National Electric Power Regulatory Authority
Islamic Republic of Pakistan

Registrar

NEPRA Tower, Ataturk Avenue (East) G-5/1, Islamabad
Ph: +92-51-9206500, Fax: +92-51-2600021
Web: www.nepra.org.pk, E-mail: info@nepra.org.pk

No. NEPRA/TRF-231/PHYDO-2013/4264-4266
April 29, 2014

Subject: **Determination of the Authority in the matter of Tariff Petition filed by Pakhtunkhwa Hydel Development Organization for its Ranolia Hydropower Project** [Case No.NEPRA/TRF-231/PHYDO-2013]

Dear Sir,

Please find enclosed herewith the subject Determination of the Authority along with Annexure-I, II (29 pages) in Case No. NEPRA/TRF-231/PHYDO-2013.

2. The Determination is being intimated to the Federal Government for the purpose of notification of the approved tariff in the official gazette pursuant to Section 31(4) of the Regulation of Generation, Transmission and Distribution of Electric Power Act (XL of 1997) and Rule 16(11) of the National Electric Power Regulatory Authority Tariff (Standards and Procedure) Rules, 1998.

3. Please note that Order of the Authority's Determination along with reference tariff table and debt service schedule as attached thereto needs to be notified in the official gazette.

Enclosure: As above

(Syed Safeer Hussain)

Secretary
Ministry of Water & Power
'A' Block, Pak Secretariat
Islamabad

CC:
1. Secretary, Cabinet Division, Cabinet Secretariat, Islamabad.
2. Secretary, Ministry of Finance, 'Q' Block, Pak Secretariat, Islamabad.

Determination of the Authority in the matter of tariff petition filed by Pakhtunkhwa Hydel Development Organization for its Ranolia Hydropower Project
CASE NO. NEPRA/TRF-231/PHYDO-2013

1 BACKGROUND

1.1 Pakhtunkhwa Hydel Development Organization (hereinafter referred to as the "petitioner") filed a tariff petition (hereinafter referred to as the "petition") pursuant to Rule 3 of the National Electric Power Regulatory Authority (Tariff Standards and Procedures) Rules, 1998 (hereinafter referred to as the "tariff rules") on April 02, 2013 for determination of EPC stage generation tariff for its 17 MW Ranolia hydropower project (hereinafter referred to as the "project") being constructed along Ranolia Khwar, a tributary of Duber Khwar in the southwest of district Kohistan, province of Khyber Pakhtunkhwa.

1.2 In accordance with sub-rule 3 of rule 4 of the tariff rules, the petition was admitted by the Authority on July 10, 2013. Consequent to the admission, notice of admission/ public hearing was published in the national newspapers on August 07, 2013, inviting thereby all the stakeholders, interested/affected persons or parties to participate in the tariff setting process through filing of comments / intervention requests. Further, in accordance with sub-rule 5 of rule 4 of the tariff rules, the Authority gave directions for service of notices to respondents and other parties which, in the opinion of the Authority, were likely to be affected by or interested in the Tariff setting process. In accordance with section 7 (5) of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 the Authority also sought recommendations of the Government of Khyber Pakhtunkhwa on this petition. In response to the aforesaid notices, no intervention request was filed by any party. However, comments were received from the Peshawar Electric Supply Company (hereinafter referred to as "PESCO") regarding various technical and financial parameters of the project which have been duly considered by the Authority and have been discussed where appropriate, in relevant parts of this determination.

1.3 Public hearing in this regard was held on August 21, 2013 at Islamabad, which was attended by the Petitioner and representatives of PESCO. During the public hearing, the

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Authority expressed its reservations on certain technical and financial parameters of the project, and directed the petitioner to reconsider and revise some of these parameters. Further, PESCO being the proposed power purchaser was directed to provide detailed comments on the tariff petition. The petitioner vide letter no.144/SHYDO/Ranolia/Tariff dated August 26, 2013 revised its earlier submissions. Moreover, PESCO submitted its comments vide letter no. 336/Machai HPP(2.6MW) dated October 22, 2013 which were responded to by the petitioner vide letter no. 186/PHYDO/RHPP/Tariff V-II dated November 12, 2013.

2 SUBMISSIONS OF THE PETITIONER AND SALIENT FEATURES OF THE PROJECT

2.1 Summary of the technical and financial information provided by the petitioner is as follows:

Type of the project	High head run-of-the-river hydropower project
Project location	850 m upstream of Duber Bazar, along Ranolia Khwar, a tributary of Duber Khwar in the southwest of district Kohistan, Province of Khyber Pakhtunkhwa.
Installed capacity	17.0 MW
Concession Period	50 Years from Commercial Operations Date (COD) Revised to 30 Years from COD
Proposed power purchaser	Peshawar Electric Supply Company (PESCO)/ National Transmission & Despatch Company Ltd. (NTDC)
Interconnection Voltage	11 KV /132 KV
Gross Annual generation	100.52 GWh
Net Annual generation	97.51 GWh
Plant factor	67.50%
Turbine Type	Pelton -
Number of turbines	2
Turbine capacity	8.50 MW each
Gross head	408.90 m
Head loss	4.90 m

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Net head	404.00 m	
Mean Annual discharge	4.33 m^3/s	
Annual discharge	136 x 106 m^3/year	
Design Discharge	5.0 m^3/s	
Auxiliary Consumption:	0.51 MW (3%)	
Financing structure	Foreign debt 80% - Equity 20%	
Lender	Asian Development Bank	
Interest rate	6 months LIBOR + 1.35% (including commitment charges)	
Debt repayment period	20 years after commercial operations date	
Debt repayment basis	Semi annual instalments	
Rate of return on equity	19.5% per annum IRR based net	
Project cost	**Tariff Petition (US$ Million)**	**Revised (1) US$ (Million)**
Total EPC cost	38.214	38.214
Total Non-EPC cost (including Interest During Construction)	10.709	8.446
Total Project cost	48.922	46.660
O&M Costs Per Annum		
Fixed O&M Costs	US$ 1.751 Million	
Variable O&M Costs	US$ 0.258 Million	
Reference exchange rate	1 US$ = PKR 97 (For EPC contract price 1 US$ = PKR 85.4)	

(1) Note: Subsequent to the filing of tariff petition, the petitioner revised its earlier submissions as mentioned in paragraph 1.3 above.

