

**CENTRAL ELECTRICITY REGULATORY COMMISSION  
NEW DELHI**

**Petition No.324/2009**

**Coram: Dr. Pramod Deo, Chairperson  
Shri S.Jayaraman, Member  
Shri V.S.Verma, Member  
Shri M.Deena Dayalan, Member**

**DATE OF HEARING: 9.9.2010**

**DATE OF ORDER: 12.5. 2011**

**IN THE MATTER OF**

Petition for approval of Renovation and Modernization of Badarpur Thermal Power Station

**AND IN THE MATTER OF**

NTPC Ltd

Vs

1. North Delhi Power Ltd, Delhi
2. BSES Rajdhani Power Ltd, New Delhi
3. BSES Yamuna Power Ltd, Delhi
4. New Delhi Municipal Council, New Delhi
5. Military Engineering Services, New Delhi

**... Petitioner**

**..... Respondents**

**The following were present:**

- 1 Shri V.K.Padha, NTPC
2. Shri U.Mukhopadhyay, NTPC
3. Shri M.K.Srivastava, NTPC
4. Shri Ajay Dua, NTPC
5. Shri Manoj Saxena, NTPC
6. Shri Samir Agarwal, NTPC
7. Shri V.S.N.Murthy, NTPC
8. Shri V.Ramesh, NTPC
9. Shri D.G.Salpekar, NTPC
10. Shri A.K.Sahay, NTPC
11. Shri M.S.Ramesh, NTPC
12. Shri Trilok Kumar, NTPC
13. Shri S.K.Maheshwari, NTPC



## **ORDER**

This petition has been filed by the petitioner, NTPC for approval of Renovation and Modernization of Stage-II (Units 4 and 5) of Badarpur Thermal Power Station (hereinafter referred to as “the generating station”) in terms of Regulation 10 (1) of the Central Electricity Regulatory Commission (Terms and conditions of Tariff) Regulations, 2009 (hereinafter ‘the 2009 regulations’).

### **BACKGROUND**

2. The generating station was set up by the Government of India for meeting the growing demand of power in Delhi. The generating station was operated by Central Electricity Authority till March 1978 and with effect from 1.4.1978, Government of India entrusted the management of the generating station to the petitioner on management contract basis. The ownership of the generating station was transferred by the Government of India to the petitioner with effect from 1.6.2006. The petitioner has submitted that the entire power generated from the generating station (i.e.705 MW) is being supplied to the National Capital Territory of Delhi.

3. The present capacity, date of commissioning, age and operating hours of the various units of the generating station as submitted by the petitioner are as under:

<b>Units</b>	<b>Capacity (MW)</b>	<b>Date of Commissioning</b>	<b>Age as on 1.4.2009</b>	<b>Operating hours as on 30.11.2009</b>
1	95	26.7.1973	36 yrs	252749
2	95	5.8.1974	35 yrs	237821
3	95	29.3.1975	34 yrs	251508
4	210	2.12.1978	30 yrs	220360
5	210	25.12.1981	27 yrs	206526



4. The tariff of the generating station for the period from 1.4.2004 to 31.3.2009 was determined by the Commission by its order dated 9.5.2006 in Petition No.40/2004. Subsequently, the Commission by its order dated 28.9.2010 in Petition No.194/2009 revised the tariff of the generating station after considering the impact of additional capital expenditure incurred from the date of transfer (1.6.2006) till 31.3.2009.

5. The petitioner has submitted that Unit Nos.4 and 5 (2 x 210 MW) of the generating station which were commissioned during the years 1978 and 1981 respectively have completed more than 25 years of operation and more than 200,000 operating hours. Accordingly, the petitioner has planned the Renovation & Modernization/Life Extension of these units with the following objectives:

- (a) For life extension.
- (b) To sustain availability.
- (c) To overcome technological obsolescence.
- (d) To meet statutory & environmental norms.

