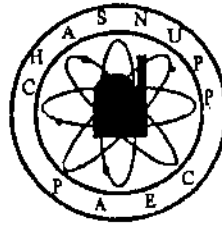


CHASHMA NUCLEAR POWER PLANT UNIT-1

Tariff Petition

for



Bulk Supply Tariff

To be applicable from July 01, 2008 and onwards

Filed with

National Electric Power Regulatory Authority  
(NEPRA)

Submitted by:

Director General

Chashma Nuclear Power Plant Unit-1, PAEC  
Kundian Distt. Mianwali

Friday, December 28, 2007

Copy No. 2

4325  
02-01-08

① E/A

# CHASHMA NUCLEAR POWER PLANT UNIT-1

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Ref. No. **C1-DG-50.15.1**

Friday, December 28, 2007

**The Registrar,**

National Electric Power Regulatory Authority

2<sup>nd</sup> Floor, OPF Building, Sector G-5/2

Islamabad.

Subject: **BULK SUPPLY TARIFF-CHASNUPP UNIT-1 (License # GL/017/2003)**

Dear Sir,

1. Chashma Nuclear Power Plant Unit-1 (C-1) is an Establishment of Pakistan Atomic Energy Commission (PAEC), which is a Public Sector Organization. C-1 started production from 13 June 2000.
2. C-1 is a Licensee of National Electric Power Regulatory Authority (NEPRA), by virtue of **Generation License No. GL/017/2003, issued on 09<sup>th</sup> September 2003**, in accordance with Licensing (Generation) Rules, 2000, under Section 15 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997.
3. Control period of existing Tariff of C-1, as determined by NEPRA vide letter No.NEPRAR/TRF-31/CHASNUPP-2004 dated 03-12-2004 and subsequently notified in official Gazette of Pakistan vide SRÖ No.436(1)/2005 dated 05-05-2005 is going to expire on **June 30, 2008**. C-1 is required to file a new tariff petition no later than **January 01, 2008**. Therefore, we submit herewith the comprehensive tariff proposal of C-1 for sale of electricity to the Central Power Purchasing Agency (CPPA) within National Transmission and Dispatch Company Limited (NTDC) for determination of tariff under provisions of NEPRA Tariff Standards and Procedure

Copy No. 2

4325  
02-01-08

Rules-1998 to be applicable from July 01, 2008 and onwards till rest of the plant life ending in year 2040.

4. Reference Tariff has been proposed in two (02) parts i.e. Capacity Purchase Price (CPP) and Energy Purchase Price (EPP) -- **Annex-III**. Moreover, Supplemental Charges/Other Pass-through Items are proposed to be charged to Central Power Purchasing Agency (CPPA) within NTDC. As directed by NEPRA, commercial audit of the accounts is already in progress ( report will be submitted in due course). The reference tariff has been proposed comprising of the following components:
  - i) **Energy Purchase Price (EPP)**
    - a) Fuel Cost Component (FCC)
  - ii) **Capacity Purchase Price (CPP)**
    - a) **Escalable Component**
      - o Establishment Charges
      - o Regulatory Fees
      - o Return on Equity (RoE)
      - o Depreciation of Short-Life Assets
      - o Depreciation of Capital Works in Progress/Completed
      - o Refueling outages
      - o Spares
      - o Miscellaneous Costs
    - b) **Non- Escalable Component**
      - o Provision for Decommissioning Fund
      - o Provision for Waste Disposal Fund
      - o Plant Depreciation
      - o Interest Charges on Debt
      - o Interest During Construction (IDC)
  - iii) **Supplemental Charges/Other Pass Through Items**
5. Basis and justification for the proposed cost components of the Reference Tariff and plant parameters are outlined in **Annex-II**. The reference tariff is subject to adjustments and indexation which are detailed in **Annex-VI**.
6. Director General C-1, Chief Accountant C-1 and Sr. Director, ASAD (Applied System Analysis Division), or their assigns and successors shall act as authorized representative of PAEC in matters concerning this Petition.

7. A payment of Rs.2,789,250= on account of Tariff Petition fee is appended with this application. Bank draft is enclosed.

8. Authority is requested for determination on the following:

- (i) Approval of Reference Tariff to be applicable from **July 01, 2008** and onwards till the rest of the plant life ending in year **2040** as per **Annexure-III**.
- (ii) Approval for the automatic adjustment and indexation of the reference tariff from time to time as explained in **Annexure-VI**.
- (iii) Approval for continuation of Capacity Charge Adjustment Factor (**CCAF**) as allowed by the authority in its earlier determination dated December 03, 2004.
- (iv) CPPA/NTDC may be directed to sign the Power Purchase Agreement (PPA) with C-1 as per order of the Authority in its earlier determination in December 2004.

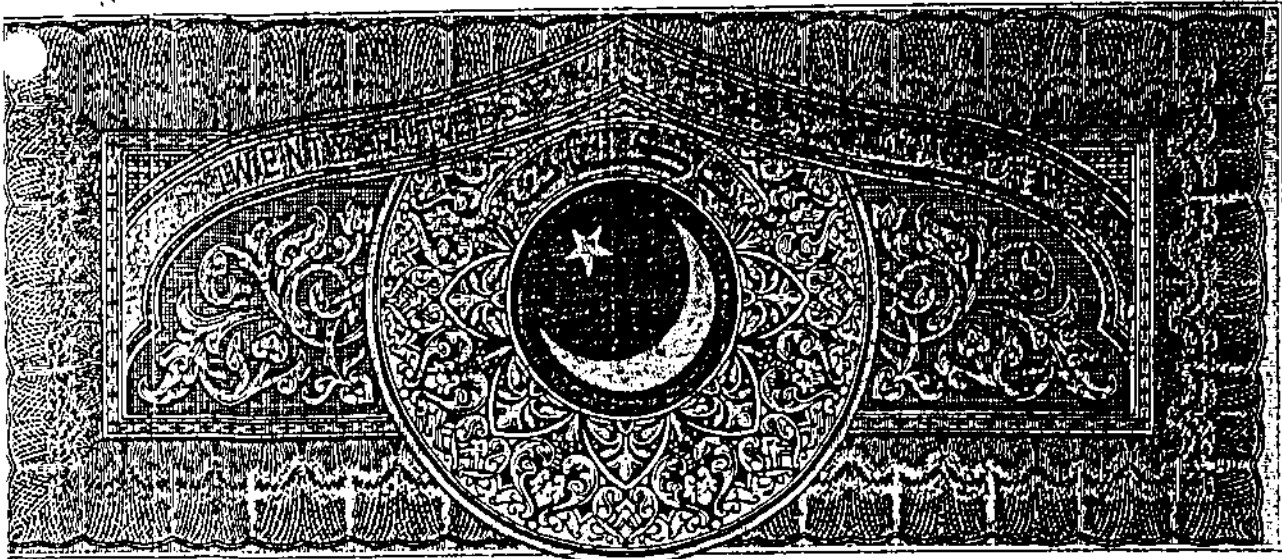
9. List of Annexes in support of Reference Tariff:

Annex-I	Affidavit
Annex-II	Basis of Reference Tariff
Annex-III	Reference Tariff
Annex-IV	Calculation of Capacity Purchase Price (CPP)
Annex-V (a~e)	Calculation of Energy Purchase Price (EPP)
Annex-VI	Adjustment, Indexation and Pass-through Items
Annex-VII	Historical Market Value & Indicators
Annex-VIII	Repayment Schedule of Debts and Owner's Equity
Annex-IX (A&B)	Provision for Decommissioning Fund

Best regards,

  
(Safder Habib)  
Director General



Annex-1

BEFORE THE NATIONAL ELECTRIC POWER REGULATORY AUTHORITY

Affidavit

I, Safder Habib, Director General, Chashma Nuclear Power Plant Unit-1 (CHASNUPP UNIT-1) (Generation License # GL/017/2003) being duly authorized representative/attorney of Chashma Nuclear Power Plant Unit-1, PAEC, hereby solemnly affirm and declare that the contents of the accompanying petition/application No. CL-DG-50.15.1 dated 28-12-07 including all supporting documents are true and correct to the best of my knowledge and belief and that nothing has been concealed. I also affirm that all further documentation and information to be provided by me in connection with the accompanying petition shall be true to the best of my knowledge and belief.

*(Signature)*  
(Safder Habib)

Director General  
Chashma Nuclear Power Plant Unit-1  
Kundian, Distt. Mianwali

Verified on this Friday 28 day of December that the contents hereof are true and correct to the best of my knowledge and nothing has been concealed.