3 ISSUES

3.1 Based on the available information including, but not limited to, comments of the stakeholders, proceedings of the case and information submitted by the petitioner, the following main issues were framed for discussion and consideration by the Authority:

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- Whether the capacity and annual generation claimed by the petitioner are justified?
- Whether the terms and conditions of debt claimed by the petitioner are justified?
- Whether construction period claimed by the petitioner is justified?
- Whether project cost claimed by the petitioner is justified?
- Whether return on equity claimed by the petitioner is justified?
- Whether O &M costs claimed by the petitioner are justified?
- Whether insurance during operations claimed by the petitioner is justified?

The following paragraphs cover discussions and deliberations on above listed issues:

4. **Whether the capacity and annual generation claimed by the petitioner are justified?**

4.1 The petitioner has claimed following capacity and annual generation:

	As per tariff petition
Installed capacity	17 MW
Auxiliary consumption	0.51 MW
Net capacity	16.49 MW
Annual plant factor	67.50%
Annual saleable generation	97.51 GWh.

4.2 The Petitioner has quoted annual gross energy of 100.5 GWh at 67.50% plant factor in the Tariff Petition. Further, 3% auxiliary consumption has been requested by the Petitioner. The Authority expressed its reservations on the net annual energy figure based on 3% auxiliary consumption, and the Petitioner was directed to revise its net annual energy estimate at 1% auxiliary consumption based on the already established benchmark for hydropower project of similar capacity. However, the Authority observed that while the Petitioner subsequently revised certain other technical and

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financial parameters of the project, its claimed auxiliary consumption remained unchanged in subsequent submissions. PESCO in its comments questioned the hydrology data of the project, stating that the hydrology data shows mean monthly flows for 14 years which is relatively shorter time period as compared to the standard period of 30 for 35 years. In response, the Petitioner submitted that unlike WAPDA's gauges on large rivers, which are operational since 1960, the gauges of SHYDO have been maintained since 1989. The Authority considers that the claimed annual plant factor of 67.50% which has been based on the actual hydrology recorded at site over a span of almost 14 years is acceptable. However, the Authority is of the considerate opinion that the auxiliary consumption being claimed by the Petitioner is on a slightly higher side, and after considering the proposed scheme as well as the Technical benchmarks of auxiliary consumption, has decided to allow auxiliary consumption of 1% of gross installed capacity claimed by the petitioner.

4.4 In view of the discussion above, the net plant capacity and the net annual energy of the project works out to be 16.63 MW and 99.516 GWh respectively and is hereby allowed.

5. **Whether the terms and conditions of debt claimed by the petitioner are justified?**

5.1 The petitioner has requested for allowing following terms for its 100% foreign debt:

Debt as a percentage of total project cost	80%
Debt servicing	Bi-annual
Interest rate	6 month LIBOR + 0.60%
Debt repayment period	20 years after commercial operations date (herein after referred to as "COD")

5.2 The Authority has noted that the petitioner has requested for allowing adjustment/ indexation of its debt component with US$/PKR exchange rate parity, although the loan availed by the petitioner is denominated in Japanese Yen. Upon enquiry, the petitioner vide its letter No. 489/PHYDO/Machai dated December 09, 2013 has clarified that:

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- Indexation of US$/PKR exchange rate parity is being requested as EPC costs and other cost components are denominated in US $.

- The loan currently being drawn is converted to equivalent US $ while making payments to the EPC contractor and other eligible payments.

- The loan agreement provides that the currency of loan or a portion of the loan can be changed and it intends to approach Asian Development Bank to change currency of loan from Yen to US $.

5.3 The Authority after due consideration has decided to allow the adjustment/ indexation of debt component with US$/PKR exchange rate parity, to be applicable throughout the debt repayment period.

5.4 The Authority has noted that the terms of debt claimed by the petitioner, as detailed at paragraph 5.1 above, compare favorably with the debt terms allowed to some other hydropower projects, and in view thereof has decided to allow the debt terms detailed at paragraph 5.1 above to the petitioner.

6. Whether construction period claimed by the petitioner is justified?

6.1 The petitioner has requested for approval of 45 months construction period. The Authority has noted that the EPC documents indicate 30 months as construction period. The Authority after considering the construction period allowed to a comparable project and timeframe considered reasonable for the construction of the project, hereby allows the petitioner maximum project construction period of 30 months. The petitioner is directed to submit detail of any liquidated damages, penalties, etc. (by whatever name called), actually recoverable by the petitioner from the EPC contractor(s), on account of any delay on part of the EPC contractor beyond 30 months construction period, for adjustment in the project cost, along with its application for allowing tariff adjustments at the COD. The petitioner will be allowed adjustments at the COD for maximum project construction period of 30 months starting from the construction start date stipulated in the Power Purchase Agreement.

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7. **Whether project cost claimed by the petitioner is justified?**

7.1 The petitioner has claimed following project cost:

Description	Petition US$ (Million)	Revised US$ (Million)
EPC Contract /Construction Cost including land	38.214	38.214
Project Development	1.748	1.748
Management Consultant	2.662	2.662
Insurance during Construction	0.615	0.615
Cost of loan arrangement /financing fee	0.234	0.234
Spares	1.909	1.909
Design review/independent Engineer under PPA	0.090	0.090
Contingency @5%	2.262	-
Interest During Construction (IDC)	1.188	1.188
Total Project Cost	**48.922**	**46.660**

7.2 The aforementioned costs are discussed in detail in the following paragraphs:

7.3 **EPC contract price:**

7.3.1 The EPC cost has been claimed by the petitioner on the basis of signed EPC contract. According to the information provided by the petitioner, it has executed the EPC contract with M/s DESCON Engineering (Pvt.) Limited and Tianjin Design & Research Institute of Electric Drive (TRIED) Consortium dated June 28, 2011. The break-up of EPC cost provided by the petitioner is as follows:

EPC Cost Components	Foreign Component (USS)	Local Component (PKR)
Plant and Mandatory Spare Parts Supplied from Abroad	5,392,572	-
Plant and Mandatory Spare Parts Supplied from Within the Employer's Country	-	115,163,382
Design Services	191,489	74.637.861
Civil Works, Installation and Other Services	1,300,780	2.482.722.217
Base EPC Cost	**6,884,841**	**2,672,523,460**

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7.3.2 In support of its claim the petitioner has submitted a bids evaluation report prepared by a joint venture of M/s Sheladia Associates, Inc., USA; Winrock International, USA; AGES Consultants Peshawar, Pakistan and IDC, Pakistan. According to the bids evaluation report, in accordance with the single-stage, two-envelope bidding procedure of the ADB, the technical proposals from the following bidders were received and evaluated:

a) KTR (JV)
b) SHUNTAI, JINLUN & Al-FAJR (JV)
c) DESCON - TRIED (JV)
d) SGEIED - ATL (JV)

On the basis of evaluation of bids and recommendations from the ADB it was concluded that DESCON-TRIED (JV), being the only technically substantially responsive bidder, may be awarded the EPC contract.

