National Electric Power Regulatory Authority

Islamic Republic of Pakistan

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Registrar

No. NEPRA/R/LAG-23/ 4458-59

June 20, 2011

General Manager (Hydel)
Water and Power Development Authority (WAPDA)
186 - WAPDA House, Shahrah-e-Quaid-e-Azam,
Lahore

Subject: **Modification in Generation Licence No. GL(Hydel)/05/2004, dated 03.11.2004 – WAPDA for its Hydel Power Stations**

Reference: *Your letter No. 3580-83/GMH/CEHO/G-182, dated 09.04.2010.*

It is intimated that the Authority has approved "Licensee Proposed Modification" in Generation Licence No. GL(Hydel)/05/2004 in respect of WAPDA for its Hydel Power Stations pursuant to Regulation 10(11) of the NEPRA Licensing (Application & Modification Procedure) Regulations, 1999.

2. Enclosed please find herewith Modification-II in the Generation Licence No. GL(Hydel)/05/2004 along with modified Schedule-I & Scheduled-II as approved by the Authority. Further, the determination of the Authority in the matter is also attached.

Encl:/As above

(Syed Safeer Hussain)

Copy to Director General, Pakistan Environmental Protection Agency, House No. 311, Main Margalla Road, F-11/3, Islamabad.

National Electric Power Regulatory Authority (NEPRA)

Islamabad – Pakistan

GENERATION LICENCE

GL(HYDEL)/05/2004

In exercise of the Powers conferred upon the National Electric Power Regulatory Authority (NEPRA) under Section-26 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 (XL of 1997), the Authority hereby modifies the Generation Licence granted to WAPDA (on November 03, 2004 and expiring on November 02, 2034), to the extent of changes mentioned as here under:-

(i). Installed capacity mentioned in the **Face Sheet** may be **read** as **6879.56 MW** instead of **6443.60 MW**;

(ii). Changes in **Schedule-I** attached as Modified Schedule-I; and

(iii). Changes in **Schedule-II** attached as Modified Schedule-II.

This **Modification-II** is given under my hand this 20th of **June** **Two Thousand** & **Eleven**

Registrar

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
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SCHEDULE-I
(Revised)
Modification-II

The location, size (capacity in MW) technology, interconnection arrangements, technical limits, technical functional specifications and other details specific to the Generation Facilities of the Licensee.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
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NEPRA

Hydel Power Station
Tarbela

(a). Location

(b). Plant: run of the river, storage, veir

(c). Head: minimum, maximum

(d). Technology: Francis, Pelton, etc. size, number of units

(e). Tunnel(s) if existing: length, diameter

(f). expected life

(g). Interconnection with national grid company, length of transmission line(s)

(h). Peaking/base load operation

(i). Plant characteristics: generation voltage, power factor, frequency, automatic generation control, ramping rate, control metering and instrumentation

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
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Tarbela Hydel Power Station

1.	Location	On Right Bank, of River Indus at Tarbela in Distt. Abbottabad, in the province of Khyber Pakhtoon Khawa (KPK).				
2.	Plant	Type	Total Capacity	No. of Units		
		Storage	3478 MW	14		
3.	Head	Maximum		Minimum		
		440 ft		190 ft		
4.	Technology	Francis Turbines				
5.	Tunnel		No.	Length	Diameter	
					At Intake	At Penstock
	Total No. of Tunnel		5	-		
	(i).	No. of Power Tunnels	3	T1, T2 = 2400 ft. T3 = 2700 ft.	45.0 ft.	43.5 ft.
	(ii).	No. of Irrigation Tunnels	2	T4 = 2700 ft T5 = 3675 ft	45.0 ft.	36.0 ft.
6.	Minimum Expected Useful Life of the Generation Facility	50 Years				
7.	Peaking/Base Operation	Generally during High Flow Period, the plant is operated for base load where as during Low Flow Period, it is utilized for peaking purpose.				
8.	Plant Characteristics	Generator Voltage	Units (1-10) = 13.8 KV			
			Units (11-14) = 18.0 KV			
		Power Factor	Units (1-4) = 0.85			
			Units (5-10) = 0.95			
			Units (11-14) = 0.90			
		Frequency	50 Hz			
		Automatic Generation Control	Yes			