*(Signature)*  
(Safder Habib)

Director General  
Chashma Nuclear Power Plant Unit-1  
Kundian, Distt. Mianwali

## Annex-II

### **BASIS OF REFERENCE TARIFF**

1) Installed & De-rated Capacity	325 MWe
2) Auxiliary Consumption	25 MWe
3) Net Capacity	300MWe
4) Heat Rate / Thermal efficiency	10,425 kJ/kWh
5) Fuel Average Burn up	~30,000 MWD/T Uranium
6) Energy Sale	1,839.60 Million kWh/annum
7) Capacity Factor	70% per annum

#### **8) Energy Purchase Price (EPP)**

Nuclear Fuel and its allied expenditures are the only component of EPP. The fuel is being arranged from foreign supplier. Sub-components of Reload Fuel Cost include:

- i) Natural Uranium ( $U_3O_8$ )
- ii) Conversion Services
- iii) Enrichment Services
- iv) Fabrication Services
- v) Fuel Management Services
- vi) Transportation, Insurance during Transportation and Storage etc.
- vii) Cost of Financing for advance payments to fuel supplier

#### **BASIS OF DETERMINATION OF COMPONENTS OF RELOAD FUEL COST:**

C-1 had fuel supply contract with foreign supplier for first five reloads (5<sup>th</sup> reload is likely to be loaded in reactor core in **August, 2008** during Refueling Outage (RFO-5).

Under the contract, price of Natural Uranium ( $U_3O_8$ ) was determined at International Market Rates based on the average value of following three prices:

- i) Average price published by TradeTech, USA in the NUEXCO Monthly Reports (The Nuclear Review) during the **calendar year** preceding the year of delivery.
- ii) Average price of  $U_3O_8$  deliveries to US utilities and supplies from foreign suppliers.

- iii) Average price of U<sub>3</sub>O<sub>8</sub> deliveries to European Union utilities under multi-annual contracts.

The prices for fuel processing services (conversion, enrichment and fabrication) were fixed for Reload-1 to Reload-5.

Whereas, as per recent contract with the fuel supplier for fuel supply of Reload-6 to Reload-8, prices of Natural Uranium (U<sub>3</sub>O<sub>8</sub>) and fuel processing services shall be determined as described in Table-A (Annex-II).

For Reload-9 and onwards, mechanism of fuel cost determination depends on terms and conditions to be negotiated and agreed with the fuel supplier.

As per NEPRA determination of December 2004, C-1 was allowed fixed EPP rate of Rs.0.32/kWh considering prevailing international fuel prices at that time. That time the price of U<sub>3</sub>O<sub>8</sub> in international market was US\$20.5/lb in year 2004 and in June 2007 it increased to US\$135/lb. Historical Market Value & Indicators of Natural Uranium Prices published in "The Nuclear Review", December 2007 is given as Annex-VII.

Fuel cost component of the Reference Tariff based on existing fuel supply contract with the supplier for Reload-5 has been worked out to Rs. 0.6026/kWh whereas for Reload-6, 7 & 8 it is estimated to Rs. 1.0636/kWh, Rs. 1.2154/kWh & Rs.1.2678/kWh respectively on the basis of new fuel supply contract. The increase in fuel price is mainly due to sharp rise in uranium prices in international market and partly due to correlation of the prices of allied services also to market rates. A brief comparison of total cost of each reload (Reload-1 to Reload-5) and future trend of reload prices (Reload-6, 7 & 8) has been given in Annex-V.

Keeping in view the tendency of major changes in fuel prices, it is submitted that fuel cost may be allowed as pass-through item as usual for all IPPs. Mechanism to adjust Fuel Cost Component of the Reference Tariff on account of variation in reload fuel cost has been defined at Annex-VI.



TABLE - A (Annex-II)

**UNIT PRICES FOR FUEL ASSEMBLIES**

**1. Unit Price for Fuel Assemblies for Reload-6**

- a) Unit Price of Natural Uranium Concentrate in the form of U<sub>3</sub>O<sub>8</sub> for Reload 6 is fixed as US\$ 105 per pound U<sub>3</sub>O<sub>8</sub>;
- b) Unit Price of Conversion Service (PC) for Reload 6 is fixed as US\$ 12.65 per kilogram Uranium (natural);
- c) Unit Price for enrichment service of Reload 6 (refer to as "NS") shall be calculated as:

$$NS = Nms + 5\% \times Nms$$

Where:

Nms = Average of NUEXCO/TradeTech's SWU restricted values of October, November, December 2007. (Ux price data will replace TradeTech data only if the data from TradeTech is not available)

- d) Unit price for Fuel Assemblies Fabrication for Reload-6 shall be RMB 3,850/KgU.

**2. Unit Price for Fuel Assemblies for Reload -7**

- a) Unit Price of Natural Uranium Concentrate in the form of U<sub>3</sub>O<sub>8</sub> for Reload 7 is fixed as US\$ 110 per pound U<sub>3</sub>O<sub>8</sub>;
- b) Unit Price of Conversion Service (PC) for Reload 7 is fixed as US\$ 12.65 per kilogram Uranium (natural);
- c) Unit Price for enrichment service of Reload 7 (refer to as "NS") shall be calculated as:

$$NS = Nms + 5\% \times Nms$$

Where:

Nms = Average of NUEXCO/TradeTech's SWU restricted values of March, April, May 2008. (Ux price data will replace TradeTech data only if the data from TradeTech is not available)

- d) Unit price for Fuel Assemblies Fabrication for Reload-7 shall be RMB 3,950/KgU.

**3. Unit Price for Fuel Assemblies for Reload -8**

**a) Natural Uranium Concentrate**

Unit price of Natural Uranium Concentrate in the form of U<sub>3</sub>O<sub>8</sub> shall be "PY"

$$PY = Nu + 5\% \times Nu$$

Where:

Nu = Average of NUEXCO/TradeTech's Exchange values for U<sub>3</sub>O<sub>8</sub> of June, July and August 2008. (Ux price data will replace TradeTech data only if the data from TradeTech is not available)

**b) Conversion Service**

Unit price for the Conversion Service (PC) shall be "PC"

$$PC = Pmc + US\$ 1.5/Kg U$$

Where:

Pmc = Average of North America and Europe market value published by TradeTech of November, December 2009 and January, 2010. (Ux price data will replace TradeTech data only if the data from TradeTech is not available)

**c) Enrichment Service**

Unit Price for enrichment service of Reload 8 (refer to as "NS") shall be calculated as:

$$NS = Nms + 5\% \times Nms$$

Where:

Nms = Average of NUEXCO/TradeTech's SWU restricted values of July, August and September 2010. (Ux price data will replace TradeTech data only if the data from TradeTech is not available)

**d) Fabrication of Fuel Assemblies**

Unit Price for Fuel Assemblies Fabrication for Reload-8 shall be RMB 4,275/KgU.

**IN-CORE FUEL MANAGEMENT SERVICES**

Total cost of In-Core Fuel Management Services for each reload (from Reload-6 to Reload-8) shall be fixed as RMB 1,593,750=.

**QUANTITIES OF MATERIAL AND SERVICES**

Material & Services	Quantity
Natural Uranium	97819.497 Kg U <sub>3</sub> O <sub>8</sub>
Conversion Services	82947.085 Kg U
Enrichment Services	55395.571 Kg SWU
Fabrication	11900 Kg U

9) **Capacity Purchase Price (CPP)**

i) **Escalable Components**

Cost of following escalable components of CPP will be as per prevalent indexed tariff based on NEPRA determination of December 2004. Only adjustment on account of projected CPI inflation of 7.5% will be required from July 01, 2008:

- a. Regulatory Fees
- b. Depreciation of Short Life Assets
- c. Refueling Outages
- d. Spares

Cost of following escalable components of CPP has slightly been enhanced in the proposed tariff. Also, one more component has been added. Brief basis and justification for increase are given below for each enhanced component:

a) **Establishment Charges**

It includes Pay and Allowances of Regular and Casual employees of the Plant. Sharpe increase during FY2005-06 and onwards is due to conversion of Basic Pay Scale (BPS) into Special Pay Scale (SPS) of Non-Technical Employees of all Strategic Organizations including PAEC in line with Technical Employees who already have SPS since FY2001-02. Budget estimates of Rs.580 Million for FY2007-08 are based on existing manpower and the same has been increased by 15% considering annual increments and expected increase in pay by GoP in July, 2008 and used for future projection from FY2008-09 and onwards. This amount may be indexed to change in CPI.

b) **Depreciation of Capital Works in Progress/Completed**

Some residential and office buildings have been constructed after commercial operation of the plant. Therefore, annual depreciation on straight line method for completed works has been charged in CPP. The depreciation amount may be indexed to change in CPI.