7.3.3 The petitioner has claimed that their EPC contract is FIDIC based and thus not only provides transparency but is also in accordance with the best international practices providing a fair/win-win situation for the employer as well as the contractor.

Duties and taxes

7.3.4 The Authority has found that the EPC cost claimed by the petitioner includes an estimated amount of Rs. 39.219 million on account of duties and taxes. The Authority noted that the claimed duties and taxes work out to be about 7.5% of the total cost of plant and mandatory spare parts claimed to be supplied from abroad. The Authority, in similar cases, has allowed customs duties @ 5% of the cost of plant and machinery to be imported from abroad and has therefore decided to allow duties and taxes to the petitioner on similar lines. Accordingly, the duties and taxes worked out and allowed by the Authority works out to be US$ 0.270 million, which will be subject to adjustment on actual at COD. The Authority has further decided to exclude the amount of duties and taxes from the EPC contract price as proposed by the Petitioner and as the same is being allowed separately as part of project cost. Adjustment of duties and taxes imposed on the Petitioner which are of non-refundable nature will be allowed on actual at the time of COD stage adjustment of tariff. Adjustment of

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taxes/duties payable on fees/charges, etc. of various third parties, not directly imposed on the petitioner, will not be allowed. The mechanism for adjustment of duties and taxes at actual on COD is detailed in paragraph (I) (b) of the order.

Price Escalation Mechanism of EPC Contract

7.3.5 As per the provisions of EPC contract submitted by the petitioner, the price payable to the EPC contractor is escalable under a 'price escalation mechanism' (hereinafter referred to as the "mechanism"). However, as per the Petitioner, the mechanism was not made part of the original EPC contract, and is being negotiated with the EPC contractor.

7.3.6 The Authority has considered that although the mechanism for price escalation has not been finalized at this stage, however under the NEPRA 'Mechanism for Determination of Tariff for Hydro Power Projects' (hereinafter referred to as the "hydropower mechanism"), all hydropower projects are eligible for adjustment due to escalation in steel, cement, labor and fuel prices during the construction period. The Authority has therefore decided that the finalized mechanism negotiated between the Petitioner and EPC contractor can be considered at the time of COD. The Authority hereby directs the Petitioner to finalize the price escalation mechanism as soon as possible, and approach the Authority for COD adjustment of tariff only after it is in a position to submit all necessary documentary evidence in relation to price escalations. Additionally, the Petitioner is directed to ensure that the finalized price escalation mechanism is in line with NEPRA's hydropower mechanism, as the Authority would be constrained to disallow any portion of the price escalation mechanism of the contract that falls outside the confines of the hydropower mechanism.

7.3.7 In view of the above, the Authority has decided to exclude the Price escalation related provisional amount of Rs. 95.764 Million from the EPC price at this stage.

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Cost of Interconnection

7.3.8 The Authority has found that the EPC contract price includes Rs. 56.666 million on account of transmission lines. PESCO in its comments vide letter no. 336/MachaiHPP(2.6MW) dated October 22, 2013, has submitted as under:

> *"Since the interconnectivity study has already been carried out by NTDC, therefore their office may be asked regarding connectivity of the generated voltage with Grid station."*

7.3.9 Whereas, the NTDC vide its letter no. 12201 dated October 29, 2013 has submitted the following in this regard:

"Planning Power Department of NTDC has confirmed that NTDC has neither prepared the interconnection study of the subject project nor PHYDO has submitted the said document to NTDC for vetting/approval."

Subsequently, in this regard the petitioner vide its letter No. 186/PHYDO/RHPP/Tariff V-II dated November 12, 2013 has submitted that:

> *"Approval of interconnectivity has been granted by NTDC after series of correspondence. On ground connectivity arrangements are in progress and will be completed along with the completion of the power plant."*

7.3.10 The Authority has observed that neither NTDC nor PESCO has exhibited a clear stance regarding the interconnection arrangements, and neither of the two parties has given any concrete comments on the costs and technical parameters of the interconnection facilities. The Authority is of the opinion that the exact mechanics for the development of interconnection facilities should have been finalised between the power purchaser and the petitioner at this stage. The Authority has therefore decided to exclude Rs. 56.666 million on account of cost of grid system and connections from the EPC contract price and to allow recovery of the interconnection cost incurred by the petitioner, if any, at the COD stage, after it submits a detailed plan duly endorsed by the power purchaser and authentic

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verifiable documents, to the satisfaction of the Authority, that these costs have been actually incurred in a prudent manner.

Protection of the Environment, Health and Safety and Security Arrangements

7.3.11 The Authority has noted that the EPC contract price also includes the costs associated with Environment Protection as required under the Initial Environmental Examination (IEE), meeting Health and Safety standards on site, and the cost of Security Arrangement as under:

	Local Component Rs. (Million)
Protection of the Environment	35.359
Health and Safety	5.000
Security Arrangements	30.000

7.3.12 The costs being reasonable are hereby allowed by the Authority subject to adjustment at COD up to the abovementioned maximum caps.

7.3.13 The Authority has noted that the EPC cost after making the adjustments detailed above works out to US $ 6.885 million and Rs. 2,480.874 million (i.e. US $ 32.461 million aggregate EPC cost or US $ 1.909 million per MW EPC cost based on reference exchange rate parity of Rs./US$ of 97). The Authority after due consideration allows US $ 6.885 million for foreign component and Rs. 2,480.874 million as local component of EPC cost to the petitioner. The aforementioned EPC cost does not include duties and taxes of US$ 0.270 million which are being allowed separately at this stage, and will be subject to adjustment at actual on COD as detailed in paragraph (I) (b) of the order.

7.3.14 The local component of EPC cost related civil works cost will be adjusted on account of variation in the prices of construction materials such as steel, cement, fuel and labor based on the finalized adjustment mechanism at COD.

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7.4 **Land cost:**

7.4.1 The EPC cost claimed by the Petitioner includes US $ 0.035 million on account of land cost. However, the record shows that the petitioner has claimed this cost on account of travelling related to land. The Authority has generally allowed travelling expenses as part of project development costs, which are being allowed separately to the petitioner. Accordingly, cost of travelling related to land amounting to US $ 0.035 million separately claimed by the petitioner is disallowed.