REGISTRAR

		CCT	Voltage (KV)	Length (KM)
9.	Interconnection Arrangements (CCT details, length of Transmission Line, voltage level details etc.)	Tarbela-Gatti-I	500	329.69
		Tarbela-Gatti-II	500	321.00
		Tarbela-Sheikh Muhammadi	500	113.07
		Tarbela-Rewat	500	110.89
		Tarbela-Burhan-I	220	035.01
		Tarbela-Burhan-II	220	035.01
		Tarbela-Burhan-III	220	035.04
		Tarbela-Sangjani-IV	220	062.05
		Tarbela-Mardan-I	220	067.00
		Tarbela-Mardan-II	220	067.00

REGISTRAR

Hydel Power Station
Mangla

(a). Location

(b). Plant: run of the river, storage, veir

(c). Head: minimum, maximum

(d). Technology: Francis, Pelton, etc. size, number of units

(e). Tunnel(s) if existing: length, diameter

(f). expected life

(g). Interconnection with national grid company, length of transmission line(s)

(h). Peaking/base load operation

(i). Plant characteristics: generation voltage, power factor, frequency, automatic generation control, ramping rate, control metering and instrumentation

REGISTRAR

Mangla Hydel Power Station

1.	Location	On River Jhelum at Mangla near Mirpur, Azad Jammu & Kashmir.			
2.	Plant	Type	Total Capacity	No. of Units	
		Storage	1000 MW	10	
3.	Head	Maximum		Minimum	
		363 ft		192 ft	
4.	Technology	Francis Turbnes			
5.	Tunnel	No.	Length	Diameter	
				At Intake	At Penstock
	Total No. of Tunnel	5			
	(i). No. of Power Tunnels	5	1560 ft. each	30 ft.	26 ft.
	(ii). No. of Irrigation Tunnels	-	-	-	-
6.	Minimum Expected Useful Life of the Generation Facility	50 Years			
7.	Peaking/Base Operation	Plant is operated for base load generally during High Flow Period, where as during Low Flow Period, it is utilized for peaking.			
8.	Plant Characteristics	Generator Voltage	Units (1-10) = 13.2 KV		
		Power Factor	Units (1-10) = 0.8		
		Frequency	50 Hz		
		Automatic Generation Control	Automatic Load Frequency Control is installed on Units 3, 4, 7&8		

REGISTRAR

		CCT	Voltage (KV)	Length (KM)
9.	Interconnection Arrangements (CCT details, length of Transmission Line, voltage level details etc.)	Mangla-Ghakhar-I	220	111.09
		Mangla-Ghakhar Express –II	220	113.07
		Mangla-Ghakhar-III	220	113.07
		Mangla – KSK-I	220	170.06
		Mangla – KSK-II	220	170.06
		Mangla – KSK-III	220	172.09
		Mangla – New Rawat-I	220	79.09
		Mangla – New Rawat-II	220	79.09
		Mangla – Jhelum-New Rawat-I	132	123.91
		Mangla – Gujar Khan-New Rawat-I	132	88.36
		Mangla – Gujar Khan-New Rawat-II	132	88.36
		Mangla – Old Rawat-I	132	90.00
		Mangla – Old Rawat-II	132	90.00
		Mangla – Rajar-Kharian-I	132	61.00
		Mangla-Kharian-II	132	61.00
		Mangla-Kharian-III	132	61.00
		Mangla-Scarp-I	132	189.06
		Mangla-Scarp – II	132	109.03
		Mangla-Mirpur	132	8.00

REGISTRAR

Hydel Power Station
Warsak

(a). Location

(b). Plant: run of the river, storage, veir

(c). Head: minimum, maximum

(d). Technology: Francis, Pelton, etc. size, number of units

(e). Tunnel(s) if existing: length, diameter

(f). expected life

(g). Interconnection with national grid company, length of transmission line(s)

(h). Peaking/base load operation

(i). Plant characteristics: generation voltage, power factor, frequency, automatic generation control, ramping rate, control metering and instrumentation