**c) Miscellaneous Costs**

It includes Transportation, Utilities, Communication, Commodities & Services, and Consultancy etc. In earlier determination the authority partially allowed the recovery of cost of commodities & services (*in-house services rendered by PAEC Establishments*) assuming that these transactions did not reflect arm-length transactions billed at market rate. In this connection, it is submitted that in fact C-1 is getting these services from sister organizations at cost which is much lesser as compared to market price of these services. C-1 contribute a certain percentage of annual operational and maintenance (O&M) expenditures of these service providers on the basis of cost sharing ratio (*approved by competent authority in PAEC*) among various establishment of PAEC. Therefore, the budget estimates for FY2007-08 has been used for proposed tariff. The amount may be indexed to change in CPI.

**d) Return on Equity**

Return on Equity has been revised on the basis of 1-Year KIBOR (10.4%) plus 2% premium which is subject to adjustment on account of variation in KIBOR on quarterly basis.

**ii) Non-Escalable Components**

**a) Provision for Decommissioning Funds**

In Tariff Determination-2004 NEPRA allowed Rs.117M per year as Provision for Decommissioning Fund (Rs.75M) and Waste Disposal Fund (Rs.42M) and advised C-1 to invest the amount in Pakistan Investment Bonds (PIBs). Since then C-1 is investing the funds in PIBs. As on October 2, 2007 the cumulative amount of the decommissioning fund (including profit) was Rs.353.1M. However, the Provision for Decommissioning Fund has been re-assessed on the basis of latest available global estimates and inflation rate.

The cumulative decommissioning funds of C-1, at the rate of Rs.75 M/year during 2005-2040, will be around Rs.22,839M in 2040 (**Annexure-IX-A**). The Present Value of this cumulative fund, which is highly dependent upon the assumed discount/inflation rate, will be:

- Rs.983.39M (US\$ 15.82M) with current official (State Bank of Pakistan's) discount rate of 10% p.a.

- Rs.2,099.93M (US\$ 33.79M) with historical inflation rate (annual average 7.5% experienced during 1982-2007).
- Rs.2,449.17M (US\$ 39.41M) with inflation rate target of MTDF (Medium Term Development Framework 2005-10, Planning Commission, GOP, May 2005, p 38) (7% p.a.). Assuming 1US\$=Rs.62.15

All these three estimates of present value of decommissioning fund of C-1 are very low compared to the global estimates for decommissioning cost of NPP. The methodology for estimating the costs of decommissioning have evolved over the last 25-30 years from simple ratios of the costs to decommission earlier simpler facilities to "bottom-up estimates", where detailed inventories of equipment and structure are analyzed and estimated for decontamination, removal, packaging, transportation and disposal.

- United States Nuclear Regulatory Commission (USNRC) has recently revised their estimates for cost of decommissioning (NUREG-1307, Revision 12, February 2007). A 325 MWe, PWR, type NPP will have decommissioning cost of **US\$270M** in 2006 prices i.e. 73% higher as compared to the USNRC's estimates of 1986 after adjusting for inflation during 1986-2006.
- In 2003, the OECD Nuclear Energy Agency published a survey report on policies, strategies and costs of decommissioning of nuclear power plants in 26 countries. Out of 22 data sets reported-for PWRs, 3 were close to size of C-1. The decommissioning costs (in US dollar for year 2001) of these three plants were **US \$909/kWe** (for Trino of Italy), **US \$341/kWe** (for Beznau of Switzerland) and **US\$340/kWe** (for Doel of Belgium). Ignoring the cost estimate for Trino, which was extremely high, the specific decommissioning cost of PWRs similar to size of CHASNUPP-I was around **US\$340/kWe** in 2001 prices (equal to US \$ 398/kWe in 2007 prices considering inflation rate in the US during 2001-07). Assuming this specific cost, the total decommissioning cost of C-1 will be around **US\$129M** in 2007 prices.

The assured completion of decommissioning activities is dependent on adequate funds to complete the work without risk to public and workers' health and safety and the environment. Therefore, it is imperative to enhance the collection of

decommissioning funds of C-1 at least @ Rs. 330 M/year. The adequacy of this fund should be reviewed by PAEC and NEPRA after every five years.

If allocation for decommissioning of C-1 increases to Rs.330 M/year from July 2008, the total amount of decommissioning fund by the year 2040 will be around Rs.74,657M including profit of PIBs (Annexure-IX-B). The present value of the total funds will be:

- Rs.3,2147M (US\$ 51.72M) with current official (State Bank of Pakistan's) discount rate of 10% p.a. This amount of fund is only 19% of the estimates by USNRC (US\$ 270M) and 40% of the estimates (US\$ 129M) based on OECD/NEA survey.
- Rs.6,864M (US \$ 110.45M) with historical inflation rate of 7.5 %. This amount is 41% of the estimates by USNRC and 86% of estimates based on OECD/NEA survey.
- Rs.8,005M (US\$ 128.82M) with inflation target of MTFD OF 7.0%. This amount is 48% of the estimates by USNRC and 100% of estimates based on OECD/NEA survey.

#### b) Provision for Waste Disposal Funds

The main objective in managing and disposing of radioactive waste is to protect people and the environment. This means isolating or diluting the waste so that the rate or concentration of any radio nuclides returned to the biosphere is harmless. To achieve this objective, practically all radioactive wastes are contained and managed and eventually disposed off in a radioactive waste disposal repository.

PAEC has plans to develop a National Radioactive Waste Repository, which will accept all type of solid radioactive waste including low, level, intermediate level and high level waste. The repository has its own acceptance criteria for each class of waste it can accept. For radioactive waste to be transferred to the repository it must be processed, conditioned and packaged to meet the acceptance criteria. To achieve this requirement, a Waste Management Facility has to be established at each plant site to process, condition, package and store the radioactive waste.

C-1 has a waste management processing and storage facilities as part of plant for the Low and Intermediate level waste. The cost of operation of this facility is already covered in the O&M cost of the plant and this is not included in these calculations. However the waste management processing and storage facilities provided with the plant are limited both in capacity and capability and additional facility is required for this purpose.

A new Waste Management Facility at C-1 site is being established. This facility will cater to all four NPP units built at the site. The cost of this facility is estimated to be Rs. 800 million. This amount will be divided among the four plants at the site @ Rs. 200 million/plant, therefore Rs. 200 million may be recovered from C-1. This cost of Rs. 800 million will be incurred in 4 years during 2008-2011 during the construction

of the facility. When the Waste Management Facility is operational it will process and store the waste and prepare it for disposal. The operation of this facility to process the waste from C-1 will cost 20 million / year. This processed waste will be transferred to National Repository and 30 million /year will be required to be paid to the National Repository as disposal charges. In total Rs. 50 million/year are to be allocated for processing and disposal of Low and Intermediate level solid waste until C-1 is finally shutdown for decommissioning.

The spent fuel from the reactor is stored in the spent fuel bay within the plant. However the capacity of the spent fuel bays is only for 15 re-loads and one full core. This capacity is not sufficient and after the fuel is cooled for 10 years it will be transferred to a Dry Storage facility located within the Waste Management Center. The Dry Storage campaign will be required in the year 2020, 2030 and 2050. It is assumed that C-1 will be permanently shutdown in 2040, therefore no Dry Storage campaign is planned in 2040. First campaign of 2020 will cost Rs. 800 million and the next two campaigns will cost Rs. 300 million each. During the final decommissioning phase of C-1 in the year 2080, the entire lot of spent fuel will be transferred from the Dry Storage Facility to the National Radioactive Waste Repository for deep geological disposal. This final disposal of spent fuel is estimated to cost Rs. 2000 million, to be paid to the Repository: (Above estimates are in 2007 prices)

The total cost for the above mentioned activities will result in an annual cost allocation of Rs. 206 million which will amount to Rs. 0.11/kWh to be charged per unit of electricity.

In 2004 C-1 requested Rs. 100 million for radioactive waste management and disposal. NEPRA allowed C-1, only Rs. 42 million / year for Waste Disposal Fund from the tariff. Out of this 50% could be utilized for management of radioactive waste on a yearly basis and rest of 50% to be kept for disposal. However this amount is quite insufficient to cover the expenses for the waste management and disposal as estimated above.

Internationally on an average the cost of managing and disposing of nuclear power plant wastes represents about 5% of the total cost of the electricity generated. The actual arrangements for paying for waste management and decommissioning also vary. The key objective is however always the same: to ensure that sufficient funds are available when they are needed. Most nuclear utilities are required by governments to put aside a levy (e.g. 0.1 cents per kilowatt hour in the USA, 0.14 c/kWh in France) to provide for management and disposal of their wastes.