6. The petitioner has submitted that R&M schemes for Unit Nos 4 and 5 of the generating station were initially formulated at an estimated cost of ₹27289 lakh (excluding taxes and duties) based on Residual Life Assessment (RLA)/Life Extension (LE) studies conducted by M/s BHEL which was approved by the Central Electricity Authority (hereinafter referred to as "CEA") vide its Letter No 3/2/NTPC/TRM/CEA/2004 dated 25.1.2005. The approved R&M Scheme was brought on the record of the Commission in compliance with the order of the Single Member Bench of the Commission passed on 26.7.2005. The Commission in its order dated 9.5.2006 in Petition No. 40/2004, while determining the tariff of the generating station



for the period 2004-09, had allowed capital dozing only of minor nature to sustain the operation of Stage I of the generating station (i.e. Unit Nos. 1 to 3) till they are phased out and agreed in principle to the renovation and modernisation of Unit Nos. 4 and 5 of the generating station keeping in view of the approval of the CEA to the R&M Scheme. The petitioner has also submitted that during the implementation of R & M schemes in respect of Units Nos.4 and 5, further discussions were held with the CEA and the manufacturers. It emerged from the discussion that advantage should be derived by leveraging the advanced technologies for enhancing the overall performance of the generating station. Accordingly, the R&M schemes were recast and approval to the revised schemes were accorded by CEA vide its letter No.3/2/NTPC/TRM-CEA/2008 dated 22.2.2008. The revised schemes included implementation of 14 R&M schemes for Life Extension Unit Nos.4 & 5 of the generating station at an estimated expenditure of ₹42864 lakh (excluding taxes & duties, contingency, IDC & FC). The petitioner has submitted that the R&M schemes were implemented during 2008-09 and are planned for implementation during 2009-14 in a phased manner during the planned shutdown of these units of the generating station.

7. The petitioner has submitted that CEA approval dated 22.2.2008 envisaged life extension by 15 to 20 years on implementation of the proposed R&M scheme. The petitioner has also submitted that since generation of power beyond 15 years after completion of R&M /LE schemes is not assured, the life of the units may be considered as 15 years after implementation of the schemes for the purpose of recovery of depreciation. It has been further submitted that in addition to R & M works of the main plant, the balance of plant and associated works were also required to be carried out for Life Extension. Accordingly, the petitioner has proposed to undertake the



following additional works to enable operation of the generating station in a closed cycle mode:

- (i) Construction of pipe line from Okhla barrage to the generating station.
- (ii) Additional Cooling Towers and associated mechanical and electrical works.
- (iii) Renovation of the existing Cooling Towers etc.

8. The petitioner has further submitted that the generating station being a takeover station, infrastructure facilities were in need of renovation so that minimum norms comparable to other generating stations of NTPC could be maintained for the employees. Accordingly, the petitioner has proposed to augment some of the facilities in the township of the generating station.

9. The petitioner has further submitted that the Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2004 provides that in case any expenditure on R&M and life extension is required for a generating station, the expenditure may be admitted by the Commission after the same is incurred. Based on the said provision and the necessity for R&M, the petitioner has gone ahead with the implementation of some of the schemes other than R&M/LE schemes.

10. The year-wise break-up of the estimated expenditures (including taxes and duties, contingency, IDC & FC) on R&M Schemes approved by CEA and other schemes as submitted by the petitioner are as per the details given overleaf.



(₹ in lakh)

Sl no	Description	2009-10	2010-11	2011-12	2012-13	2013-14	Total
1	R & M package approved by CEA	604	7148	20965	25867	48	54632
<b>2</b>	<b>Other Schemes</b>						
(i)	Plant schemes	69	3151	11175	3395	1668	19457
(ii)	Civil Works (Plant)	110	831	4299	2171	711	8122
(iii)	Civil Works (Township)	0.00	147	881	294	147	1468
(iv)	Schemes in progress	1598	680	241	0.00	0.00	2519
	<b>Total</b>	<b>2381</b>	<b>11957</b>	<b>37561</b>	<b>31727</b>	<b>2574</b>	<b>86198</b>

11. The petitioner has also identified certain works to be carried out exclusively for Stage-I of the generating station at an expenditure of ₹1816 lakh and has prayed that the expenditure be allowed to sustain the operation of the Stage I (Unit No. I to 3) of the generating station till they are phased out.

12. The petitioner has submitted that the proposed R& M scheme after implementation would extend the life of the plant and improve the operational efficiency and output of the machines and is thus the most cost effective way of ensuring power supply to its customers. Accordingly, the petitioner has sought approval of the Commission under Regulation 10(1) of the 2009 regulations to the Schemes with reference to the revised CEA clearance dated 22.2.2008 for Unit-4 and Unit-5 (2x210 MW) as indicated in Annexures III and IV of the petition and other schemes as indicated in Annexures V and VI of the petition.