REGISTRAR

Warsak Hydel Power Station

1.	Location	located on River Kabul at about 30 KMs from Peshawar in Khyber Pakhtoon Khawa (KPK)				
2.	Plant	Type	Total Capacity	No. of Units		
		Storage	240 MW	6		
3.	Head	Maximum		Minimum		
		150 ft		130 ft		
4.	Technology	Francis Turbine				
5.	Tunnel	No.	Length	Diameter		
	Total No. of Tunnel	1	-	At Intake	At Penstock	
	(i). No. of Power Tunnels	1	365 ft.	39 ft.	39 ft.	
	(ii). No. of Irrigation Tunnels	-	-	-	-	
6.	Minimum Expected Useful Life of the Generation Facility	25 Years after completion of rehabilitation.				
7.	Peaking/Base Operation	Mostly the plant runs as base load, with delivery of peak load for minimum time period during evening.				
8.	Plant Characteristics	Generator Voltage	Units (1-6) = 13.2 KV			
		Power Factor	Units (1-4) = 1.0 Units (5-6) = 0.85			
		Frequency	50 Hz			
		Automatic Generation Control	No			
9.	Interconnection Arrangements (CCT details, length of Transmission Line, voltage level details etc.)	CCT	Voltage (KV)	Length (KM)		
		Warsak-Peshawar Cantt..-I	132	24.1		
		Warsak-Jamrud-II	132	27.69		
		Warsak-Shahi Bagh-I	132	25.91		
		Warsak-Shahi Bagh-II	132	25.91		

REGISTRAR

Hydel Power Station
Ghazi Brotha

(a). Location

(b). Plant: run of the river, storage, veir

(c). Head: minimum, maximum

(d). Technology: Francis, Pelton, etc. size, number of units

(e). Tunnel(s) if existing: length, diameter

(f). expected life

(g). Interconnection with national grid company, length of transmission line(s)

(h). Peaking/base load operation

(i). Plant characteristics: generation voltage, power factor, frequency, automatic generation control, ramping rate, control metering and instrumentation

REGISTRAR

Ghazi Barotha Hydel Power Station

1.	Location	Near Village Barotha 63 KM downstream of Tarbela about 10 KM West of Attock City, Punjab		
2.	Plant	Type	Total Capacity	No. of Units
		Run off the canal with small storage for peak Hours.	1450 MW	5
3.	Head	Maximum		Minimum
		74 meter		69 meter
4.	Technology	Francis Turbine		
5.	Tunnel	-		
6.	Minimum Expected Useful Life of the Generation Facility	50 Years		
7.	Peaking/Base Operation	Peak Load Operation		
8.	Plant Characteristics	Generator Voltage		Units (1-5) = 18 KV
		Power Factor		Units(1-5) = 0.95
		Frequency		Frequency = 50 Hz
		Automatic Generation Control		Yes
9.	Interconnection Arrangements (CCT details, length of Transmission Line, voltage level details etc.)	CCT	Voltage (KV)	Length (KM)
		Two circuit Tarbela-Brotha-Rawat	500	156
		Two circuit 500 KV Tarbela-Brotha-Ghatti	500	80 KM

REGISTRAR

Hydel Power Station
Chashma

(a). Location

(b). Plant: run of the river, storage, veir

(c). Head: minimum, maximum

(d). Technology: Francis, Pelton, etc. size, number of units

(e). Tunnel(s) if existing: length, diameter

(f). expected life

(g). Interconnection with national grid company, length of transmission line(s)

(h). Peaking/base load operation

(i). Plant characteristics: generation voltage, power factor, frequency, automatic generation control, ramping rate, control metering and instrumentation

REGISTRAR

Chashma Hydel Power Station

1.	Location	On Right abutment of Chashma Barrage in Dist. Mianwali, Province of Punjab.		
2.	Plant	Type	Total Capacity	No. of Units
		Run of the River	184 MW	8
3.	Head	Maximum		Minimum
		13.8 meter		3 meter
4.	Technology	Bulb type Turbine		
5.	Tunnel	The Power House is fed through 1000 meter long and 136 meter wide Headrace water channel.		
6.	Minimum Expected Useful Life of the Generation Facility	60 Years.		
7.	Peaking/Base Operation	It is run off the river plant and loading generally depends upon the water releases available.		
8.	Plant Characteristics	Generator Voltage		Units (1-8) = 11 KV
		Power Factor		Units (1-8) = 0.90
		Frequency		50 Hz
		Automatic Generation Control		No
9.	Interconnection Arrangements (CCT details, length of Transmission Line, voltage level details etc.)	CCT	Voltage (KV)	Length (KM)
		Chashma-Wanbuchran-(CCT-1)	132	33.357
		Chashma-Wanbuchran -(CCT-2)	132	33.357
		Chashma Left Bank- (CCT-1)	132	1.71
		Chashma Left Bank- (CCT-2)	132	1.71