The major cost of waste management will result from the cost of developing the Waste Repository. Its cost can only be roughly estimated at this time and it will be common for all types of waste including spent fuel and with enough capacity to cater to all radioactive waste of the country. Since C-1 is small plant, it would not be appropriate to charge a large fraction of the cost of the repository from it. Most of the proposed NPPs to be built by 2030 will be larger units of 1000 MWe each similar to those in the USA and larger fraction of cost will be recovered from them. However, temporary funding for the construction of above referred facilities will be borrowed from GoP.

Therefore PAEC is requesting an allocation of Rs. 114 million/year or Rs.0.06215/kWh which is equivalent to the amount of US. 0.1 cents / kWh, similar to that charged to the NPPs in the United States.

The adequacy of this fund should be reviewed by PAEC and NEPRA after every five years.

**c) Plant Depreciation**

As already allowed by NEPRA in its earlier determination, principal repayments of debt have been levelized over projected plant life of 40 years. This component has slightly been increased because of revision of repayment schedule at the rate of 9.41% per annum instead of 8% per annum.

**d) Interest Charges on Debt & IDC**

Economic Coordination Committee (ECC) of the Government of Pakistan (GoP) while approving tariff of Rs.3.15 per kWh in November, 2001 (not agreed by WAPDA/NTDC) asked C-1 to service its debt at the rate of 9.41% per annum interest. However, considering the prevailing market rates at the time of filing first tariff petition in May, 2004 the interest rate was reduced to 8.0% per annum as recommended by Central Development Working Party (CDWP) of GoP for Chashma Nuclear Power Project Unit-2 (C-2). However, in September 2006, during a meeting regarding debt servicing of C-1, the Ministry of Finance (MoF) advised C-1 to repay the loan along with interest at the rate of 9.41% per annum instead of 8% per annum. Therefore, interest charges on debt and IDC from FY2008-09 and onwards has been revised on the basis of interest rate of 9.41% per annum instead of 8% per annum.

## REFERENCE TARIFF

Annex-III

Description	Annual Revenue Requirement Rs. Million	FY-2008-09 to 2039-40	
		Rs./kWh	Rs./kW/Month
<b>A Energy Purchase Price (EPP)</b>			
Fuel Cost	1,108.52	0.6026	
<b>B Capacity Purchase Price (CPP)</b>			
<b>Escalable Component</b>			
Establishment charges	666.43	0.3623	185.1181
Regulatory Fees	15.02	0.0082	4.1709
Return on Equity (ROE)	121.80	0.0662	33.8334
Depreciation of Short-Life Assets	28.93	0.0157	8.0361
Depreciation of Capital Works in Progress	43.87	0.0238	12.1854
Refueling Outages	488.21	0.2654	135.6138
Spares	595.69	0.3238	165.4689
Miscellaneous O&M Costs	984.83	0.5353	273.5636
<b>Sub-Total</b>	<b>2,944.77</b>	<b>1.6008</b>	<b>817.9903</b>
<b>Non-Escalable Component</b>			
Provision for Decommissioning Fund	330.00	0.1794	91.6667
Provision for Waste Disposal Fund	114.00	0.0620	31.6667
Plant Depreciation	793.55	0.4314	220.4301
Interest Charges on Debt	1,738.43	0.9450	482.8960
Interest During Construction (IDC)	276.07	0.1501	76.6861
<b>Sub-Total</b>	<b>3,252.04</b>	<b>1.7678</b>	<b>903.3455</b>
<b>Total Capacity Purchase Price</b>	<b>6,196.81</b>	<b>3.3686</b>	<b>1,721.3358</b>
<b>Grand Total (A+B)</b>		<b>7,305.33</b>	<b>3.9712</b>
Net Capacity		300	MWe
Annual Plant Factor		70%	
Annual Generation		1839.60	Mil kWh



**CALCULATION OF CAPACITY PURCHASE PRICE (CPP)**

Annex-IV

COST COMPONENTS	Unit	2004-05	2005-06	2006-07	2007-08	From FY2008-09 and onwards to FY2039-40
		(Actual)	(Actual)	(Actual)	(Budgeted)	(Projected)
<b>A. Escalable Component</b>						
Establishment Charges	Mil. Rs.	339.32	467.28	520.82	579.50	666.43
Regulatory Fees	Mil. Rs.	10.89	8.47	12.37	14.00	15.02
Return on Equity (ROE)	Mil. Rs.	83.86	83.86	83.86	83.86	121.80
Depreciation of Short-Life Assets	Mil. Rs.	21.02	24.95	27.49	27.49	28.93
Depreciation of Capital Works in Progress	Mil. Rs.	13.13	25.71	40.81	40.81	43.87
Refueling Outages	Mil. Rs.	408.29	427.47	452.59	485.56	488.21
Spares	Mil. Rs.	526.96	532.37	539.45	548.75	595.69
Miscellaneous O&M Costs	Mil. Rs.	685.35	854.64	830.24	916.12	984.83
Transportation (TA/DA, POL etc.)	Mil. Rs.	41.67	55.75	66.15	52.67	56.62
Communication (Phone, Fax etc.)	Mil. Rs.	3.34	3.11	1.88	2.08	2.24
Utilities (Electricity, Gas etc.)	Mil. Rs.	108.64	93.98	126.87	95.21	102.35
Consumables, Commodities & Services etc.	Mil. Rs.	531.71	701.81	635.35	766.16	823.62
<b>Sub Total</b>	Mil. Rs.	<b>2,088.82</b>	<b>2,424.76</b>	<b>2,507.63</b>	<b>2,696.09</b>	<b>2,944.77</b>
	Rs./kW/Month	<b>580.23</b>	<b>673.54</b>	<b>696.56</b>	<b>748.91</b>	<b>817.99</b>
<b>B. Non-Escalable Component</b>						
Provision for Decommissioning Fund	Mil. Rs.	75.00	75.00	75.00	75.00	330.00
Provision for Waste Disposal Fund	Mil. Rs.	42.00	42.00	42.00	42.00	114.00
Plant Depreciation	Mil. Rs.	662.02	662.02	662.02	662.02	793.55
Interest Charges on Debt	Mil. Rs.	1,558.66	1,558.66	1,558.66	1,558.66	1,738.43
Interest During Construction (IDC)	Mil. Rs.	234.70	234.70	234.70	234.70	276.07
<b>Sub Total</b>	Mil. Rs.	<b>2,572.39</b>	<b>2,572.39</b>	<b>2,572.39</b>	<b>2,572.39</b>	<b>3,252.04</b>
	Rs./kW/Month	<b>714.55</b>	<b>714.55</b>	<b>714.55</b>	<b>714.55</b>	<b>903.35</b>
<b>Total CPP (A + B)</b>	Mil. Rs.	<b>4,661.21</b>	<b>4,997.14</b>	<b>5,080.02</b>	<b>5,268.47</b>	<b>6,196.81</b>
	Rs./kW/Month	<b>1,294.78</b>	<b>1,388.10</b>	<b>1,411.12</b>	<b>1,463.46</b>	<b>1,721.34</b>
	Rs./kWh	<b>2.0306</b>	<b>2.3027</b>	<b>2.6128</b>	<b>2.2353</b>	<b>3.3686</b>
Capacity (Net)	MWe	300	300	300	300	300
Annual Generation	Mil kWh	2,295.45	2,170.09	1,944.31	2,356.91	1,839.60

**CALCULATION OF ENERGY PURCHASE PRICE (EPP)**

Fuel Cost Components	Initial Core	Re-Load 1	Re-Load 2	Re-Load 3	Re-Load 4	Re-Load 5	Re-Load 6	Re-Load 7	Annex-V
	(Cycle-1)	(Cycle-2)	(Cycle-3)	(Cycle-4)	(Cycle-5)	(Cycle-5)	(Cycle-7)	(Cycle-8)	Re-Load 8
	(Actual)	(Actual)	(Actual)	(Actual)	(Actual)	Annex-V(a)	Annex-V(b)	Annex-V(c)	Annex-V(d)
	(Actual)	(Actual)	(Actual)	(Actual)	(Actual)	(Reference)	(Estimated)	(Estimated)	(Estimated)
<b>Total Generation (Gwh)</b>	3,664.150	2,507.170	2,902.540	3,123.140	2,874.672	2,933.010	2,976.615	2,964.375	2,964.375
<b>Fuel Cost (Mil. US\$)</b>	42.396	13.690	13.984	14.180	16.032	23.670	38.483	39.727	40.264
<b>Fuel Cost (Mil Rs.)</b>	1,105.321	811.283	836.822	821.746	981.089	1,448.745	2,391.706	2,469.004	2,502.388
<b>Transportation Cost (Mil Rs.)</b>	47.389	24.402	23.219	35.048	29.854	33.215	35.215	37.215	39.215
<b>Insurance (Mil Rs.)</b>	4.381	2.810	2.750	5.000	0.904	2.500	4.000	5.000	5.000
<b>Total Cost excluding Interest (Million Rs.)</b>	1,157.091	838.495	862.791	861.793	1,011.847	1,484.460	2,430.921	2,511.219	2,546.603
<b>Cost of Financing (Mil Rs.) *</b>						282.935	734.996	1,091.691	1,211.705
<b>Total Cost including Interest (Million Rs.)</b>	1,157.091	838.495	862.791	861.793	1,011.847	1,767.394	3,165.917	3,602.910	3,758.308
<b>EPP (Rs./kWh)</b>	0.3158	0.3344	0.2973	0.2759	0.3520	0.6026	1.0636	1.2154	1.2678