13. None of the respondents has filed reply to the petition.



## **Examination of the proposal**

14. Based on the submission of the petitioner and the documents on record, we proceed to examine the proposal of the petitioner for approval of the R&M scheme for life extension of Unit Nos.4 & 5 the generating station.

15. Clause (1) of Regulation 10 of 2009 Regulations provides as under:

*“ The generating company or the transmission licensee as the case may be, for meeting the expenditure on renovation and modernization (R&M) for the purpose of life extension beyond the useful life of or a unit thereof or the transmission system shall make an application before the Commission for approval of the proposal with Detailed Project Report giving complete scope, justification, cost benefit analysis, estimated life extension from a reference date, financial package, phasing of expenditure, estimated completion cost including foreign component, if any, record of consultation with beneficiaries and any other information considered relevant by the generating company or the transmission licensee.”*

16. In accordance with the above provision, the petitioner has submitted the proposal for R&M Scheme for our approval. It is observed that the petitioner on the basis of the RLA studies conducted by M/s BHEL had submitted the detailed project report for life extension work on Unit Nos. 4 and 5 of the generating station to CEA. After detailed examination of the proposal and discussions with the engineers of the generating station, CEA found that life extension works on both the Units of the generating station were essential and accordingly, accorded approval to the schemes at an estimated cost of ₹27289 lakh vide its letter dated 25.1.2005. The approval of the CEA was brought on record of the Commission by the petitioner during the proceedings in Petition No. 40/2004. The Commission after examination of the proposed R&M schemes accorded in principle approval to the scheme in view of CEA approval in its order dated 9.5.2006 and directed the petitioner to furnish the details while filing



petition for revision of tariff after incurring R&M expenditure. It is further observed that the petitioner vide its letter dated 26.10.2007 had submitted a revised proposal for R&M and life extension of Unit Nos. 4 & 5 of the generating station containing 14 packages at an estimated cost of ₹ 44763 lakhs (excluding taxes and duties) and ₹ 58987 lakh (including taxes, duties, IDC and contingencies). While according approval to the R&M Schemes vide its Letter No.3/2/NTPC/TRM-CEA/2008 dated 22.2.2008, CEA has appreciated the necessity of the R&M scheme for the generating station in the following terms:

“The proposal has been examined on the basis of information furnished by NTPC and also discussions held with the engineers of NTPC. The R&M/Life Extension works on both the units 4 & 5 are considered essential in view of the fact that there is decline in operational efficiency due to ageing effect and constraints in optimum generation due to inferior quality coal/inadequate milling capacity, stringent environmental norms, obsolete C&I system etc. The scope of works to be undertaken under various packages is based on RLA studies, operational feedback and detailed discussion with power station/NTPC engineers and is found to be generally in order.”

Further CEA has observed that after implementation of R&M/Life Extension works, the station heat rate of Unit Nos.4&5 of the generating station is projected to improve by a minimum of 150 kcal/kWh, apart from extension of useful life of these units by 15 to 20 years. Accordingly, CEA has accorded approval to the proposal for R&M/Life Extension works of Unit Nos.4 & 5 of the generating station at an estimated cost of ₹ 42864 lakh (without taxes, duties and contingencies).

17. The petitioner has submitted the total expenditure proposed on the R&M scheme and the phasing of the scheme as per details quoted in para 10 above. The details of expenditures on approved R&M scheme submitted by the petitioner are indicated in the table given overleaf.





(₹ in lakh)

Sl.No.	Description	Project as per approval by CEA (incl. taxes & duties )	Actual up to end of the previous year (March 2009)
1	Main Plant Package (Boiler & Auxiliary TG & Auxiliary Electrical & C&I)	43588.00	886.24
2	Provision of Ambient Air quality Monitoring System (AAQMS)	120.00	102.35
3	Augmentation of Electro static precipitator (ESP)	3823.00	-
4	R&M works for 220 kV switchyard	1294.00	21.29
5	Procurement of 3 Nos. Dozers	410.00	410.00
6	Replacement of existing 6.6 KV PVC insulated power HT cables.	68.00	46.04
7	Replacement of existing station lighting fixtures etc.	65.00	-
8	Replacement of existing LT power & control cables.	40.00	40.00
9	Replacement of goods lift No.2 & 3 (2 nos)	88.00	-
10	Supply & Installation of ILMS & suspended magnets in CHP.	129.00	-
11	Water Treatment plant & De-mineralized water system	115.00	
(a)	Conversion of DM Water streams WBA/SBA system in WTP.	-	40.00
(b)	Replacement of online instrumentation in WTP	-	-
(c)	Replacement of DM pipelines with SS pipe Line	-	12.73
12	Repair & refurbishment of CHP Coal Hopper	100.00	-
13	Fire detection & protection system packing for UCB & MCB	399.00	-
14	Augmentation of Coal Unloading System (modification of conveyor 1A/ 1B)	176.00	-
	<b>TOTAL</b>	<b>50415.00</b>	<b>1558.65</b>