7.5 **Project development costs:**

7.5.1 The petitioner has claimed US $ 1.748 million on account of project development cost and has provided the following break-up of its claim:

Project Development Cost	US $ (Million)
Salaries/Compensation	0.7600
Feasibility Study	0.9000
IEE Public Hearing / NOC	0.0002
Generation License Fee	0.0206
Tariff Petition Fee	0.0350
Auditor's Fee & Secretarial Work	0.0300
Annual generation license fee (3 year, before COD)	0.0020
Total Project Development Cost	**1.7476**

7.5.2 The Authority has considered the project development cost claimed by the Petitioner vis-à-vis costs allowed to comparable projects under similar heads, and has found this cost to be on the higher side. The Authority has assessed US$ 0.220 million as project development costs for this project and the same is being allowed to the petitioner.

7.6 **Management Consultant and Independent Engineer cost:**

7.6.1 The petitioner has claimed US $ 2.662 million on account of cost of hiring management consultants, whereas US $ 0.090 million has been claimed on account of cost of hiring independent engineer as required under the standard PPA.

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7.6.2 In support of its claim the petitioner has provided a copy of its contract with consultants M/s Sheladia Associates, INC. USA, Winrock International USA, AGES Consultants Peshawar Pakistan and IDC Pakistan (Joint Venture) dated July 13, 2009 along with its addendum #1 dated July 31, 2012.

7.6.3 The Authority has observed that contrary to the Petitioner's claim, the original contract with management consultants submitted by the Petitioner clearly specifies the ceiling price of the contract as US $ 1,581,200 in foreign currency, excluding taxes; whereas the contract price was revised and enhanced to US$ 2,165,523 (excluding taxes) through addendum 1 dated July 31, 2012 mainly due to delay in the EPC contract award and other procedural formalities. The Authority considers that the amount of US $ 2.662 Million claimed of the petitioner is quite high. Based on the underlying documents submitted by the Petitioner, the Authority has noted that delay in execution of the project is a major contributing factor towards the high construction management cost claimed by the Petitioner. The Authority has considered the scope of work of the consultants, national and international benchmarks for such costs and after due consideration has decided to allow US $ 1.581 million (excluding taxes) as per the original contract price based on which the bid of the management consultant was accepted.

7.6.4 Further, the Authority considers that the cost of US$ 0.090 million claimed by the Petitioner for Independent Engineer is reasonable, and hereby allows this cost to the Petitioner.

7.7 <u>Spares:</u>

7.7.1 The petitioner has claimed an amount of US $ 1.909 million on account of spares not covered under the EPC contract. The Authority has found that the EPC contract price includes the cost of mandatory spare parts. Further, a price list of recommended spare parts of US $ 0.616 million is also included in the EPC contract.

7.7.2 The Authority has noted that certain spare parts inventory is necessary for smooth operations of the plant. The Authority has therefore decided to allow US $ 0.616 million as maximum ceiling for cost of spares on the basis of claim of the petitioner. This cost will be adjusted on actual basis at COD, not exceeding the maximum ceiling

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of US $ 0.616 million, on production of authentic documentary evidence by the petitioner.

7.8 **Insurance during construction:**

7.8.1 The petitioner has claimed US $ 1.188 million on account of insurance during construction. The Authority has found that according to the EPC contract, the EPC contractor is required to obtain the insurances set forth in the contract at its own expense. Further, the petitioner has also not highlighted any additional insurance coverage required to be taken by it on its own expense during the construction period. In view of the aforementioned, the Authority has decided to disallow cost of insurance during construction claimed by the petitioner.

7.9 **Financing fees:**

7.9.1 The petitioner has claimed US $ 0.234 million on account of financing fees and has submitted that cost claimed under this head reflects the cost of letters of credit.

7.9.2 In addition to the above, the petitioner has claimed commitment charges @ 0.75% of the undisbursed loan amount as a part of interest during construction. The Authority in other such cases has allowed commitment charges as a part of financial charges. In line with the established practice, the Authority has decided to consider commitment charges as a part of financial charges.

7.9.3 Based on the claim of the petitioner, the Authority has assessed US $ 0.551 million as financial charges. The Authority has further decided that these financial charges will be subject to adjustment at COD on the basis of actual expense, up to a maximum of 3% of the allowed debt (excluding the impact of interest during construction and financial charges), on production of authentic documentary evidence.

7.10 **Interest during construction:**

7.10.1 The petitioner has claimed interest during construction (hereinafter referred to as "IDC") of US $ 1.188 million, based on 31 months construction period and interest

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rate of LIBOR plus 1.35% spread. The Authority has scrutinized the financing documents provided by the petitioner, and has found that the applicable interest rate on debt is LIBOR plus 0.60 % spread; whereas commitment charges @ 0.75% of the undisbursed loan amount have also been claimed as IDC by the petitioner. Based on the financing and other terms/conditions allowed to the petitioner while excluding the amount of commitment charges as discussed earlier, the Authority has assessed IDC as US $ 0.484 million. The IDC will be adjusted at COD on the basis of actual debt draw downs (within the overall debt allowed by the Authority at COD), actual PKR/US$ exchange rate variation and actual interest rates not exceeding the limit of 6 months LIBOR per annum plus 0.60%, during the project construction period allowed by the Authority.

8. Recapitulating the approved project cost of the petitioner under various cost heads is given hereunder:

	Approved		
	US $ Million	**Rs. Million**	**Equivalent US$ (Millions)**
EPC cost			
- Local portion		2,480.874	25.576
- Foreign portion	6.885		6.885
Sub Total	6.885	2,480.874	32.461
Duties and taxes			0.270
Project development costs			0.220
Management consultant			1.581
Independent Engineer under PPA			0.090
Spares			0.616
Financial charges			0.551
Interest during construction			0.484
Total Project Cost		**2,480.874**	**36.272**

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9. **Whether return on equity claimed by the petitioner is justified?**

9.1 The petitioner has requested for allowing an IRR of 19.5% per annum net after deduction of withholding tax on invested equity. The Authority has observed that it is allowing 17% rate of return on equity (IRR based) to hydro power projects. The Authority further observed that rate of return on equity allowed to hydro power projects is already higher by 2% than the rate of return on equity allowed to thermal power projects and therefore aptly covers the additional risks associated with development of hydropower projects in the country. In view thereof, the Authority has decided to allow 17% (IRR based) rate of return on equity to the petitioner as has already been allowed to other hydro power projects.

9.2 The Petitioner has submitted that the project is being developed on BOOT basis and at the end of the Term of PPA, either the term will be extended under the renegotiated terms and conditions or will be sold/ privatized to any suitable investors if allowed by the laws and policies prevalent at that time. The Authority has also observed from computations submitted by the petitioner that it has claimed redemption of invested equity based on the same premise. The Authority is of the opinion that this project is being developed in the public sector and therefore is not expected to be transferred to another party at the end of the tariff control period. In view of this fact, the Authority finds no justification to allow redemption of equity to the petitioner.

