurement action was not initiated till July 2009.
- As per terms of the tender call notice the contractor should bear all taxes and royalties including enhancement during execution of the works. During the period 2004-09, the Company paid Rs. 12.50 crore in 1,019 works of UIHEP without deducting service tax, which worked out to Rs. 27.99 lakh (calculated at the rate of 2.24 *per cent* on Rs. 12.50 crore) from the bills of the contractors.
- The Company did not include in the work/ purchase order placed on BHEL any penal/liquidated damage (LD) clause for delay in execution of works/supply of material for reasons not on record as was included in purchase/supply orders placed on other parties. Test check of records revealed that in 19 out of 20 work/purchase orders placed with BHEL during July 2001 to October 2007 in RHEP and UKHEP there was delay in delivery of material/execution of works for more than ten weeks. As there was no penal clause, the Company was not in a position to enforce timely completion of works/supply. The management stated (July 2009) that BHEL being the OEM, the Company had to accept the terms of BHEL. It also added that the issue was being taken up with BHEL.

- During the period 2004-05 to 2008-09, the Company released Rs. 1.89 crore to three security agencies towards emoluments, ESI, EPF, Sales Tax and Income Tax and supervision charges without ensuring the actual deposit of the same with the concerned authority as details of deposit made by these security agencies was not furnished by them.

Environment Management

2.43 Hydropower generation is environment friendly and hydro projects cause much less damage to the environment compared to thermal power projects. The important measures to be undertaken for preservation of the environment are (i) compensatory afforestation for loss of forest land, (ii) maintenance of water quality, (iii) measures for protection of flora and fauna and (iv) aquatic weed control.

The environment management system was inadequate.

Audit observed that there was no system in existence in the Company for treatment of effluents before disposal and monitoring of water quality. During the period between June 2004 and January 2009 due to leakage of turbine oil in HPS and UIHEP, 2,983 liters of turbine oil was mixed with waste water and released into the rivers. Further, though the Company spent Rs. 3.52 crore on peripheral development activities during the period 2005-09, it did not incur any expenditure on afforestation work. The expenditure on peripheral development activities included expenditure on electrification of villages for Rs. 2.24 crore under Rajiv Gandhi Gramin Vidyutikaran Yojana, despite decision of the BoD (February 2006) to exclude such expenditure from peripheral development activities.

Audit further observed that the Company disbursed Rs. 1.10 crore during March/May 1998 to the Divisional Forest Officer, Kalahandi for afforestation work. The Company, however, did not collect utilisation certificate for the same so far (May 2009). Thus, the Company did not take adequate measures for protection of the environment.

The Management accepted the audit findings in the exit conference and stated that steps were being taken for catchment area treatment and watershed management at UIHEP and UKHEP.

Security of dam and powerhouses

2.44 The safety and security of the dam at UIHEP and the seven power houses were looked after by the Company. The Company engaged private security agencies for this purpose. Audit observed that the Company neither had a security policy in place nor was a security officer employed to oversee and co-ordinate security related matters with the private security agencies although UIHEP, UKHEP and Balimela reservoirs are located in Naxalite-infested areas. The security personnel were not equipped with communication devices to transmit information in case of an emergency. Neither smoke detector devices nor fire fighting equipments were installed inside the

powerhouses. Further, no training was imparted to the employees of the Company on disaster management. In view of recent threats by Naxalites, the security issues need to be addressed on priority as the occurrence of any disaster would adversely affect the generational capabilities.

Manpower Management

2.45 As per the National Electricity Plan of April 2007, the technical and non-technical manpower requirement for the Tenth Plan (2002-07) in the hydropower sector in terms of installed capacity was 1.53 and 0.26 *per* MW respectively, whereas the same would be 1.38 and 0.23 *per* MW in the Eleventh Plan (2007-12). As against the above norm, the technical and non-technical men in position of the Company was 1.15 and 0.77 per MW in 2004-05, 1.17 and 0.68 in 2005-06, 1.15 and 0.64 in 2006-07, 1.11 and 0.63 in 2007-08 and 1.06 and 0.60 in 2008-09 respectively. Hence, the men-in position under the technical category was less than the norms whereas it exceeded the norms under the non-technical category for all the five years ending March 2009. Further, the technical manpower has also declined over the last three years. Though the shortfall in technical staff adversely affected the operation and maintenance of the units, the Management did not take any step to maintain the manpower requirement as per the norms during 2004-09. On this being pointed out in audit (May 2009), the Management decided (July 2009) for re-assessment of the manpower requirement of the Company.