18. CEA had approved the estimated cost of R&M at ₹42864 lakh (excluding taxes and duties). However, the petitioner has calculated the expenditure at ₹50415 lakh (including taxes & duties). As on 31.3.2009, the petitioner has already incurred an expenditure of ₹1558.65 lakh (including taxes & duties) in respect of the R&M schemes. Moreover, out of the expenditure already incurred, actual expenditures on two items



are less than the approved cost. The actual expenditure on water treatment plant and demineralised water system was ₹70.00 lakh as against approved cost of ₹115.00 lakh and for replacement of 6.6 kV PVC insulated power cable, the actual expenditure incurred was ₹46.00 lakh as against the approved cost of ₹68.00 lakh. Thus, the total estimated expenditure on R&M schemes stands revised to ₹ 50348.00 lakh (₹50415 lakh - ₹67 lakh). After accounting for ₹1558.65 lakh which has already been incurred upto 31.3.2009, the petitioner has claimed an amount of ₹ 48789 lakh (including taxes and duties but excluding contingency, IDC & FC). Accordingly, our prudence check of the expected expenditures on R&M scheme has been confined to ₹ 48789.00 lakh during the period 2009-14 as discussed in the succeeding paragraphs.

**(A) CEA approved R&M schemes**

19. Prudence check of the items of expenditure included in the R&M scheme has been carried out and our observations on each of the items of expenditure are as under:

(a) **Main plant package:** An expenditure of ₹42701.76 lakh has been claimed for main plant package consisting of boiler, auxiliary turbine generator (TG), auxiliary electrical, and Control & Instrumentation (C&I). The R&M activities of this package is based on the RLA study and Condition Assessment of Steam Generator, Turbine Generator and connected auxiliaries as these Units have put in more than 200,000 operational hours and have outlived their useful life. The estimated gross value of the replaced old asset has been considered as 1/10<sup>th</sup> of the new asset and accordingly, corresponding decapitalisation to the extent of 1/10<sup>th</sup> of the new asset has been carried out alongwith the capitalization of new asset. Hence, the expenditure of ₹42701.76 lakh has been allowed along with the corresponding de-capitalization of ₹4270.18 lakh (i.e 10% of ₹ 42701.76 lakh) for



extension of useful life apart from achieving better reliability and sustained availability of these units of the generating station.

(b) **Ambient Air Quality Monitoring system (AAQMS):** The work on AAQMS is necessary to meet the norms specified under the environment protection laws. Since the expenditure of ₹17.65 lakh is for compliance of a statutory requirement, the same is allowed.

(c) **Augmentation of Electrostatic Precipitator (ESP):** An expenditure of ₹3823.00 lakh has been claimed towards ESP. This work is necessary to control the present high emission level which is in the range of 300-400 mg/Nm<sup>3</sup> in comparison to the average emission in the range of 100-150 mg/Nm<sup>3</sup> as required under the environmental norms specified by the Delhi Pollution Control Committee. Thus, the said claim has been allowed along with the corresponding de-capitalization of ₹382.30 lakh (10% of the value of new asset).

(d) **R&M works of 220 kV Switchyard:** An expenditure of ₹1272.71 lakh has been claimed under this head. This work is continuous in nature and consists of replacement of Current Transformers (CTs), circuit breakers, distance protection and bus-bar protection etc. The CT's and circuit breakers have an inadequate short circuit current rating of 31.5 kA which is less than the required rating of 40 kA. Moreover, the protection relays which are of electro-mechanical type are very old and have also become obsolete and unreliable. Hence, the expenditure of ₹1272.71 lakh has been allowed along with the corresponding de-capitalization of ₹127.27 lakh (10% of the value of new asset).