9.3 The Authority has assessed return on equity during construction (hereinafter referred to as "ROEDC") and return on equity after COD on the basis of terms and conditions allowed to the petitioner, as detailed in this determination and equity draw down schedule submitted by the petitioner. The ROEDC will be adjusted at COD on the basis of actual equity injections (within the overall equity allowed by the Authority at COD) during the project construction period allowed by the Authority.

10. **Whether O &M costs claimed by the petitioner are justified?**

10.1 The petitioner, in its revised submissions, has claimed the following O&M costs per annum, after COD, for the tariff control period:

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	US$ in millions
Fixed O&M costs	0.258
Variable O & M costs	1.493
	1.751

10.2 The petitioner has submitted that fixed O&M costs represent the fixed costs of all the staff required for O&M, power plant administration, security, transportation, overheads, office costs, professional fees such as audit, tax and legal, as well as some minor fixed operational costs such as environmental monitoring.

10.3 The petitioner has further submitted that variable O&M costs primarily include costs of lubricants, consumables and imported spare parts to be utilized in scheduled and unscheduled maintenance; as well as costs of specialized technical services from manufacturer during maintenance of the power plant.

10.4 The petitioner has requested for allowing indexation of its O & M costs as follows:

Local O&M	WPI
Foreign O&M	European CPI/US CPI, Chinese indices, PKR/US $ and PKR/Euro

10.5 However, the petitioner has not provided breakup of its O&M cost claim into foreign component and local component.

10.6 The Authority after due consideration has decided to allow O&M costs to the petitioner @ 2% of its project cost, excluding interest during construction, assessed by the Authority through this determination. Further, the Authority has decided to consider 75% of the allowed O & M costs as fixed and 25% of the allowed O & M costs as variable. Moreover, the allowed O & M costs are further subdivided into foreign component and local component as follows:

	% of total allowed cost	
	Local	Foreign
Variable O & M costs	50	50
Fixed O & M costs	80	20

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10.7 The Authority has also considered request of the petitioner for allowing indexation of its foreign O & M costs with European CPI, Chinese indices and PKR/Euro parity. The Authority has allowed indexation of foreign component of O & M cost based on US$/PKR exchange rate and US CPI for foreign component of O&M cost and local CPI (General) for the local O&M component. The Authority has therefore decided to allow indexation of O&M cost component on the basis of aforementioned principle in the instant case as well.

11. **Whether insurance during operations claimed by the petitioner is justified?**

11.1 The petitioner has claimed US $ 0.615 million per annum as insurance cost during operational period. Moreover, the petitioner has requested for allowing indexation of US$ to PKR for this cost, on the basis of actual insurance payment. The Authority has found that the insurance cost claimed by the petitioner works out to be 1.61% of its claimed EPC cost.

11.2 The Authority in other comparable hydropower projects allowed Insurance expense at maximum ceiling of 1.35% of the EPC cost, subject to provision of verifiable documentary evidence by the Petitioner on annual basis. The Authority has decided to allow to the petitioner, insurance during operations up to 1.35% of the allowed EPC cost, in accordance with the established benchmark. In case of insurance denominated in US $, insurance cost component of tariff will be adjusted on account of US$/PKR exchange rate variation on annual basis.

ORDER

Pursuant to Rule 6 of the National Electric Power Regulatory Authority Licensing (Generation) Rules, 2000, read with Section 31(4) of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997, Pakhtunkhwa Hydel Development Organization (the Petitioner) is allowed to charge, for its Ranolia Hydropower Project, the following specified/approved tariff for delivery of electricity to the power purchaser:

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Tariff Components	Years 1-20 Rs./kWh	Years 21-30 Rs./kWh	Indexation
Fixed charges			
Fixed O & M			
- local	0.4186	0.4186	CPI - General
- foreign	0.1047	0.1047	US$/PKR & US CPI
Insurance	0.4271	0.4271	US$/PKR
Debt service	1.5794		US$/PKR & LIBOR
Return on equity	1.2021	1.2021	US$/PKR
Return on equity during construction	0.2615	0.2615	US$/PKR
Variable charges			
Variable O & M			
- local	0.0872	0.0872	CPI - General
- foreign	0.0872	0.0872	US$/PKR & US CPI
Total	4.1678	2.5884	

i) The reference tariff has been calculated on the basis of net annual benchmark energy generation of 99.516 GWh, at annual plant capacity factor of 67.50%, for installed capacity of 17 MW.

ii) The above charges will be limited to the extent of net annual energy generation of 99.516 GWh. For Net annual generation supplied during a year to the power purchaser in excess of benchmark energy of 99.516 GWh, the Petitioner will be eligible for a production bonus payment as per GoP Policy for Development of Renewable Energy for Power Generation, 2006.

iii) Payment on account of hydrological risk shall be made by the power purchaser, on the basis of benchmark monthly energy generation, based on the average historic hydrology for that particular month.

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iv) In the above tariff no adjustment for carbon emission reduction receipts, has been accounted for. However, upon actual realization of carbon emission reduction receipts, the same shall be distributed between the power purchaser and the petitioner in accordance with the approved mechanism given in the applicable government policy.

v) The reference PKR/dollar rate has been taken as 97.

vi) The above tariff is applicable for a period of thirty years commencing from the commercial operations date (COD).

vii) The component wise tariff is indicated at Annex-I.

viii) Debt Servicing Schedule is attached as Annex-II.

I. One Time Adjustments

The following onetime adjustments shall be applicable to the reference tariff:

a. Price escalations will be allowed at COD in accordance with NEPRAs 'Mechanism for Determination of Tariff for Hydro Power Projects', for the term not exceeding the construction period allowed by the Authority. Prudency of the price adjustment formula agreed under the provisions of the EPC contract will be determined by NEPRA in light of NEPRA's 'Mechanism for Determination of Tariff for Hydro Power Projects' at the time of COD. No price adjustment shall be payable on the portion of contract price paid to the contractor as an advance payment.

b. Duties and/or taxes, not being of refundable nature, imposed on the petitioner up to the commencement of its commercial operations will be subject to adjustment at actual on COD, as against US $ 0.270 million allowed now, upon production of verifiable documentary evidence to the satisfaction of the Authority.

c. Adjustment of the interconnection cost to be borne by the petitioner, if any, will be allowed at COD upon submission of a detailed plan duly endorsed by the power purchaser and authentic verifiable documents, to the satisfaction of the Authority.