As per the National Electricity Plan (April 2007), the present power scenario demands a comprehensive and pragmatic approach to develop and conserve valuable human resources. Thus, training was considered to be one of the important elements of human resource development. Accordingly, it is desirable that each employee of the organisation is exposed to at least two weeks' refresher/advanced training during a plan period of five years. Further, the Executives/Managers must be exposed to at least two weeks' management training during a plan period of five years. The Company operates a training centre as per the National Training Policy (March 2002) for the power sector. Scrutiny of records revealed that during July 2005 to March 2009 (42 months), training for Executives was conducted for 19 months only. The training policy of the Company stipulates training for all non-executives for at least seven days each year. The percentage of non-executive personnel trained by the Company, however, ranged from 0.57 to 4.28 in HPS, 2.34 to 11.18 in UIHEP, 7.16 to 12.04 in UKHEP and 0.41 to 3.24 in RHEP during July 2005 to March 2009. In case of BHEP training was imparted to 3.74 *per cent* of personnel in 2005-06 only and no training was imparted thereafter. The reasons for such poor performance in imparting training were not on record. Shortfall in training defeated the very objective of the training policy. Further, in respect of the executives sponsored for training outside the State no record was produced by the Company to ascertain their actual participation in the training and completion thereof.

The manpower requirement of the Company was not as per the norm of National Electricity Plan.

Audit observed that breakdown (August 2008) of Unit-I of RHEP was due to lack of technical knowledge of operating employees. The BoD opined (September 2008) to impart training to the technical personnel so as to avoid such kind of problems in future. The BoD reiterated (December 2008) the need for rigorous in-house training in the units.

The Management stated (October 2009) in the exit conference that a consultant had been appointed to study the manpower of the Company as a whole along with performance measurement system.

Internal control system

2.46 Internal control system is an essential part of the managerial control system. An efficient and effective internal control system helps the management to achieve the organisational objectives efficiently and effectively. The following deficiencies in the internal control system of the Company were noticed in audit:

- The Company did not have Civil engineers at the unit offices, though civil works were executed by the Company.
- The Company did not reconcile the difference between the gross generation and energy exported plus auxiliary and colony consumption plus transformation loss.
- Though the Company installed Supervising Control and Data Acquisition (SCADA) system at the Corporate office and in the unit offices, the bills of the units were not raised taking data through the SCADA system but were raised only after receipt of hard copy of the data from each of the units.
- The unit offices submit requisition for funds to the Corporate office stating details and purpose of the fund required, basing on which the Corporate office releases funds to the unit offices. The utilisation certificates submitted by the unit offices, however, did not indicate whether the fund has been spent on the purpose for which it was released. As a result, the Corporate office exercised little control over utilisation of funds by the unit offices.

The internal audit of the Company needed to be strengthened to be commensurate with the size of the Company.

The internal audit of the Company was conducted by firms of chartered accountants from the years 2005-06 to 2008-09. The Statutory Auditors for the years 2004-05, 2007-08 and 2008-09, however, opined that the internal audit functions carried out by the management of the Company at the units needed to be strengthened to be commensurate with the size of the Company and nature of its business.

The Management accepted (October 2009) the audit findings in the exit conference besides stating that action had been taken to strengthen the internal audit system.

Acknowledgement

Audit acknowledges the co-operation and assistance extended by the Management and staff of the Company at various stages of conducting the Performance Audit.

Conclusion

Though the Company was in existence from April 1995 it could not increase its installed capacity despite expenditure of Rs. 228.77 crore for installation of new projects as well as for augmentation of capacity of existing projects. Its plan for capacity addition of 2,341 MW remained unfulfilled.

The capacity utilisation of the generating units ranged from 62.75 to 93.90 *per cent* mainly due to forced outages of 1.17 lakh hours against 12.74 lakh hours available for generation resulting in loss of generation of 4,274 MU valued at Rs. 156.05 crore. Due to underutilisation of generating plants during the monsoon the Company could not generate 4,790 MU to earn revenue of Rs. 164 crore. The Company used 51.25 *per cent* of water available for generation of power. The expenditure on operation and maintenance, auxiliary consumption and transformation loss was in excess of the norms resulting in loss of Rs. 131.57 crore.

Non-realisation of cost of generation and excess holding of inventory also added to avoidable expenditure of Rs. 20.98 crore by the Company. There were deficiencies in contract management, manpower management, environmental management and monitoring and internal control system of the Company.

Recommendations

The Company should consider:

- **Preparing a perspective plan for increasing its installed capacity through addition of new generating units as well as by RMU of the existing units;**
- **Utilising its plants and machineries as well as water of the reservoirs efficiently by avoiding forced outages through planned maintenance of the plants and equipment;**
- **Reducing operation and maintenance expenditure and auxiliary consumption and transformation loss;**
- **Restructuring its manpower; and**
- **Strengthening its monitoring and internal control system.**