\* Interest on advance payments for Reload-5-8 has been accounted for at the rate of 12.40% per annum

RELOADS	UNIT PRICE	QUANTITY	UNIT PRICE	DATE	DATE	UNIT PRICE	AMOUNT	REMARKS
<b>FUEL COST</b>								
Price of U3O8+Conversion	7,595,990	60.85	462,215,992	05-Feb-07	20-Jan-09	1.959	581,154,095	Paid
Enrichment Services	5,561,860	60.85	338,439,181	18-Feb-07	20-Jan-09	1.929	424,030,433	Paid
Adjustment of U3O8	1,162,542	62.15	72,251,985	01-Jan-08	20-Jan-09	1.055	81,733,070	
70% of Total Fabrication Price	3,748,500	60.75	227,721,375	28-Sep-07	20-Jan-09	1.315	265,561,415	Paid
30% of Total Fabrication Price	1,606,500	62.15	99,843,975	03-Mar-08	20-Jan-09	0.885	110,725,225	
Adjustment of U3O8 after Delivery	3,994,724	62.15	248,272,097	01-Jul-08	20-Jan-09	0.556	264,948,025	
Sub-Total	23,670,116		1,448,744,604			0.000	1,728,153,263	
<b>TRANSPORTATION</b>								
Air/Ship Transportation			25,000,000	01-Apr-08	20-Jan-09	0.805	27,468,265	
Airport/Port Handling Charges	50,000	62.15	3,107,500	01-Apr-08	20-Jan-09	0.805	3,414,305	
TA/DA	32,180	62.15	2,000,000	01-Apr-08	20-Jan-09	0.805	2,197,461	
Container Rental	50,000	62.15	3,107,500	01-Apr-08	20-Jan-09	0.805	3,414,305	
Sub-Total	132,180		33,215,000			0.000	36,494,337	
<b>INSURANCE</b>								
Transportation Insurance			1,500,000	01-Apr-08	20-Jan-09	0.805	1,648,096	
Storage Insurance			1,000,000	01-Apr-08	20-Jan-09	0.805	1,098,731	
Sub-Total			2,500,000				2,746,827	
<b>Total Reload Fuel Cost</b>	<b>23,802,296</b>		<b>1,484,459,604</b>				<b>1,767,334,427</b>	

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RELOAD	VALUE (\$)	IS US\$	START DATE	END DATE	OPERATIONAL	OPERATIONAL	
<b>FUEL COST</b>							
Natural Uranium (U3O8)	22,647,566	62.15	1,407,546,227	15-Dec-07	19-May-10	2.427	1,869,358,821
Conversion Services	1,049,276	62.15	65,212,503	15-Dec-07	19-May-10	2.427	86,608,572
Enrichment Services	8,201,410	62.15	509,717,632	01-Feb-08	19-May-10	2.296	666,627,988
30% of Total Fabrication & Fuel Management Price	1,975,364	62.15	122,768,873	15-Jun-08	19-May-10	1.926	153,767,861
40% of Total Fabrication & Fuel Management Price	2,633,818	62.15	163,691,789	01-Aug-08	19-May-10	1.797	201,960,840
15% of Total Fabrication & Fuel Management Price	987,682	62.15	61,384,436	01-Jan-09	19-May-10	1.378	72,113,807
15% of Total Fabrication & Fuel Management Price	987,682	62.15	61,384,436	04-Mar-09	19-May-10	1.208	70,696,042
<b>Sub-Total</b>	<b>38,482,798</b>		<b>2,391,705,896</b>			<b>0.000</b>	<b>3,121,133,932</b>
<b>TRANSPORTATION</b>							
Air/Ship Transportation			27,000,000	01-Apr-09	19-May-10	1.132	30,818,124
Airport/Port Handling Charges	50,000	62.15	3,107,500	01-Apr-09	19-May-10	1.132	3,546,938
TA/DA	32,180	62.15	2,000,000	01-Apr-09	19-May-10	1.132	2,282,824
Container Rental	50,000	62.15	3,107,500	01-Apr-09	19-May-10	1.132	3,546,938
<b>Sub-Total</b>	<b>132,180</b>		<b>35,215,000</b>			<b>0.000</b>	<b>40,194,823</b>
<b>INSURANCE</b>							
Transportation Insurance			2,000,000	01-Mar-09	19-May-10	1.216	2,305,601
Storage Insurance			2,000,000	01-Apr-09	19-May-10	1.132	2,282,824
<b>Sub-Total</b>			<b>4,000,000</b>				<b>4,588,425</b>
<b>Total Reload Fuel Cost</b>	<b>38,614,978</b>		<b>2,430,920,896</b>				<b>3,165,917,180</b>

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RELOAD	UNIT	PRICE	AMOUNT	START DATE	END DATE	PERIOD	VALUE AT START OF OPERATING PERIOD
<b>FUEL COST</b>							
Natural Uranium (U308)		62.15	1,474,572,205	15-Aug-08	22-Sep-11	3.104	2,119,582,069
Conversion Services		62.15	65,212,503	01-Feb-08	22-Sep-11	3.641	99,810,419
Enrichment Services		62.15	509,717,632	01-Jul-08	22-Sep-11	3.227	743,314,680
30% of Total Fabrication & Fuel Management Price		62.15	125,850,456	15-Jul-08	22-Sep-11	3.189	182,705,090
40% of Total Fabrication & Fuel Management Price		62.15	167,800,650	01-Aug-08	22-Sep-11	3.142	242,284,166
15% of Total Fabrication & Fuel Management Price		62.15	62,925,259	01-Jul-09	22-Sep-11	2.227	81,639,767
15% of Total Fabrication & Fuel Management Price		62.15	62,925,259	01-Sep-09	22-Sep-11	2.058	80,034,721
Sub-Total			2,469,003,964			0.000	3,549,370,913
<b>TRANSPORTATION</b>							
Air/Ship Transportation			29,000,000	10-Sep-09	22-Sep-11	2.033	36,778,977
Airport/Port Handling Charges		62.15	3,107,500	10-Sep-09	22-Sep-11	2.033	3,941,058
TA/DA		62.15	2,000,000	10-Sep-09	22-Sep-11	2.033	2,536,481
Container Rental		62.15	3,107,500	10-Sep-09	22-Sep-11	2.033	3,941,058
Sub-Total			37,215,000			0.000	47,197,574
<b>INSURANCE</b>							
Transportation Insurance			2,000,000	10-Sep-09	22-Sep-11	2.033	2,536,481
Storage Insurance			3,000,000	10-Sep-09	22-Sep-11	2.033	3,804,722
Sub-Total			5,000,000				6,341,203
<b>Total Reload Fuel Cost</b>			<b>39,858,712</b>				<b>2,511,218,964</b>
							<b>3,602,909,689</b>

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RELOAD	Value	Rate	Value	Rate	Start Date	End Date	Rate	Value
<b>FUEL COST</b>								
Natural Uranium (U308)	23,726,021	62.15	1,474,572,205		01-Nov-08	24-Jan-13	4.233	2,416,541,701
Conversion Services	1,049,276	62.15	65,212,503		01-Mar-10	24-Jan-13	2.904	91,571,811
Enrichment Services	8,201,410	62.15	509,717,632		01-Nov-10	24-Jan-13	2.233	661,735,708
30% of Total Fabrication & Fuel Management Price	2,186,094	62.15	135,865,742		15-Mar-11	24-Jan-13	1.866	168,976,918
40% of Total Fabrication & Fuel Management Price	2,914,792	62.15	181,154,323		01-Aug-11	24-Jan-13	1.485	215,493,015
15% of Total Fabrication & Fuel Management Price	1,093,047	62.15	67,932,871		01-Jan-12	24-Jan-13	1.066	76,945,697
15% of Total Fabrication & Fuel Management Price	1,093,047	62.15	67,932,871		02-Mar-12	24-Jan-13	0.899	75,457,099
<b>Sub-Total</b>	<b>40,263,687</b>		<b>2,502,388,147</b>					<b>3,708,721,950</b>
<b>TRANSPORTATION</b>								
Air/Ship Transportation			31,000,000		01-Feb-12	24-Jan-13	0.981	34,765,974
Airport/Port Handling Charges	50,000	62.15	3,107,500		01-Feb-12	24-Jan-13	0.981	3,485,009
TA/DA	32,180	62.15	2,000,000		01-Feb-12	24-Jan-13	0.981	2,242,966
Container Rental	50,000	62.15	3,107,500		01-Feb-12	24-Jan-13	0.981	3,485,009
<b>Sub-Total</b>	<b>132,180</b>		<b>39,215,000</b>					<b>43,978,957</b>
<b>INSURANCE</b>								
Transportation Insurance			2,000,000		01-Feb-12	24-Jan-13	0.981	2,242,966
Storage Insurance			3,000,000		01-Feb-12	24-Jan-13	0.981	3,364,449
<b>Sub-Total</b>			<b>5,000,000</b>					<b>5,607,415</b>
<b>Total Reload Fuel Cost</b>	<b>40,395,867</b>		<b>2,546,603,147</b>					<b>3,758,308,323</b>