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NEPRA AUTHORITY

d. Cost of spares will be adjusted on actual basis at COD, not exceeding the maximum ceiling of US $ 0.616 million, on production of authentic documentary evidence by the petitioner.

e. Financial charges will be adjusted at COD on the basis of actual expense, up to a maximum ceiling of 3% of the total debt allowed (excluding the impact of interest during construction and financial charges), on production of authentic documentary evidence.

f. The interest during construction will be adjusted at COD on the basis of actual debt draw downs (within the overall debt allowed by the Authority at COD), actual PKR/US$ exchange rate variation for foreign loan denominated in US $ and actual interest rates not exceeding the limit of 6 months LIBOR per annum plus 0.60%, during the project construction period allowed by the Authority.

g. The return on equity during construction will be adjusted at COD on the basis of actual equity injections (within the overall equity allowed by the Authority at COD), during the project construction period allowed by the Authority.

h. The return on equity (including return on equity during construction) will be adjusted at COD on the basis of PKR/US$ exchange rate variation.

i. At the COD for all project costs payable in PKR, the amounts allowed in US $ will be converted into PKR using the reference PKR/US$ exchange rate of Rs.97.

j. Any liquidated damages, penalties, etc. (by whatever name called), actually recoverable by the petitioner from the EPC contractor(s), pertaining to the construction period allowed by the Authority, will be adjusted in the project cost at COD.

k. The reference tariff table shall be revised at COD while taking into account the above adjustments. The petitioner shall submit its request to the Authority within 90 days of COD for necessary adjustments in tariff.

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II. Pass-Through Items

No provision for income tax has been accounted for in the tariff. If any tax is imposed on the petitioner, the exact amount paid by the petitioner shall be reimbursed by the power purchaser to the petitioner on production of original receipts. This payment will be considered as a pass-through payment spread over a 12 months period. Furthermore, in such a scenario, the petitioner shall also submit to the power purchaser details of any tax shield savings and the power purchaser shall deduct the amount of these savings from its payment to the petitioner on account of taxation.

Withholding tax on dividends is also a pass through item just like other taxes as indicated in the government guidelines for determination of tariff for new IPPs. The power purchaser shall make payment on account of withholding tax at the time of actual payment of dividend, on production of original receipts, subject to maximum of 7.5% of 17% return on equity according to the following formula:

Withholding tax payable = $[\{17\% * (E_{(Ref)} - E_{(Red)})\} + ROEDC_{(Ref)}] \times 7.5\%$

Where:

$E_{(Ref)}$ = Adjusted reference equity at COD

$E_{(Red)}$ = Equity redeemed

$ROEDC_{(Ref)}$ = Reference return on equity during construction

In case the petitioner does not declare a dividend in a particular year or only declares a partial dividend, then the difference in the withholding tax amount (between what is paid in that year and the total entitlement as per the net return on equity) would be carried forward and accumulated so that the petitioner is able to recover the same as a pass through from the power purchaser in future on the basis of the total dividend payout.

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III. Hydrological Risk

Hydrological Risk shall be borne by the Power Purchaser in accordance with the GoP Policy for Power Generation 2002 and GoP Policy for Development of Renewable Energy for Power Generation, 2006.

IV. Indexations:

The following indexation shall be applicable to the reference tariff:

i) Indexation applicable to O&M

The local part of O&M cost will be adjusted on account of local inflation and O&M foreign component will be adjusted on account of variation in dollar/rupee exchange rate and US CPI. Quarterly adjustments for inflation and exchange rate variation will be made on 1st July, 1st October, 1st January and 1st April respectively on the basis of latest available information with respect to CPI - General (notified by the Pakistan Bureau of Statistics), US CPI (notified by US bureau of labor statistics) and revised TT & OD selling rate of US Dollar as notified by the National Bank of Pakistan. The mode of indexations will be as follows:

$$F\ O\&M_{(LREV)} = F\ O\&M_{(LREF)} * CPI_{(REV)} / CPI_{(REF)}$$

$$F\ O\&M_{(FREV)} = F\ O\&M_{(FREF)} * US\ CPI_{(REV)} / US\ CPI_{(REF)} * ER_{(REV)} / ER_{(REF)}$$

$$V\ O\ \&\ M_{(LREV)} = V\ O\&M_{(LREF)} * CPI_{(REV)} / CPI_{(REF)}$$

$$V\ O\&M_{(FREV)} = V\ O\&M_{(FREF)} * US\ CPI_{(REV)} / US\ CPI_{(REF)} * ER_{(REV)} / ER_{(REF)}$$

Where:

$F\ O\&M_{(LREV)}$ = The revised applicable fixed O&M local component of tariff

$F\ O\&M_{(FREV)}$ = The revised applicable fixed O&M foreign component of tariff

$V\ O\&M_{(LREV)}$ = The revised applicable variable O&M local component of tariff

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V O&M (FREV)	=	The revised applicable variable O&M foreign component of tariff
F O&M (LREF)	=	The reference fixed O&M local component of tariff for the relevant period
F O&M (FREF)	=	The reference fixed O&M foreign component of tariff for the relevant period
V O&M (LREF)	=	The reference variable O&M local component of tariff for the relevant period
V O&M (FREF)	=	The reference variable O&M foreign component of tariff for the relevant period
CPI (REV)	=	The revised Consumer Price Index (General) as notified by the Pakistan Bureau of Statistics
CPI (REF)	=	179.94 Consumer Price Index (General) of June 2013 notified by the Pakistan Bureau of Statistics
US CPI (REV)	=	The revised US CPI (all urban consumers)
US CPI (REF)	=	233.504 US CPI (all urban consumers) for the month of June 2013 as notified by the US Bureau of Labor Statistics
ER (REV)	=	The revised TT & OD selling rate of US dollar as notified by the National Bank of Pakistan
ER (REF)	=	The reference TT & OD selling rate of US dollar as notified by the National Bank of Pakistan - Current reference 97

ii) Adjustment of insurance component

In case of insurance denominated in US $, insurance cost component of tariff will be adjusted annually on account of US$/PKR exchange rate variation on actual basis subject to the maximum ceiling of 1.35% of the approved EPC cost.