REGISTRAR

Hydel Power Station
Renala

(a). Location

(b). Plant: run of the river, storage, veir

(c). Head: minimum, maximum

(d). Technology: Francis, Pelton, etc. size, number of units

(e). Tunnel(s) if existing: length, diameter

(f). expected life

(g). Interconnection with national grid company, length of transmission line(s)

(h). Peaking/base load operation

(i). Plant characteristics: generation voltage, power factor, frequency, automatic generation control, ramping rate, control metering and instrumentation

REGISTRAR

Renala Hydel Power Station

1.	Location	located on Lower Bari Doad Canal near Renala Town Distt. Okara.		
2.	Plant	Type	Total Capacity	No. of Units
		Run of Canal	1.1 MW	5
3.	Head	Maximum		Minimum
		10 ft		7 ft
4.	Technology	Francis Turbine (Horizontal Shaft)		
5.	Penstock	No.	Length	Diameter Internal
	Total No. of Penstock	Nil		
6.	Minimum Expected Useful Life of the Generation Facility	15 Years		
7.	Peaking/Base Operation	Meant for local load of Lift Irrigation Pumping Stations.		
8.	Length of Transmission Line (Radial feeder for Lift Irrigation System)	CCT	Voltage (KV)	Length (KM)
		11 KV feeder EHKL	11	60
9.	Plant Characteristics	Generator Voltage		Units (1-5) = 3.3 KV
		Power Factor		Units (1-5) = 0.8
		Frequency		50 Hz
		Automatic Generation Control		No
10.	Interconnection Arrangements (CCT details, length of Transmission Line, voltage level details etc.)	CCT	Voltage (KV)	Length (KM)
		11 KV feeder EHKL	11	60

REGISTRAR

Hydel Power Station
Chichoki

(a). Location

(b). Plant: run of the river, storage, veir

(c). Head: minimum, maximum

(d). Technology: Francis, Pelton, etc. size, number of units

(e). Tunnel(s) if existing: length, diameter

(f). expected life

(g). Interconnection with national grid company, length of transmission line(s)

(h). Peaking/base load operation

(i). Plant characteristics: generation voltage, power factor, frequency, automatic generation control, ramping rate, control metering and instrumentation

REGISTRAR

Chichoki Hydel Power Station

1.	Location	On Upper Chenab Canal (UCC) near village Joyanwala about 20 KMs from Sheikhupura.		
2.	Plant	Type	Total Capacity	No. of Units
		Run of Canal	13.2 MW	3
3.	Head	Maximum		Minimum
		27.7 ft		22.3 ft
4.	Technology	Kaplan Turbine		
5.	Penstock	No.	Length	Diameter Internal
	Total No. of Penstock	N.A		
6.	Minimum Expected Useful Life of the Generation Facility	30 Years.		
7.	Peaking/Base Operation	Operated as base load according to the water share in the upper Chanab Canal.		
8.	Plant Characteristics	Generator Voltage	Units (1-3) = 3.3 KV	
		Power Factor	Units (1-3) = 0.8	
		Frequency	50 Hz	
		Automatic Generation Control	No	
9.	Interconnection Arrangements (CCT details, length of Transmission Line, voltage level details etc.)	CCT	Voltage (KV)	Length (KM)
		Chichokimallian-Attabad-Shaikhpura	66	18

REGISTRAR

Hydel Power Station
Nandipur

(a). Location

(b). Plant: run of the river, storage, veir

(c). Head: minimum, maximum

(d). Technology: Francis, Pelton, etc. size, number of units

(e). Tunnel(s) if existing: length, diameter

(f). expected life

(g). Interconnection with national grid company, length of transmission line(s)

(h). Peaking/base load operation

(i). Plant characteristics: generation voltage, power factor, frequency, automatic generation control, ramping rate, control metering and instrumentation