(e) **Replacement of existing station lighting fixtures etc:** An expenditure of ₹65.00 lakh has been claimed towards the replacement of existing station lighting fixtures etc. The existing light distribution boards, cables, wiring switchboards etc. have been damaged at various locations of the generating station over a period of time and are beyond repair, thereby hampering the operation and maintenance of the generating station and resulting in unsafe working conditions. Hence, the expenditure of ₹65.00 lakh for safe and efficient operation of generating station has been allowed along with the corresponding de-capitalization of ₹6.50 lakh (10% of the value of new asset).

(f) **Replacement of two goods lifts:** An expenditure of ₹88.00 lakh has been claimed towards the replacement of two goods lifts. The goods lifts are very old and the bearing, structure, pulley, sling etc. have all been damaged, thereby hampering the timely movement of equipments, tools etc. and causing delay in the maintenance activities of the generating station. Also, on account of obsolescence, spares and maintenance support is not available. Hence, the expenditure of ₹88.00 lakh for safe and efficient operation of generating station has been allowed along with the corresponding de-capitalization of ₹8.80 lakh (10% of the value of new asset).

(g) **Supply and Installation of In-Line Magnetic Separator (ILMS):** An expenditure of ₹129.00 lakh has been claimed under this head. The existing ILMS in the conveyor system is not working properly. As a result, the magnetic separator in the system trips the conveyor and affects the supply of coal to the coal bunkers. There is a necessity to replace ILMS. Hence, the expenditure of

₹129.00 lakh has been allowed along with the corresponding de-capitalization of ₹12.90 lakh (10% of the value of new assets).

(h) **Replacement of on-line instruments in the water treatment plant:** An expenditure of ₹17.44 lakh has been claimed for replacement of on-line instruments in water treatment plant. At present, samples are drawn manually and are analyzed off-line, which is time consuming and prone to error. Hence, an expenditure of ₹17.44 lakh along with corresponding de-capitalization of ₹1.74 lakh (10% of the value of new asset) has been allowed for replacement of online instruments in water treatment plant.

(i) **Repair and refurbishment of coal hopper in Coal handling plant:** An expenditure of ₹100.00 lakh has been claimed under this head. The coal hoppers and conveyor support structures are damaged due to spontaneous combustion of coal affecting the smooth flow of coal. Hence, the expenditure of ₹100.00 lakh along with the corresponding de-capitalization of ₹10.00 lakh (10% of the value of new asset) has been allowed for strengthening of coal hoppers in Coal Handling Plant.

(j) **Fire detection and protection system package for Unit Control Board (UCB) and Main Control Board (MCB):** An expenditure of ₹399.00 lakh has been claimed for fire detection and protection system package for Unit Control Board and Main Control Board. Provisions for firefighting system for control room and control equipments room have not been made since inception of the generating station and portable fire extinguishers of CO<sub>2</sub> gas and dry powder are being used to extinguish fire which is inadequate and unsafe. Hence, the expenditure of



₹399 lakh along with the corresponding de-capitalization of ₹39.9 lakh (10% of the value of new asset) has been allowed.

(k) **Augmentation of coal unloading:** An expenditure of ₹176.00 lakh has been claimed under this head. The conveyor structures and hoppers have deteriorated due to continuous exposure, thereby preventing coal conveyor to be used to its capacity. The spillage of coal leads to delay in the release of rakes. Since coal supply to the generating station is made through Indian Railways, bunching of coal rakes has aggravated the release time of rakes. Hence, the expenditure of ₹176.00 lakh along with the corresponding de-capitalization of ₹17.6 lakh (10% of the value of new asset) has been allowed.

20. Based on the above discussions, the total expenditure allowed (along with the corresponding de-capitalization) on CEA approved R&M schemes to be incurred during the period 2009-14 is as under:

	(₹ in lakh)					
	2009-10	2010-11	2011-12	2012-13	2013-14	Total
CEA approved R&M schemes (including taxes & duties)	539.44	6383.20	18723.14	23100.78	43.00	48789.56
De-capitalization	53.44	637.82	1871.55	2310.08	4.30	4877.19
<b>Total amount allowed CEA approved R&amp;M schemes (excluding IDC and FC)</b>	<b>486.00</b>	<b>5745.38</b>	<b>16851.59</b>	<b>20790.70</b>	<b>38.70</b>	<b>43912.37</b>

21. However, the contingency expenditure for an amount of ₹2521 lakh on CEA approved schemes has not been allowed at this stage as the same would be considered at the time of truing up at the end of tariff period 2009-14.