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iii) Return on equity

The return on equity component of tariff including return on equity during construction will be adjusted on the basis of revised TT & OD selling rate of US Dollar as notified by the National Bank of Pakistan according to the following formula:

$$ROE_{(REV)} = ROE_{(REF)} \times ER_{(REV)} / ER_{(REF)}$$

$$ROEDC_{(REV)} = ROEDC_{(REF)} \times ER_{(REV)} / ER_{(REF)}$$

Where:

$ROE_{(REV)}$	=	Revised return on equity component of tariff expressed in Rs/kWh.
$ROE_{(REF)}$	=	Reference return on equity component of tariff expressed in Rs/kWh.
$ROEDC_{(REV)}$	=	Revised return on equity during construction component of tariff expressed in Rs/kWh.
$ROEDC_{(REF)}$	=	Reference return on equity during construction component of tariff expressed in Rs/kWh.
$ER_{(REV)}$	=	The revised TT & OD selling rate of US dollar as notified by the National Bank of Pakistan
$ER_{(REF)}$	=	The reference TT & OD selling rate of US dollar

iv) Adjustment for LIBOR variation

The interest part of debt service component will remain unchanged throughout the term except for the adjustment due to variation in 6 months US $ LIBOR, while spread of 0.60% on 6 months US $ LIBOR remaining the same, according to the following formula:

$$\Delta I = P_{(REV)} * (LIBOR_{(REV)} - 0.50\%) / 2$$

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Where:

ΔI = the variation in interest charges applicable corresponding to variation in 6 months US \$ LIBOR. Δ I can be positive or negative depending upon whether 6 months US \$ LIBOR $_{(Rev)}$ per annum > or < 0.50%. The interest payment obligation will be enhanced or reduced to the extent of Δ I for each half year under adjustment.

$P_{(REV)}$ = is the outstanding principal (as indicated in the attached debt service schedule to this order at Annex-II) on a bi-annual basis at the relevant calculations date.

Note:

Adjustments on account of inflation, foreign exchange rate variation, LIBOR variation and actual insurance will be approved and announced by the Authority within fifteen working days after receipt of the petitioner's request for adjustment in tariff in accordance with the requisite indexation mechanism stipulated herein.

V. Terms and Conditions of Tariff:

Design & Manufacturing Standards:

Hydro power generation system shall be designed, manufactured and tested in accordance with the latest IEC standards or other equivalent standards. All plant and equipment shall be new.

Emissions Trading/ Carbon Credits:

The petitioner shall process and obtain emissions/carbon credits expeditiously and credit the proceeds to the power purchaser as per the applicable government policy and the terms and conditions agreed between the petitioner and the power purchaser.

Power Curve of the Hydel Power Complex:

The power curve of the Hydel Power plant shall be verified by the Power Purchaser , as part of the Commissioning tests according to the latest IEC standards and shall be used to measure the performance of the hydel generating units.

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Others:

i. The Authority has allowed/approved only those cost(s), term(s), condition(s), provision(s), etc. which have been specifically approved in this tariff determination. Any cost(s), term(s), condition(s), provision(s), etc. contained in the tariff petition or any other document which are not specifically allowed/approved in this tariff determination, should not be implied to be approved, if not adjudicated upon in this tariff determination.

ii. The above tariff and terms and conditions shall be incorporated as the specified tariff approved by the Authority pursuant to Rule 6 of the National Electric Power Regulatory Authority Licensing (Generation) Rules, 2000 in the power purchase agreement between the petitioner and the power purchaser.

iii. The order along with reference tariff table and debt service schedule as attached thereto are recommended for notification by the Federal Government in the official gazette in accordance with Section 31(4) of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997.

AUTHORITY

28/4/2014

(Habibullah Khilji)
Member

25/4/14

(Maj. (R) Haroon Rashid)
Member

25.4.XIV

(Khawaja Muhammad Naeem)
Vice Chairman

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

25.04.14

Annex-I

PAKHTUNKHWA HYDEL DEVELOPMENT ORGANIZATION (PHYDO)
RANOLIA HYDROPOWER PROJECT
REFERENCE TARIFF

Year	Variable O&M Local	Variable O&M Foreign	Fixed O&M Local	Fixed O & M Foreign	Insurance	Return on Equity (ROE)	ROE During Construction (ROEDC)	Withholding Tax @7.5%	Loan Repayment	Interest Charges	Total Tariff
	Rs./kWh	Rs./kWh	Rs./kWh	Rs./kWh	Rs./kWh	Rs./kWh	Rs./kWh	Rs./kWh	Rs./kWh	Rs./kWh	Rs./kWh
1	0.0872	0.0872	0.4186	0.1047	0.4271	1.2021	0.2615	0.1098	1.2717	0.3076	4.2775
2	0.0872	0.0872	0.4186	0.1047	0.4271	1.2021	0.2615	0.1098	1.2857	0.2936	4.2775
3	0.0872	0.0872	0.4186	0.1047	0.4271	1.2021	0.2615	0.1098	1.2999	0.2794	4.2775
4	0.0872	0.0872	0.4186	0.1047	0.4271	1.2021	0.2615	0.1098	1.3143	0.2651	4.2775
5	0.0872	0.0872	0.4186	0.1047	0.4271	1.2021	0.2615	0.1098	1.3288	0.2506	4.2775
6	0.0872	0.0872	0.4186	0.1047	0.4271	1.2021	0.2615	0.1098	1.3434	0.2359	4.2775
7	0.0872	0.0872	0.4186	0.1047	0.4271	1.2021	0.2615	0.1098	1.3582	0.2211	4.2775
8	0.0872	0.0872	0.4186	0.1047	0.4271	1.2021	0.2615	0.1098	1.3732	0.2061	4.2775
9	0.0872	0.0872	0.4186	0.1047	0.4271	1.2021	0.2615	0.1098	1.3884	0.1910	4.2775
10	0.0872	0.0872	0.4186	0.1047	0.4271	1.2021	0.2615	0.1098	1.4037	0.1757	4.2775
11	0.0872	0.0872	0.4186	0.1047	0.4271	1.2021	0.2615	0.1098	1.4192	0.1602	4.2775
12	0.0872	0.0872	0.4186	0.1047	0.4271	1.2021	0.2615	0.1098	1.4348	0.1445	4.2775
13	0.0872	0.0872	0.4186	0.1047	0.4271	1.2021	0.2615	0.1098	1.4506	0.1287	4.2775
14	0.0872	0.0872	0.4186	0.1047	0.4271	1.2021	0.2615	0.1098	1.4666	0.1127	4.2775
15	0.0872	0.0872	0.4186	0.1047	0.4271	1.2021	0.2615	0.1098	1.4828	0.0965	4.2775
16	0.0872	0.0872	0.4186	0.1047	0.4271	1.2021	0.2615	0.1098	1.4992	0.0802	4.2775
17	0.0872	0.0872	0.4186	0.1047	0.4271	1.2021	0.2615	0.1098	1.5157	0.0636	4.2775
18	0.0872	0.0872	0.4186	0.1047	0.4271	1.2021	0.2615	0.1098	1.5324	0.0469	4.2775
19	0.0872	0.0872	0.4186	0.1047	0.4271	1.2021	0.2615	0.1098	1.5493	0.0300	4.2775
20	0.0872	0.0872	0.4186	0.1047	0.4271	1.2021	0.2615	0.1098	1.5664	0.0129	4.2775
21	0.0872	0.0872	0.4186	0.1047	0.4271	1.2021	0.2615	0.1098	-	-	2.6981
22	0.0872	0.0872	0.4186	0.1047	0.4271	1.2021	0.2615	0.1098	-	-	2.6981
23	0.0872	0.0872	0.4186	0.1047	0.4271	1.2021	0.2615	0.1098	-	-	2.6981
24	0.0872	0.0872	0.4186	0.1047	0.4271	1.2021	0.2615	0.1098	-	-	2.6981
25	0.0872	0.0872	0.4186	0.1047	0.4271	1.2021	0.2615	0.1098	-	-	2.6981
26	0.0872	0.0872	0.4186	0.1047	0.4271	1.2021	0.2615	0.1098	-	-	2.6981
27	0.0872	0.0872	0.4186	0.1047	0.4271	1.2021	0.2615	0.1098	-	-	2.6981
28	0.0872	0.0872	0.4186	0.1047	0.4271	1.2021	0.2615	0.1098	-	-	2.6981
29	0.0872	0.0872	0.4186	0.1047	0.4271	1.2021	0.2615	0.1098	-	-	2.6981
30	0.0872	0.0872	0.4186	0.1047	0.4271	1.2021	0.2615	0.1098	-	-	2.6981
Levelized Tariff	**0.0872**	**0.0872**	**0.4186**	**0.1047**	**0.4271**	**1.2021**	**0.2615**	**0.1098**	**1.2356**	**0.1907**	**4.1245**