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QUANTITIES AND UNIT PRICE OF NATURAL URANIUM AND ALLIED SERVICES

Services	Unit	2006/07		2007/08		2008/09		2009/10	
		Quantity	US\$	Quantity	US\$	Quantity	US\$	Quantity	US\$
Natural Uranium (U3O8)	Kg U3O8	107,983.678	113.860	97,819.497	231.525	97,819.497	242.550	97,819.497	242.550
Conversion Services	Kg U	91,565.910	5.000	82,947.085	12.650	82,947.085	12.650	82,947.085	12.650
Enrichment Services	Kg SWU	49,926.926	111.400	55,395.571	148.050	55,395.571	148.050	55,395.571	148.050
Fabrication Services	Kg U	11,900.000	450.000	11,900.000	** 534.722	11,900.000	** 548.611	11,900.000	** 593.750
Fuel Management Services	Fixed				** 221,354.167		** 221,354.167		** 221,354.167

\* Estimated on the basis of Reload-7 Prices because published data of TradeTech is not yet available.

\*\* Conversion rate for RMB into US\$ is 7.2

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Annex-VI

Adjustments, Indexation and Pass-through Items

1. **Adjustment of Fuel Cost Component of Energy Purchase Price in the Reference Tariff**

The Fuel Cost Component of the EPP in the Reference Tariff applicable during the entire period of Operating Cycle # n will be adjusted with Fuel Price Adjustment Factor (FPAF) at the start of Operating Cycle #n (Operating Cycle is a period from the beginning of Refueling Outage till the beginning of next Refueling Outage.) as provided in the following formula:

$$FCC_{(REV)} = FCC_{(REF)} \times FPAF$$

Where:

**FCC<sub>(REV)</sub>** the applicable Fuel Cost Component revised at the start date of Operating Cycle # n

**FCC<sub>(REF)</sub>** the value of Fuel Cost Component of the Reference Tariff, expressed in Rs./kWh as indicated in Annex-V (Rs.0. 6026/kWh)

**FPAF** the index to calculate variation in Fuel Cost Component for Operating Cycle # n. It is calculated as follows:

$$FPAF = \text{Fuel Price for Reload \# n-1 (ACT)} \div \text{Fuel Price for Reload \# 5 (REF)}$$

Where:

**Fuel Price for Reload # 5 (REF)** the Rupee value of total Fuel Price for Reload # 5 as indicated in Annex-V (Rs. 1,767.39 Million)

**Fuel Price for Reload #n-1 (ACT)** the Rupee value of total Reload Fuel Price actually paid for Reload # n-1 to the supplier including cost of financing at 1-Year KIBOR (10.4%) plus 2% premium for advance payments of fuel.



C-1 shall submit the adjustment proposal before the start of scheduled Refueling Outage. The Authority may determine the adjustment of Fuel Cost Component effective from start of new Operating Cycle. The first adjustment shall be submitted two months before Operating Cycle-7 (after RFO-6).

**2. Indexation of Escalable Component of Capacity Purchase Price**

As already allowed in existing tariff, the escalable component of CPP shall be adjusted on account of CPI inflation as notified by Federal Bureau of Statistics (FBS) on semi-annual basis.

The adjustments shall be made twice a year on 1st January and 1st July. The first adjustment on account of inflation shall be carried out on **1st January, 2009**.

The Escalable Component (EC) shall be indexed as follows:

$$EC_{(REV)} = EC_{(REF)} \cdot (CPI_{(REV)} / CPI_{(REF)})$$

Where:

EC<sub>(REV)</sub> = the revised applicable escalable component of Capacity Purchase Price

EC<sub>(REF)</sub> = the reference escalable component of Capacity Purchase Price adjusted as a result of test carried out by NTDC

CPI<sub>(REV)</sub> = the revised Consumer Price Index (CPI)

CPI<sub>(REF)</sub> = the reference Consumer Price Index as notified by Federal Bureau of Statistics for the month of **September, 2008**

**3. Adjustment of CPP through CCAF Mechanism**

In Tariff determination made by the authority on December 03, 2004, the purchaser (NTDC) had expressed its concern that in the absence of continuous and stable availability of power from C-1, NTDC would be at disadvantage because it will be paying a fixed amount of money (through CPP) and not getting any electricity in return and this in turn would not be fair to consumer who would ultimately have to bear the cost in the shape of cost pass-through by CPPA. The authority then in order to fairly distribute the risk of non-availability of capacity between NTDC & C-1, introduced Capacity Charge Adjustment Factor (CCAF) mechanism. According to

this mechanism, the capacity payments for the period excluding scheduled outage, maintenance period and force majeure conditions for a month, would be adjusted downwards by a CCAF, if units generated (and available for delivery) in a month fall below 60% of plant factor (capacity availability). Similarly, the capacity payments would be adjusted upwards by CCAF for any generation in excess of 75% during a month.

Incentive based tariff determined by NEPRA on December 03, 2004 resulted in improved performance of the plant during the tariff control period. Annual Capacity Factor achieved during FY-2004-05, 2005-06 & 2006-07 is 87%, 83% and 74% respectively. However, in long run such level of performance can not be maintained. Since the performance of a Nuclear Power Plant is adversely correlated with the life of the plant. As long the plant gets older, its capacity availability decreases, therefore the designed rating of the plant guaranteed by the manufacturer is 70%. Therefore, for future, incentive based tariff will motivate C-1 to achieve maximum capacity.

It is therefore, submitted that the Authority may allow to continue CCAF mechanism as allowed in determination made in December 03, 2004 for future tariff to be applicable from July 01, 2008 and onwards.

#### **4. Capacity Payment during outage**

Authority is requested to allow to continue full capacity payment during the scheduled outage, maintenance period and force majeure conditions.

#### **5. Other Pass-through Items**

The following Items in addition to nuclear fuel shall be payable by NTDC to C-1 on the basis of actual cost incurred by C-1.

- (1) Payments into Workers' Welfare Fund or Workers' Profit Participation Fund.
- (2) Costs incurred by C-1 for modifications or expansion of the requirements for protective device required by NTDC.
- (3) Corporate taxes; including Income Tax, Turnover Tax, and duties levied by the government on spare parts, consumables, etc.



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## RE-PAYMENT SCHEDULE OF DEBT, IDC &amp; OWNER'S EQUITY