REGISTRAR

Nandipur Hydel Power Station

1.	Location	On Upper Chenab Canal (UCC) about 10 KMs from Gujranwala on Gujranwala Sialkot Road.		
2.	Plant	Type	Total Capacity	No. of Units
		Run of Canal	13.8 MW	3
3.	Head	Maximum		Minimum
		24.4 ft		19.5 ft
4.	Technology	Kaplan Turbine		
5.	Penstock	No.	Length	Diameter Internal
	Total No. of Penstock	N.A		
6.	Minimum Expected Useful Life of the Generation Facility	30 Years.		
7.	Peaking/Base Operation	Operated as base load according to the water share in the upper Chanab Canal.		
8.	Plant Characteristics	Generator Voltage		Units (1-3) = 3.3 KV
		Power Factor		Units (1-3) = 0.8
		Frequency		50 Hz
		Automatic Generation Control		No.
9.	Interconnection Arrangements (CCT details, length of Transmission Line, voltage level details etc.)	CCT	Voltage (KV)	Length (KM)
		Nandipur-Daska	66	20
		Nandipur-Gujranwala	66	10

REGISTRAR

Hydel Power Station
Shadiwal

(a). Location

(b). Plant: run of the river, storage, veir

(c). Head: minimum, maximum

(d). Technology: Francis, Pelton, etc. size, number of units

(e). Tunnel(s) if existing: length, diameter

(f). expected life

(g). Interconnection with national grid company, length of transmission line(s)

(h). Peaking/base load operation

(i). Plant characteristics: generation voltage, power factor, frequency, automatic generation control, ramping rate, control metering and instrumentation

REGISTRAR

Shadiwal Hydel Power Station

1.	Location	On Upper Jhelum Canal (UJC) about 133 KMs Down Stream of Mangla and about 7 KMs from Gujrat		
2.	Plant	Type	Total Capacity	No. of Units
		Run of Canal	13.5 MW	2
3.	Head	Maximum		Minimum
		24.5 ft		17 ft
4.	Technology	Kaplan Turbines		
5.	Penstock	No.	Length	Diameter Internal
	Total No. of Penstock	N.A		
6.	Minimum Expected Useful Life of the Generation Facility	30 Years.		
7.	Peaking/Base Operation	Operated as base load according to the water share in the upper Jhelum Canal.		
8.	Plant Characteristics	Generator Voltage		Units (1-2) = 11KV
		Power Factor		Units (1-2) = 0.9
		Frequency		50 Hz
		Automatic Generation Control		No.
9.	Interconnection Arrangements (CCT details, length of Transmission Line, voltage level details etc.)	CCT	Voltage (KV)	Length (KM)
		Shadiwal-Gujrat	132	9.6

REGISTRAR

Hydel Power Station
Rasul

(a). Location

(b). Plant: run of the river, storage, veir

(c). Head: minimum, maximum

(d). Technology: Francis, Pelton, etc. size, number of units

(e). Tunnel(s) if existing: length, diameter

(f). expected life

(g). Interconnection with national grid company, length of transmission line(s)

(h). Peaking/base load operation

(i). Plant characteristics: generation voltage, power factor, frequency, automatic generation control, ramping rate, control metering and instrumentation

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Rasul Hydel Power Station

1.	Location	On Upper Jhelum Canal (UJC) about 74 KMs Down Stream of Mangla.		
2.	Plant	Type	Total Capacity	No. of Units
		Run of Canal	22 MW	2
3.	Head	Maximum	Minimum	
		85.05 ft	80.35 ft	
4.	Technology	Kaplan Turbine		
5.	Penstock	No.	Length	Diameter Internal
	Total No. of Penstock	2	281 ft.	21 ft.
6.	Minimum Expected Useful Life of the Generation Facility	30 Years.		
7.	Peaking/Base Operation	Operated as base load according to the water share in the Canal.		
8.	Plant Characteristics	Generator Voltage	Units (1-2) = 11KV	
		Power Factor	Units (1-2) = 0.88	
		Frequency	50 Hz	
		Automatic Generation Control	No	
9.	Interconnection Arrangements (CCT details, length of Transmission Line, voltage level details etc.)	CCT	Voltage (KV)	Length (KM)
		Rasul-Malikwal	66	38.4
		Rasul-Malikwal-II	66	38.4
		Rasul-Kharian (D/C Bundled)	132	42.0
		Rasul-Kharian (Bundled)	132	42.0

REGISTRAR

Hydel Power Station
Dargai

(a). Location

(b). Plant: run of the river, storage, veir

(c). Head: minimum, maximum

(d). Technology: Francis, Pelton, etc. size, number of units

(e). Tunnel(s) if existing: length, diameter

(f). expected life

(g). Interconnection with national grid company, length of transmission line(s)