Levelized Tariff (1-30 years) discounted at 10% per annum = US Cents 4.2520/kWh at reference exchange rate of 1 US$ =Rupees 97.00.

Annex-II

PAKHTUNKHWA HYDEL DEVELOPMENT ORGANIZATION (PHYDO)
RANOLIA HYDROPOWER PROJECT
Debt Servicing Schedule

	Foreign Debt							
Period	Principal Million $	Repayment Million $	Mark-Up Million $	Balance Million $	Debt Service Millin $	Annual Principal Repayment Rs./Kwh	Annual Interest Rs./kWh	Annual Debt Servicing Rs./kWh
	29.02	0.65	0.16	28.37	0.8102			
	28.37	0.65	0.16	27.71	0.8102			
1	29.02	1.30	0.32	27.71	1.6203	1.2717	0.3076	1.5794
	27.71	0.66	0.15	27.06	0.8102			
	27.06	0.66	0.15	26.39	0.8102			
2	27.71	1.32	0.30	26.39	1.6203	1.2857	0.2936	1.5794
	26.39	0.66	0.15	25.73	0.8102			
	25.73	0.67	0.14	25.06	0.8102			
3	26.39	1.33	0.29	25.06	1.6203	1.2999	0.2794	1.5794
	25.06	0.67	0.14	24.39	0.8102			
	24.39	0.68	0.13	23.71	0.8102			
4	25.06	1.35	0.27	23.71	1.6203	1.3143	0.2651	1.5794
	23.71	0.68	0.13	23.03	0.8102			
	23.03	0.68	0.13	22.35	0.8102			
5	23.71	1.36	0.26	22.35	1.6203	1.3288	0.2506	1.5794
	22.35	0.69	0.12	21.66	0.8102			
	21.66	0.69	0.12	20.97	0.8102			
6	22.35	1.38	0.24	20.97	1.6203	1.3434	0.2359	1.5794
	20.97	0.69	0.12	20.28	0.8102			
	20.28	0.70	0.11	19.58	0.8102			
7	20.97	1.39	0.23	19.58	1.6203	1.3582	0.2211	1.5794
	19.58	0.70	0.11	18.87	0.8102			
	18.87	0.71	0.10	18.17	0.8102			
8	19.58	1.41	0.21	18.17	1.6203	1.3732	0.2061	1.5794
	18.17	0.71	0.10	17.46	0.8102			
	17.46	0.71	0.10	16.74	0.8102			
9	18.17	1.42	0.20	16.74	1.6203	1.3884	0.1910	1.5794
	16.74	0.72	0.09	16.03	0.8102			
	16.03	0.72	0.09	15.30	0.8102			
10	16.74	1.44	0.18	15.30	1.6203	1.4037	0.1757	1.5794
	15.30	0.73	0.08	14.58	0.8102			
	14.58	0.73	0.08	13.85	0.8102			
11	15.30	1.46	0.16	13.85	1.6203	1.4192	0.1602	1.5794
	13.85	0.73	0.08	13.11	0.8102			
	13.11	0.74	0.07	12.38	0.8102			
12	13.85	1.47	0.15	12.38	1.6203	1.4348	0.1445	1.5794
	12.38	0.74	0.07	11.63	0.8102			
	11.63	0.75	0.06	10.89	0.8102			
13	12.38	1.49	0.13	10.89	1.6203	1.4506	0.1287	1.5794
	10.89	0.75	0.06	10.14	0.8102			
	10.14	0.75	0.06	9.38	0.8102			
14	10.89	1.50	0.12	9.38	1.6203	1.4666	0.1127	1.5794
	9.38	0.76	0.05	8.62	0.8102			
	8.62	0.76	0.05	7.86	0.8102			
15	9.38	1.52	0.10	7.86	1.6203	1.4828	0.0965	1.5794
	7.86	0.77	0.04	7.09	0.8102			
	7.09	0.77	0.04	6.32	0.8102			
16	7.86	1.54	0.08	6.32	1.6203	1.4992	0.0802	1.5794
	6.32	0.78	0.03	5.55	0.8102			
	5.55	0.78	0.03	4.77	0.8102			
17	6.32	1.56	0.07	4.77	1.6203	1.5157	0.0636	1.5794
	4.77	0.78	0.03	3.98	0.8102			
	3.98	0.79	0.02	3.20	0.8102			
18	4.77	1.57	0.05	3.20	1.6203	1.5324	0.0469	1.5794
	3.20	0.79	0.02	2.40	0.8102			
	2.40	0.80	0.01	1.61	0.8102			
19	3.20	1.59	0.03	1.61	1.6203	1.5493	0.0300	1.5794
	1.61	0.80	0.01	0.81	0.8102			
	0.81	0.81	0.00	(0.00)	0.8102			
20	1.61	1.61	0.01	(0.00)	1.6203	1.5664	0.0129	1.5794