Annex-VIII

GOVERNMENT DEBT				IDC		OWNER'S EQUITY			
Total	29,725.48			9,388.14		1,000.00			
Recovered during year 1-8 at 8%p.a.	(4,331.95)			(1,877.63)		(41.06)			
Balance as on 30-06-2007	25,393.55			7,510.51		958.94			
Gross up Value at 9.41% p.a.				8,834.24					
Interest Rate (p.a)	9.41%			9.41%		12.40%			
Period (Years)	32			32.00		32.00			
Yearly Installment (Mil Rs.)	2,531.97			276.07		121.80			
Year	Principal	Interest	Balance	Amortization	Balance	Principal	ROE	Instalment	Balance
2008/09	142.44	2,389.53	25,251.11	276.07	8,558.17	2.89	118.91	121.80	956.05
2009/10	155.84	2,376.13	25,095.26	276.07	8,282.10	3.25	118.55	121.80	952.80
2010/11	170.51	2,361.46	24,924.76	276.07	8,006.03	3.65	118.15	121.80	949.15
2011/12	186.55	2,345.42	24,738.20	276.07	7,729.96	4.11	117.69	121.80	945.04
2012/13	204.11	2,327.86	24,534.09	276.07	7,453.89	4.62	117.18	121.80	940.42
2013/14	223.32	2,308.66	24,310.78	276.07	7,177.82	5.19	116.61	121.80	935.24
2014/15	244.33	2,287.64	24,066.45	276.07	6,901.75	5.83	115.97	121.80	929.41
2015/16	267.32	2,264.65	23,799.12	276.07	6,625.68	6.55	115.25	121.80	922.85
2016/17	292.48	2,239.50	23,506.65	276.07	6,349.61	7.37	114.43	121.80	915.49
2017/18	320.00	2,211.98	23,186.65	276.07	6,073.54	8.28	113.52	121.80	907.21
2018/19	350.11	2,181.86	22,836.54	276.07	5,797.47	9.31	112.49	121.80	897.90
2019/20	383.06	2,148.92	22,453.48	276.07	5,521.40	10.46	111.34	121.80	887.44
2020/21	419.10	2,112.87	22,034.38	276.07	5,245.33	11.76	110.04	121.80	875.68
2021/22	458.54	2,073.44	21,575.84	276.07	4,969.26	13.22	108.58	121.80	862.47
2022/23	501.69	2,030.29	21,074.16	276.07	4,693.19	14.85	106.95	121.80	847.61
2023/24	548.90	1,983.08	20,525.26	276.07	4,417.12	16.70	105.10	121.80	830.92
2024/25	600.55	1,931.43	19,924.71	276.07	4,141.05	18.77	103.03	121.80	812.15
2025/26	657.06	1,874.92	19,267.66	276.07	3,864.98	21.09	100.71	121.80	791.06
2026/27	718.89	1,813.09	18,548.77	276.07	3,588.91	23.71	98.09	121.80	767.35
2027/28	786.53	1,745.44	17,762.23	276.07	3,312.84	26.65	95.15	121.80	740.70
2028/29	860.55	1,671.43	16,901.68	276.07	3,036.77	29.95	91.85	121.80	710.74
2029/30	941.53	1,590.45	15,960.16	276.07	2,760.70	33.67	88.13	121.80	677.07
2030/31	1,030.12	1,501.85	14,930.04	276.07	2,484.63	37.84	83.96	121.80	639.23
2031/32	1,127.06	1,404.92	13,802.98	276.07	2,208.56	42.54	79.26	121.80	596.70
2032/33	1,233.11	1,298.86	12,569.87	276.07	1,932.49	47.81	73.99	121.80	548.89
2033/34	1,349.15	1,182.82	11,220.72	276.07	1,656.42	53.74	68.06	121.80	495.15
2034/35	1,476.10	1,055.87	9,744.61	276.07	1,380.35	60.40	61.40	121.80	434.75
2035/36	1,615.01	916.97	8,129.61	276.07	1,104.28	67.89	53.91	121.80	366.85
2036/37	1,766.98	765.00	6,362.63	276.07	828.21	76.31	45.49	121.80	290.54
2037/38	1,933.25	598.72	4,429.38	276.07	552.14	85.77	36.03	121.80	204.77
2038/39	2,115.17	416.80	2,314.21	276.07	276.07	96.41	25.39	121.80	108.36
2039/40	2,314.21	217.77	0.00	276.07	0.00	108.36	13.44	121.80	0.00
Total	25,393.55	55,629.62		8,834.24		958.94	2,938.07	3,897.61	
Levelized (Year 9-40)	793.65	1,738.43		276.07		29.97	91.83	121.80	
Levelized (Year 1-8)	662.02	1,558.66		234.70		25.00	58.86	83.86	

DECOMMISSIONING FUND AS PER EXISTING TARIFF

ANNEXURE-X-A

0	1	2	3	4	5	6	7	8	9	10
Year	Period	Investment	Reinvest merit	Principal Maturity Reinvest	Investment Amount	ROR	Tenor	Semi Annual Profit	Progressive total	Principal Maturity
			+9	+10	(2+3+4)					+6
2004-05	0.50	75	3.75		76.00	10%	20	3.75	3.75	
	1.00		3.84		3.75	10%	20	0.18	3.94	
2005-06	1.50	75	7.88		78.94	10%	20	3.95	7.88	
	2.00		8.28		83.28	10%	20	0.39	8.28	
2006-07	2.50	75	12.44		12.44	10%	20	4.18	12.44	
	3.00		13.08		88.08	10%	20	0.62	13.08	
2007-08	3.50	75	17.47		17.47	10%	20	4.40	17.47	
	4.00		18.34		93.34	10%	20	0.87	18.34	
2008-09	4.50	75	23.01		23.01	10%	20	4.67	23.01	
	5.00		24.18		99.18	10%	20	1.15	24.18	
2009-10	5.50	75	29.12		29.12	10%	20	4.98	29.12	
	6.00		30.57		105.57	10%	20	1.46	30.57	
2010-11	6.50	75	35.85		35.85	10%	20	6.28	35.85	
	7.00		37.84		112.84	10%	20	1.79	37.84	
2011-12	7.50	75	43.28		43.28	10%	20	5.83	43.28	
	8.00		45.44		120.44	10%	20	2.18	45.44	
2012-13	8.50	75	51.48		51.48	10%	20	6.02	51.48	
	9.00		54.03		129.03	10%	20	2.57	54.03	
2013-14	9.50	75	60.49		60.49	10%	20	8.45	60.49	
	10.00		63.51		138.51	10%	20	3.02	63.51	
2014-15	10.50	75	70.44		70.44	10%	20	6.93	70.44	
	11.00		73.96		146.96	10%	20	3.52	73.96	
2015-16	11.50	75	81.41		81.41	10%	20	7.45	81.41	
	12.00		85.40		180.40	10%	20	4.07	85.40	
2016-17	12.50	75	93.50		93.50	10%	20	8.02	93.50	
	13.00		98.18		173.18	10%	20	4.65	98.18	
2017-18	13.50	75	108.83		108.83	10%	20	6.66	108.83	
	14.00		112.18		187.18	10%	20	3.34	112.18	
2018-19	14.50	75	121.53		121.53	10%	20	9.30	121.53	
	15.00		127.81		202.81	10%	20	6.08	127.81	
2019-20	15.50	75	137.74		137.74	10%	20	10.13	137.74	
	16.00		144.83		219.83	10%	20	6.89	144.83	
2020-21	16.50	75	155.81		155.81	10%	19.50	10.98	155.81	
	17.00		163.39		238.39	10%	18.00	7.78	163.39	
2021-22	17.50	75	175.31		175.31	10%	18.50	11.82	175.31	
	18.00		184.08		259.08	10%	18.00	8.77	184.08	
2022-23	18.50	75	197.03		197.03	10%	17.50	12.85	197.03	
	19.00		206.88		261.88	10%	17.00	9.85	206.88	
2023-24	19.50	75	220.88		220.88	10%	16.50	14.08	220.88	
	20.00		232.02	75.00	302.02	10%	16.00	11.05	232.02	75.00
2024-25	20.50	75	251.13		251.13	10%	15.50	19.10	251.13	
	21.00		263.88	75.00	413.88	9%	15.00	12.64	263.88	3.75
2025-26	21.50	75	282.30		282.30	9%	14.50	18.82	282.30	
	22.00		295.00	75.00	448.00	9%	14.00	12.70	295.00	7.88
2026-27	22.50	75	315.03		315.03	9%	13.50	20.03	315.03	
	23.00		329.20	75.00	479.20	9%	13.00	14.18	329.20	83.28
2027-28	23.50	75	350.77		350.77	9%	12.50	21.58	350.77	
	24.00		368.55	75.00	518.55	9%	12.00	15.78	368.55	88.08
2028-29	24.50	75	389.79		389.79	9%	11.50	23.24	389.79	
	25.00		407.34	75.00	557.34	9%	11.00	17.84	407.34	93.34
2029-30	25.50	75	432.42		432.42	8%	10.50	25.08	432.42	
	26.00		451.87	75.00	601.87	8%	10.00	18.48	451.87	99.18
2030-31	26.50	75	475.95		475.95	8%	9.50	24.07	475.95	
	27.00		494.99	75.00	644.99	8%	9.00	19.04	494.99	105.57
2031-32	27.50	75	520.78		520.78	8%	8.50	25.80	520.78	
	28.00		541.82	75.00	691.82	8%	8.00	20.63	541.82	112.64
2032-33	28.50	75	569.28		569.28	8%	7.50	27.86	569.28	
	29.00		592.05	75.00	742.05	8%	7.00	22.77	592.05	120.44
2033-34	29.50	75	621.74		621.74	8%	6.50	29.68	621.74	
	30.00		648.61	75.00	798.61	8%	6.00	24.87	648.61	129.03
2034-35	30.50	75	678.47		678.47	8%	5.50	31.88	678.47	
	31.00		705.61	75.00	855.61	7%	5.00	27.86	705.61	138.51
2035-36	31.50	75	735.68		735.68	7%	4.50	28.95	735.68	
	32.00		761.30	75.00	911.30	7%	4.00	25.74	761.30	148.98
2036-37	32.50	75	793.20		793.20	7%	3.50	31.90	793.20	
	33.00		820.98	75.00	970.98	6%	3.00	29.95	820.98	160.48
2037-38	33.50	75	850.09		850.09	6%	2.50	27.79	850.09	
	34.00		875.59	75.00	1,025.59	6%	2.00	25.30	875.59	173.18
2038-39	34.50	75	908.36		908.36	6%	1.50	30.77	908.36	
	35.00		933.55	75.00	1,083.55	6%	1.00	27.19	933.55	187.18
2039-40	35.50	75	960.84		960.84	5%	0.50	27.09	960.84	
	36.00				21,859.32			24.02	984.65	202.61
								840.02	984.65	137.74
CUMULATIVE DECOMMISSIONING FUNDS AT YEAR 2040										22,839.34