22. The petitioner has claimed an estimated amount of ₹3318 lakh towards Interest during Construction (IDC) and ₹198 lakh towards Financing Charges (FC) on CEA approved R&M schemes as a whole. However, the claims for IDC and FC during the period 2009-14 have been worked out on *pro rata* basis as ₹2963.17 lakh and ₹176.83 lakh respectively.

23. In response to the Commission's query on phasing of funds and implementation schedule, the petitioner vide its affidavit dated 28.5.2010 has submitted as under:

*"It is submitted that one of the major elements of proposed schemes for Units-IV & V under Main Plant Package (MPP) is that of R&M of steam turbine components and while filing the petition NTPC had envisaged major expenditure towards R&M of Unit-IV & Unit-V in the years 2011-12 & 2012-13. However, based on the actual response from the prospective Bidders and other major steam turbine manufacturers, it is learnt that in view of the very tight order position in current market scenario, they require minimum 24 months from the date of LOA for completion of supplies for steam turbine components. Accordingly there may be a shift in the proposed implementation schedule & fund phasing of expenditure towards R& M of Units-IV & V, which will be filed on actual basis at the time of truing up exercise."*

24. In view of the above explanation of the petitioner, the following projected expenditures on IDC and FC are being allowed on *pro rata* basis for the period 2009-14, subject to the actual expenditure as may be admissible at the time of truing up based on the actual implementation schedule and fund phasing.

<i>(₹ in lakh)</i>						
<b>Item</b>	<b>2009-10</b>	<b>2010-11</b>	<b>2011-12</b>	<b>2012-13</b>	<b>2013-14</b>	<b>Total</b>
Estimated IDC	32.76	387.68	1137.13	1403.00	2.61	2963.18
Estimated FC	1.96	23.13	67.86	83.72	0.16	176.83

25. Accordingly, expenditures on CEA approved R&M scheme allowed for 2009-14 (including IDC and FC) are as under:

<i>(₹ in lakh)</i>						
<b>Item</b>	<b>2009-10</b>	<b>2010-11</b>	<b>2011-12</b>	<b>2012-13</b>	<b>2013-14</b>	<b>Total</b>
Amount allowed on CEA approved scheme (excluding IDC and FC)	486.00	5745.38	16851.59	20790.70	38.70	43912.37
Estimated IDC allowed	32.76	387.68	1137.13	1403.00	2.61	2963.18
Estimated FC allowed	1.96	23.13	67.86	83.72	0.16	176.83
<b>Total</b>	<b>520.72</b>	<b>6156.19</b>	<b>18056.58</b>	<b>22277.42</b>	<b>41.47</b>	<b>47052.38</b>

**(B) Expenditure on other schemes (other than CEA approved schemes)**

26. The petitioner has claimed an expenditure of ₹31566 lakh on other schemes as per details given in the table at para 10 above. The admissibility of the expenditures after prudence check has been discussed as under:

**(a) Plant works:** An amount of ₹19457.27 lakh has been claimed under this head. The petitioner has furnished the asset-wise justification for incurring the said expenditure. After prudence check, expenditure of ₹1556.00 lakh which includes ₹1101.00 lakh on replacement of condenser tubes incurred/to be incurred on Stage-I Units has not been allowed, since these Units are planned to be phased out in the near future. The expenditure of ₹20.00 lakh on electronic weigh machine in respect of Units of Stage-II of the generating station has also not been allowed for capitalisation since it is in the nature of minor asset. Hence, an expenditure of ₹1576.00 lakh (₹1556.00 + ₹20.00 lakh) has not been allowed. From the balance amount of ₹17881.27 lakh (₹19457.27- ₹1576.00 lakh), the petitioner has claimed an expenditure ₹13850.00 lakh on integrated closed cycle operation of Circulating Water (CW) system due to deterioration



in the inlet raw water quality including modification in auxiliary cooling system from open cycle to closed cycle, as per the following cost estimates:-

(₹ in lakh)		
No	Package Name	Amount
1	Raw water pipe lines and raw water pumps.	2500.00
2	Sewage water treatment plant 4000 m3/hr chlorination plant plus CW chemical treatment.	5850.00
3	Conversion auxiliary cooling system to Close cycle system	100.00
4	Additional Cooling Tower of 30000 m3/hr	2000.00
5	Cooling Tower Pumps	1500.00
6	Renovation of existing CTs, CT pumps and replacement of hot water duct	1900.00
<b>Total estimated cost</b>		<b>13850.00</b>

