



2. The petitioner has constructed Indira Sagar Hydroelectric Project, a multi-purpose project to facilitate power generation and create facilities for irrigation etc. Indira Sagar Hydroelectric Project, has three units, of which Unit I comprises dam and appurtenant works, Unit II comprises irrigation system and Unit III is dedicated to power generation. Unit I is common to both power generation and irrigation system. The generating station is of run-of-the-river (pondage) type.

3. Unit III is further sub-divided into 8 sub-units, called 'machines' for the purpose of the present order. The dates of commissioning of these machines is as indicated below:

Machine I	14.1.2004
Machine II	18.1.2004
Machine III	6.3.2004
Machine IV	29.3.2004
Machine V	27.7.2004
Machine VI	1.11.2004
Machine VII	7.1.2005
Machine VIII	31.3.2005 (anticipated)

4. As no confirmation regarding the actual commissioning of Machine VIII has been received from the petitioner, for the purpose of present order, Machines I to VII are being considered for approval of tariff.

5. The petitioner had earlier filed Petition No. 19/2004 for approval of provisional tariff for Machines I to IV. The provisional tariff was approved by the Commission by its order dated 6.12.2004, effective up to 31.3.2004. Accordingly,

the present petition is filed for approval of provisional tariff from 1.4.2004 and onwards.

6. The petitioner has claimed the following fixed charges on provisional basis:

(Rs. In crore)	
1.4.2004 to 26.7.2004 (Machines I to IV)	62.34
27.7.2004 to 31.10.2004 (Machines I to V)	65.27
1.11.2004 to 31.12.2004 (Machines I to VI)	49.46
1.1.2005 to 30.3.2005 (Machines I to VII)	85.42
31.3.2005 (All machines)	1.11

7. Thus, the total fixed charges claimed by the petitioner in respect of Machines I to VIII are Rs.263.60 crore. However, subsequently the petitioner vide its letter dated 18.1.2005 informed that the annual fixed charges for the period 1.4.2004 to 31.3.2005 have been revised to Rs.260.94 crore, based on provisional audited expenditure up to 7.1.2005 and anticipated expenditure for Machine VIII.

### **CAPITAL COST**

8. The petitioner has furnished the following details of capital cost:

		<b><u>Rs. In crore</u></b>
Capital Cost up to 31.3.2004 (Audited)	=	Rs.2347.17 (Machines I to IV)
Capital Cost up to 26.7.2004 (Provisionally Audited)	=	Rs.2501.68(Machines I to V)
Capital Cost up to 31.10.2004 (Provisionally Audited)	=	Rs.2664.40 (Machines I to VI)
Capital Cost up to 6.1.2005 (Provisionally Audited)	=	Rs.2747.95 (Machines I to VII)
Capital Cost up to 31.3.2005 (Anticipated)	=	Rs.3019.88 (Machines I to VIII)
Capital Cost up to completion of project (Anticipated)	=	Rs.3172.47

9. The above capital cost has been apportioned to different machines to work out the apportioned capital cost for each of them separately by uniformly distributing the expenditure incurred on common facilities. Based on this methodology, the apportioned capital cost on the date of commercial operation of the respective machine, as worked out by the petitioner to claim the provisional annual fixed charges are given below:

<b>Period</b>	<b>Number of Machines</b>	<b>Provisional Capitalised Cost (Rs. in crore)</b>
1.4.2004 to 26.7.2004	I to IV	1379.52
27.7.2004 to 31.10.2004	I to V	1744.79
1.11.2004 to 6.1.2005	I to VI	2102.29
7.1.2005 to 30.3.2005	I to VII	2432.94
31.3.2005	I to VIII	2890.43 (anticipated)

10. It is seen that the petitioner has claimed provisional annual fixed charges for eight machines based on anticipated capital expenditure of Rs.2890.43 crore. However, since we have already decided to limit provisional tariff for seven machines, the capital expenditure of Rs.2432.94 crore for seven machines is being considered.

### **METHODOLOGY**

11. The dam of Indira Sagar Hydroelectric Project was not completed to its full height when Machines I to VII started generating power. The dam has been completed up to the crest level of 245.13 meters against the Full Reservoir Level of 262.13 meters. Because of partially constructed dam, total head for generation is low, resulting in lower MW output compared to MW output achievable with the construction of dam up to its Full Reservoir Level. Therefore, the Commission

while approving provisional tariff for Machine I to IV by order dated 6.12.2004 in Petition No. 19/2004 had allowed proportionate reduction in annual fixed charges, in accordance with the following formula,

$$T = AFC \times P_1/P$$

Where,

T is proportionate annual fixed charges,

AFC is Annual Fixed Charges,

P is peak power available from generating station on completion of dam,  
and

P1 is the actual peaking provided by the generating station with the reduced height of dam.

12. At the hearing of the present petition, it was submitted on behalf of the petitioner that the methodology considered by the Commission in its order dated 6.12.2004 was causing a recurring loss to the petitioner. It was suggested that the provisional annual fixed charges be recalculated on the basis of likely completion cost of Rs.3527.54 crore the apportioned cost for which, the cost per machine works out to Rs.440.94 crore per machine. Thus, in the contention of the petitioner, annual fixed charges payable should be calculated on the basis of estimated completion cost of Rs.440.94 crore per machine. In our consideration, the methodology for calculation of annual fixed charges suggested by the petitioner is not justified since the actual capital cost on the date of commercial operation of each unit is to be considered to work out the annual fixed charges.