Assumptions:

- 1- Rate of return of each tenor is assumed to remain same as current rates.
- 2- Semi-annual profit of each investment is assumed to be reinvested along new investment at current rates.
- 3- Investment is assumed to be made at its par value, ignoring any premium or discount.
- 4- Investment is assumed to be made in the max tenor available to reach 35 years.
- 5- All figures are in million rupees.

DECOMMISSIONING FUND PROPOSED

ANNEXURE-IX-B

0	1	2	3	4	5	6	7	8	9	10
Year	Period	Investment	Reinvest ment	Principal Maturity Reinvest	Investment Amount	ROR	Tenor	Semi Annual Profit	Progressive total	Principal Maturity
			+9	+10	(2+1+4)					+5
2024-05	0.50	75	3.75		75.00	10%	20	3.75	3.75	
	1.00		3.94		3.75	10%	20	0.19	3.94	
2025-06	1.50	75	7.68		76.94	10%	20	3.95	7.68	
	2.00		8.28		7.68	10%	20	0.39	8.28	
2026-07	2.50	75	12.44		83.28	10%	20	4.16	12.44	
	3.00		13.08		12.44	10%	20	0.62	13.08	
2027-08	3.50	75	17.47		88.08	10%	20	4.40	17.47	
	4.00		17.47		17.47	10%	20	0.67	18.34	
2028-09	4.50	330	35.76		348.34	10%	20	17.42	35.76	
	5.00		37.55		35.76	10%	20	1.78	37.55	
2029-10	5.50	330	55.92		367.55	10%	20	18.38	55.92	
	6.00		58.72		55.92	10%	20	2.80	58.72	
2030-11	6.50	330	78.18		388.72	10%	20	18.44	78.18	
	7.00		82.08		78.18	10%	20	3.91	82.08	
2031-12	7.50	330	102.87		412.08	10%	20	20.80	102.87	
	8.00		107.80		102.87	10%	20	8.13	107.80	
2032-13	8.50	330	129.69		437.80	10%	20	21.89	129.69	
	9.00		136.17		129.69	10%	20	8.48	136.17	
2033-14	9.50	330	159.48		466.17	10%	20	23.31	159.48	
	10.00		167.48		159.48	10%	20	7.97	167.48	
2034-15	10.50	330	192.33		467.48	10%	20	24.87	192.33	
	11.00		201.95		192.33	10%	20	9.62	201.95	
2035-16	11.50	330	228.54		631.95	10%	20	28.60	228.54	
	12.00		239.97		228.54	10%	20	11.43	239.97	
2036-17	12.50	330	268.47		569.97	10%	20	28.50	268.47	
	13.00		281.89		268.47	10%	20	13.42	281.89	
2037-18	13.50	330	312.49		611.89	10%	20	30.58	312.49	
	14.00		328.11		312.49	10%	20	15.62	328.11	
2038-19	14.50	330	361.02		658.11	10%	20	32.91	361.02	
	15.00		379.07		361.02	10%	20	18.05	379.07	
2039-20	15.50	330	414.52		709.07	10%	20	35.45	414.52	
	16.00		435.25		414.52	10%	20	20.73	435.25	
2040-21	16.50	330	473.51		766.25	10%	20	38.26	473.51	
	17.00		497.19		473.51	10%	19.50	23.66	497.19	
2041-22	17.50	330	538.55		827.19	10%	19.00	41.36	538.55	
	18.00		565.47		538.55	10%	18.50	28.93	565.47	
2042-23	18.50	330	610.25		895.47	10%	18.00	44.77	610.25	
	19.00		640.78		610.25	10%	17.50	30.61	640.78	
2043-24	19.50	330	689.30		970.78	10%	17.00	48.64	689.30	
	20.00		723.76	75.00	889.30	10%	16.50	34.46	723.76	
2044-25	20.50	330	760.20		1,128.78	10%	16.00	66.44	760.20	75.00
	21.00		819.21	75.00	760.20	10%	15.50	38.01	819.21	3.75
2045-26	21.50	330	874.30		1,224.21	9%	15.00	85.09	874.30	78.94
	22.00		913.84	75.00	874.30	9%	14.50	39.34	913.84	7.88
2046-27	22.50	330	972.98		1,318.84	9%	14.00	59.34	972.98	83.28
	23.00		1,018.77	75.00	972.98	9%	13.50	43.78	1,018.77	12.44
2047-28	23.50	330	1,080.75		1,421.77	9%	13.00	63.88	1,080.75	88.06
	24.00		1,129.38	330.00	1,080.75	9%	12.50	48.83	1,129.38	17.47
2048-29	24.50	330	1,209.90		1,719.38	9%	12.00	80.82	1,209.90	348.34
	25.00		1,264.35	330.00	1,209.90	9%	11.50	64.45	1,264.35	35.76
2049-30	25.50	330	1,350.94		1,824.35	9%	11.00	86.80	1,350.94	367.55
	26.00		1,411.73	330.00	1,350.94	9%	10.50	60.79	1,411.73	55.92
2050-31	26.50	330	1,494.60		2,071.73	8%	10.00	82.87	1,494.60	388.72
	27.00		1,554.39	330.00	1,494.60	8%	9.50	59.78	1,554.39	78.18
2051-32	27.50	330	1,642.98		2,214.39	8%	9.00	88.58	1,642.98	412.08
	28.00		1,708.88	330.00	1,642.98	8%	8.50	63.72	1,708.88	102.67
2052-33	28.50	330	1,803.43		2,388.88	8%	8.00	84.75	1,803.43	437.80
	29.00		1,875.57	330.00	1,803.43	8%	7.50	72.14	1,875.57	129.69
2053-34	29.50	330	1,978.99		2,636.57	8%	7.00	101.42	1,978.99	468.17
	30.00		2,058.07	330.00	1,978.99	8%	6.50	78.08	2,058.07	159.48
2054-35	30.50	330	2,164.71		2,718.07	8%	6.00	108.64	2,164.71	497.48
	31.00		2,251.30	330.00	2,164.71	8%	5.50	88.89	2,251.30	192.33
2055-36	31.50	330	2,353.20		2,911.30	7%	5.00	101.80	2,353.20	531.95
	32.00		2,435.56	330.00	2,353.20	7%	4.50	82.36	2,435.56	228.54
2056-37	32.50	330	2,543.90		3,098.58	7%	4.00	108.34	2,543.90	569.97
	33.00		2,632.94	330.00	2,543.90	7%	3.50	89.04	2,632.94	268.47
2057-38	33.50	330	2,731.73		3,292.94	6%	3.00	98.79	2,731.73	811.89
	34.00		2,813.68	330.00	2,731.73	6%	2.50	81.95	2,813.68	312.49
2058-39	34.50	330	2,917.89		3,473.88	6%	2.00	104.21	2,917.89	858.11
	35.00		3,005.43	330.00	2,917.89	6%	1.50	87.64	3,005.43	361.02
2059-40	35.50	330	3,097.08		3,888.43	5%	1.00	81.84	3,097.08	709.07
	36.00			-	3,097.08	5%	0.50	77.43	3,174.49	414.52
					71,918.27			2,739.24		
CUMULATIVE DECOMMISSIONING FUNDS AT YEAR 2040										74,657.61

Assumptions:

- 1- Rate of return of each tenor is assumed to remain same as current rates.
- 2- Semi-annual profit of each investment is assumed to be reinvested along new investment at current rates.
- 3- Investment is assumed to be made at its par value, ignoring any premium or discount.
- 4- Investment is assumed to be made in the max tenor available to reach 36 years.
- 5- All figures are in million rupees.