In addition to the above, an expenditure of ₹2200 lakh has been claimed on the proposed Reverse Osmosis (RO) system for the De-Mineralized (DM) plant. Expenditure amounting to ₹1831.27 lakh has been claimed towards pay loaders, up-gradation of fire fighting system, environmental protection system, fire tenders etc. The claims of the petitioner are justified as these assets contribute to the extension of useful life of the generating station by 20 years with improved operational parameters. Hence, in terms of Clause (1) of Regulation 10 of the 2009 regulations, expenditure of ₹17881.27 lakh on plant scheme has been allowed after considering the corresponding de-capitalization of ₹174.13 lakh (estimated at 10%) on replaced assets. Accordingly, the net amount allowed for capitalization under this scheme works out to ₹17707.14 lakh (₹17881.27- ₹174.13 lakh).

**(b) Plant Civil Works:** An amount of ₹8121.50 lakh has been claimed by the petitioner under this scheme alongwith asset-wise justification for the expenditure. On prudence check, it is observed that expenditure for an amount of ₹1913.60 lakh on some assets such as repair and strengthening of RCC structure and plant roads is in the nature of O&M expenses or that of minor assets and hence are not allowed for capitalisation.

Accordingly, an amount of ₹ 6058.20 lakh has been allowed to be capitalized after considering the corresponding de-capitalization of ₹149.70 lakh (10 % of new asset) on account of replacement of old assets.

**(c) Township Civil Works:** An amount of ₹1468.00 lakh has been claimed by the petitioner under this head and the asset-wise justification towards the expenditure has been submitted. Township for the purpose of residence of the employees working in the generating station is an integral part of the generating station and is included in the main package at the time of construction. Since, the R&M Scheme is being implemented for life extension of the generating station by 15 to 20 years, it is necessary to ensure that the old buildings in the township are renovated/replaced to make it habitable for the employees of the generating station. Hence, an amount of ₹1468.00 lakh has been allowed to be capitalized along with the corresponding de-capitalization of ₹139.90 lakh (10%) on replaced assets. Accordingly, the net amount of ₹1328.10 lakh has been allowed to be capitalized.

**(d) Other works in progress:** An amount of ₹2519.02 lakh has been claimed under this head and the petitioner has furnished the asset-wise justification for the expenditure. In the said claim, certain expenditure pertaining to Stage-I of the generating station has been included. On prudence check, the expenditure of ₹260.44 lakh on Stage-I units has not been allowed as these units are to be phased out in near future. The petitioner's claim of ₹9.21 lakh on account of retrofitting of L.T. Air Circuit Breaker of Stages I & II has also not been allowed, since bifurcation of the said amount between Stage-I and Stage-II has not been furnished. An expenditure of ₹290.36 lakh projected to be incurred on assets such as Closed Circuit TV, convection super heater coils and scaffolding etc of Stage-II Units have not been allowed as these assets are in



the nature of O&M expenses or in the nature of minor assets. Hence, only the balance amount of ₹1959.02 lakh has been allowed to be capitalized under this head for the generating station.

27. Based on the above discussions, the total expenditures allowed on Other Schemes (other than CEA approved schemes) for 2009-14 are as under:

(₹ in lakh)						
	2009-10	2010-11	2011-12	2012-13	2013-14	Total
<b>Plant Works</b>						
Amount claimed	69.50	3150.77	11174.50	3395.00	1667.50	19457.27
Net Amount allowed	45.30	2584.34	10231.60	3232.10	1613.80	17707.14
<b>Plant Civil Works</b>						
Amount claimed	110.00	830.65	4298.90	2171.30	710.65	8121.50
Net Amount allowed	110.00	624.32	3060.92	1758.64	504.32	6058.20
<b>Township Civil Works</b>						
Amount claimed	0.00	146.80	880.80	293.60	146.80	1468.00
Net Amount allowed	0.00	132.81	796.86	265.62	132.81	1328.10
<b>Other works in progress</b>						
<b>Amount claimed</b>	1598.17	680.11	240.74	0.00	0.00	2519.02
<b>Net amount allowed</b>	1427.49	503.97	27.56	0.00	0.00	1959.02
<b>Total amount allowed</b>	<b>1582.79</b>	<b>3845.44</b>	<b>14116.94</b>	<b>5256.36</b>	<b>2250.93</b>	<b>27052.46</b>