The methodology earlier considered by the Commission in its order dated 6.12.2004 has been applied to normalize the effect of actual peak power available to the beneficiary because of the reduced height of dam. As and when the dam is constructed to its Full Reservoir Level, the annual fixed charges will be revised.

13. At the hearing, it was submitted on behalf of the respondents that the machines cannot be said to be under commercial operation since, in accordance with the terms and conditions of tariff notified by the Commission on 29.3.2004 applicable from 1.4.2004, the date of commercial operation is reckoned only after the generating company has demonstrated the maximum continuous rating (MCR) of the machine. Accordingly, it was submitted by the respondents that power supplied from Indira Sagar Hydroelectric Project should be considered as infirm power as MCR of the machine has not been demonstrated by the petitioner. We do not find any merit in the submission made on behalf of the respondents. The supply of infirm power is regulated during the short period after the synchronization of the machine. In the present case, the machines are continuously generating for a long period from different dates as given in para 3 above. Accordingly, power generated at Indira Sagar Hydroelectric Project cannot be considered to be infirm power. Therefore, provisional tariff needs to be determined. The petitioner shall, however, demonstrate MCR when construction of dam is completed and water is filled up to Full Reservoir Level.

14. In the light of above discussion, the methodology considered by the Commission in its order dated 6.12.2004 for computation of provisional annual fixed charges has been adopted.

**PROVISIONAL ANNUAL FIXED CHARGES**

15. According to the petitioner, based on the machine manufacturers specification, the maximum output for turbine at the net head of 42M and 49M would be 84.5 MW and 109 MW respectively. The petitioner has considered the generator efficiency of 98%, based on which the maximum generator output per machine works out as follows:

Head (Meter)	Maximum generator output per Machine (MW)
42	82.81
49	106.82

16. Based on the above,  $P_1/P$  factor has been worked out as given here under:

Machine	P (MW)	$P_1$ (MW)	$P_1/P$ Ratio
I-IV	4x125=500	4x82.81=331.21	0.66248
I-V	5x125=625	5x106.82=534.10	0.85456
I-VI	6x125=750	6x106.82=640.92	0.85456
I-VII	7x125=875	7x106.82=747.74	0.85456

17. In keeping with the terms and conditions for determination of tariff notified by the Commission, the provisional annual fixed charges are worked out as under:

(Rs. in crore)

	Machines I to IV	Machines I to V	Machines I to VI	Machines I to VII
Actual date of commercial operation	29.3.2004	27.7.2004	1.11.2004	7.1.2005
Capital expenditure	137952	174479	210229	243294
<b>Annual Fixed Charges</b>				
Depreciation	3090.11	3908.34	4709.14	5449.79
Interest on Loan	7410.67	9372.93	11293.40	13069.61
Return on Equity	5793.96	7328.13	8829.64	10218.35
Advance against Deprecation	0.00	0.00	0.00	0.00
O&M expenses	2069.27	2617.19	3153.44	3649.41
Interest on Working Capital	481.01	608.38	733.03	848.32
<b>Total</b>	<b>18845.04</b>	<b>23834.96</b>	<b>28178.65</b>	<b>33235.47</b>
P <sub>i</sub> /P Ratio	0.66248	0.85456	0.85456	0.85456
Proportionate Annual Fixed Charges	12484.46	20368.41	24541.81	28401.71
<b>Provisional Annual Fixed Charges</b>	<b>10611.79</b>	<b>17313.15</b>	<b>20860.54</b>	<b>24141.45</b>

18. The following factors have been considered for the purpose of computation of provisional annual fixed charges:

- (a) Debt-equity ratio of 70:30;
- (b) Return on Equity @ 14% per annum;
- (c) Depreciation rate @ 2.24% per annum;
- (d) O&M @ 1.5% per annum of the estimated capital cost;
- (e) Rate of interest on working capital at SBI PLR of 10.25% per annum;
- (f) Spares for working capital @ 1% of the estimated capital cost;
- (g) Rate of interest @ 7.6742% per annum as claimed by the petitioner
- (h) The provisional annual fixed charges allowed are 85% of the proportionate annual fixed charges arrived at in the manner indicated above.

### **PRIMARY ENERGY RATE**

19. The petitioner has claimed tariff based on primary energy rate of 48.78 paise/kWh, the lowest variable charge of Central Sector Thermal Power Stations



in Western Region for the year 2003-04 as communicated by Western Regional Electricity Board. This has been allowed.

20. With the above, the present petition for approval of provisional tariff stands disposed of. The annual fixed charges approved are subject to fresh scrutiny at the time of final determination of tariff as regards the factual details like details of loan, capital expenditure, etc. The petitioner is directed to file appropriate petition(s) for approval of final tariff in accordance with the terms and conditions notified by the Commission from time to time based on the actual audited accounts as applicable on the date of commercial operation of respective machine by 31.10.2005, and till then the provisional tariff approved in this order shall continue to apply.

Sd/-  
**(BHANU BHUSHAN)**  
**MEMBER**

Sd/-  
**(K.N. SINHA)**  
**MEMBER**

Sd/-  
**(A.K.BASU)**  
**CHAIRMAN**

New Delhi dated the 12<sup>th</sup> May 2005