(h). Peaking/base load operation

(i). Plant characteristics: generation voltage, power factor, frequency, automatic generation control, ramping rate, control metering and instrumentation

REGISTRAR

Dargai Hydel Power Station

1.	Location	On Upper Swat Canal in Malakand Agency near Dargai Distt. Malakand Agency.		
2.	Plant	Type	Total Capacity	No. of Units
		Run of Canal	20 MW	4
3.	Head	Maximum	Minimum	
		243 ft	239 ft	
4.	Technology	Francis Vane Turbine (Horizontally Mounted)		
5.	Penstock	No.	Length	Diameter Internal
	Total No. of Penstock	N.A		
6.	Minimum Expected Useful Life of the Generation Facility	25 Years.		
7.	Peaking/Base Operation	Runs on base load.		
8.	Plant Characteristics	Generator Voltage	Units (1-4) = 11 KV	
		Power Factor	Units (1-4) = 0.85	
		Frequency	50 Hz	
		Automatic Generation Control	No	
9.	Interconnection Arrangements (CCT details, length of Transmission Line, voltage level details etc.)	CCT	Voltage (KV)	Length (KM)
		Dargai-Mardan	132	59.27
		Dargai-Jabban	66	5.51
		Dargai-Chakdara	132	30.07

REGISTRAR

Hydel Power Station
Chitral

(a). Location

(b). Plant: run of the river, storage, veir

(c). Head: minimum, maximum

(d). Technology: Francis, Pelton, etc. size, number of units

(e). Tunnel(s) if existing: length, diameter

(f). expected life

(g). Interconnection with national grid company, length of transmission line(s)

(h). Peaking/base load operation

(i). Plant characteristics: generation voltage, power factor, frequency, automatic generation control, ramping rate, control metering and instrumentation

REGISTRAR

Chitral Hydel Power Station

1.	Location	On Lutko River, Garam Chashma Road 7 KMs East of Chitral Town		
2.	Plant	Type	Total Capacity	No. of Units
		Run of Canal	1 MW	4
3.	Head	Maximum		Minimum
		110 ft		106 ft
4.	Technology	Units 1 & 2	OSS BERGER (Cross Flow)	
		Units 3 & 4	Francis (Horizontal)	
5.	Penstock	No.	Length	Diameter
	Total No. of Penstock	N.A		
6.	Minimum Expected Useful Life of the Generation Facility	25 Years.		
7.	Peaking/Base Operation	Chitral Hydel Power House is not synchronized with National Grid directly feeds a separate 11 KV line according to considerable variation in load during routine and peak hours.		
8.	Plant Characteristics	Generator Voltage	Units (1-4) = 415 V	
		Power Factor	Units (1-4) = 0.96	
		Frequency	50 Hz	
		Automatic Generation Control	No	
9.	Interconnection Arrangements (CCT details, length of Transmission Line, voltage level details etc.)	CCT	Voltage (KV)	Length (KM)
		11 KV Feeders.	-	-
		Feeding consumers directly	-	-
		Without Grid Station	-	-

REGISTRAR

Hydel Power Station
Kurram Garhi

(a). Location

(b). Plant: run of the river, storage, veir

(c). Head: minimum, maximum

(d). Technology: Francis, Pelton, etc. size, number of units

(e). Tunnel(s) if existing: length, diameter

(f). expected life

(g). Interconnection with national grid company, length of transmission line(s)

(h). Peaking/base load operation

(i). Plant characteristics: generation voltage, power factor, frequency, automatic generation control, ramping rate, control metering and instrumentation

REGISTRAR

Kurram Garhi Hydel Power Station

1.	Location	Kurram Garhi Power Station No. 1	On River Kurram at a distance of 12 KMs in West North of Bannu City.		
		Kurram Garhi Power Station No. 2	On River Kurram at a distance of 8 KMs in West North of Bannu City.		
2.	Plant	Type	Total Capacity	No. of Units	
		Run of Canal	4MW	4	
3.	Head	Maximum	Minimum		
		60 ft	60 ft		
4.	Technology	Francis Turbine			
5.	Tunnel	No.	Length	Dia	
	Total No. of Tunnel	-	-	At Intake	At Penstock
	No. of Power Tunnel	-	Penstock length – 29.7 Meters	1650 mm	-
6.	Minimum Expected Useful Life of the Generation Facility	30 Years.			
7.	Peaking/Base Operation	Base Load.			
8.	Plant Characteristics	Generator Voltage	Units (1-4) = 11 KV		
		Power Factor	Units (1-4) = 0.80		
		Frequency	50 Hz		
		Automatic Generation Control	No		