28. The expenditures allowed for CEA approved schemes and Other Schemes are summarized as under:

(₹ in lakh)						
Items	2009-10	2010-11	2011-12	2012-13	2013-14	Total
Amount allowed for CEA approved scheme (including estimated IDC & FC)	520.72	6156.19	18056.6	22277.4	41.47	47052.38
Amount allowed for schemes other than CEA approved schemes	1582.79	3845.44	14116.9	5256.36	2250.93	27052.46
<b>Total</b>	<b>2103.51</b>	<b>10001.6</b>	<b>32173.5</b>	<b>27533.8</b>	<b>2292.4</b>	<b>74104.84</b>

29. The expenditure of ₹ 74104.84 lakh includes expenditure of ₹58055 lakh on R&M works of Unit-4 and Unit- 5, and expenditure of ₹16050 lakh on new assets such as Conversion of open cycle cooling water system to closed cycle CW system (₹13850 lakh) and Reverse Osmosis (RO) system of DM plant (₹2200 lakh). Considering the generation capacity of 420 MW (2 x 210 MW) of Unit Nos. 4 and 5 of the generating station and the expenditure of ₹58055 lakh on R&M works, the expenditure works out to ₹1.38 crore/MW [₹58055 lakh/420 MW] which would increase by ₹0.10 crore/MW [₹4266 lakh/420 MW=₹0.10 crore/MW] if the estimated contingency on the CEA approved schemes and expenditure on R&M schemes incurred upto 31.3.2009 are considered. As such, the total R&M cost for Unit Nos. 4 and 5 would work out to ₹1.48 crore/MW. Considering the benefits of extension of life of the generating station by 20 years and the improved operational norms and capacity after implementation of the R&M scheme, the expenditure of ₹1.48 crore/MW is on the lower side compared to the cost of about ₹4 to 5 crore/MW for a new generating station. The expenditure of ₹74104.84 lakh for R&M works and other works for Unit Nos. 4 and 5 of the generating station after prudence check is considered reasonable and is allowed in terms of Clause(1) of Regulation 10 of the 2009 regulations.

### **Station Capacity and Station Heat Rate after R&M**

30. CEA while according its approval for the R&M schemes has observed that pursuant to these R & M works, the turbine output was expected to achieve a capacity of 216 MW. The petitioner has submitted that at present, Unit Nos. 4 and 5 can achieve a maximum load of 204 MW only corresponding to Maximum continuous Rating (MCR) steam flow. However, up-rating of the units is not an issue in the present petition and the maximum rating of the Units could only be ascertained after all the R&M activities

are completed and actual performance of the Units is known. Most of the R&M works pertaining to Unit Nos.4 and 5 are to be completed by the end of the year 2012-13. CEA has further observed that there will be an improvement of 150 kCal/kWh on Units 4 and 5 of the generating station after completion of the R&M works, which translates into the reduction in the Station Heat Rate by 75 kCal/kWh. The normative Station Heat Rate as per the 2009 regulations is 2825 kCal/kWh. Accordingly, the revised Station Heat Rate shall be 2750 kCal/kWh, considering the overall improvement in the Station Heat Rate by 75 kCal/kWh. The revised Station Capacity and Station Heat Rate of the generating station after implementation of the R&M scheme shall be as under:

<b>Station Capacity</b>	<b>Station Heat Rate</b>
432 MW (2 x 216 MW)	2750 kCal/kWh.

31. The benefits of reduction of Heat Rate and increase in Unit capacity shall be passed on to the beneficiaries with effect from 1.4.2013, subject to the actual performance test conducted on these units by 30.9.2013. We direct the petitioner to furnish the actual Heat Rate and MW output of Units Nos.4 and 5 of the generating station after conducting the performance tests on these units, by 30.3.2013.

32. Petition No. 324/2009 is disposed of in terms of the above.

**Sd/-**  
**(M.DEENA DAYALAN)**  
**MEMBER**

**Sd/-**  
**(V.S. VERMA)**  
**MEMBER**

**Sd/-**  
**(S.JAYARAMAN)**  
**MEMBER**

**Sd/-**  
**(DR.PRAMOD DEO)**  
**CHAIRPERSON**