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		CCT	Voltage (KV)	Length (KM)
9.	Interconnection Arrangements (CCT details, length of Transmission Line, voltage level details etc.)	Kurram Garhi-Bannu	66	16.37

REGISTRAR

Hydel Power Station
Gomal Zam

(a). Location

(b). Plant: run of the river, storage, veir

(c). Head: minimum, maximum

(d). Technology: Francis, Pelton, etc. size, number of units

(e). Tunnel(s) if existing: length, diameter

(f). expected life

(g). Interconnection with national grid company, length of transmission line(s)

(h). Peaking/base load operation

(i). Plant characteristics: generation voltage, power factor, frequency, automatic generation control, ramping rate, control metering and instrumentation

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Gomal Zam Hydel Power Station

1.	Location	Right Bank of Gomal River at Khajuri Kach in South Waziristan Agency about 60KM/ West of District Tank in KPK.		
2.	Plant	Type	Total Capacity	No. of Units
		Storage	17.4 MW	2
3.	Head	Maximum	Minimum	Design
		113.0 m	74.24 m	100.0 m
4.	Technology	Vertical Francis Turbines		
5.	Tunnel	No.	Length	Diameter
		1	390 m	3 m
6.	Peak/Base Load Operation	The plant will be used for peak load (17.4 MW) as well as base load (8.7 MW) depending on the availability of water.		
7.	Expected Date of Commissioning of the Latest Unit	January 15, 2012		
8.	Minimum Expected Useful Life of the Generation Facility	50 years		
9.	Plant Characteristics	Generator Voltage	Units (1-2) = 11 KV	
		Power Factor	0.85	
		Frequency	50 Hz	
		Automatic Generation Control	Yes	
10.	Interconnection Arrangements (CCT details, length of Transmission Line, voltage level details etc.)	CCT	Voltage (KV)	Length (KM)
		Gomal Zam Power House -Tank Grid Station	132	55

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Hydel Power Station
Jinnah Hydel

(a). Location

(b). Plant: run of the river, storage, veir

(c). Head: minimum, maximum

(d). Technology: Francis, Pelton, etc. size, number of units

(e). Tunnel(s) if existing: length, diameter

(f). expected life

(g). Interconnection with national grid company, length of transmission line(s)

(h). Peaking/base load operation

(i). Plant characteristics: generation voltage, power factor, frequency, automatic generation control, ramping rate, control metering and instrumentation

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Jinnah Hydel Power Station

1.	Location	On the Indus River on the right side of the Jinnah Barrage as a bypass arrangement, approximately 5 KM downstream of Kalabagh Town in District Mianwali.		
2.	Plant	Type	Total Capacity	No. of Units
		Run of River	96 MW	08
3.	Head	Maximum		Minimum
		6.2 m		3.2 m
4.	Technology	Horizontal shaft Pit Type Kaplan Turbine		
5.	Tunnel	No.	Length	Diameter
	Total No. of Channel	1	2040 m including Tailrace	Bed Width = 134 m
6.	Peak/Base Load Operation	Base load operation.		
7.	Expected Date of Commissioning of the Latest Unit	March 31, 2012		
8.	Minimum Expected Useful Life of the Generation Facility	50 years		
9.	Plant Characteristics	Generator Voltage		Units (1-2) = 11 KV
		Power Factor		0.90
		Frequency		50 Hz
		Automatic Generation Control		Yes
10.	Interconnection Arrangements (CCT details, length of Transmission Line, voltage level details etc.)	CCT	Voltage (KV)	Length (KM)
		JHPP-I	132 KV	5 KM
		JHPP-II	132 KV	5 KM

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REGISTRAR
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Hydel Power Station
Allai Khwar

(a). Location

(b). Plant: run of the river, storage, veir

(c). Head: minimum, maximum

(d). Technology: Francis, Pelton, etc. size, number of units

(e). Tunnel(s) if existing: length, diameter

(f). expected life

(g). Interconnection with national grid company, length of transmission line(s)

(h). Peaking/base load operation

(i). Plant characteristics: generation voltage, power factor, frequency, automatic generation control, ramping rate, control metering and instrumentation

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Allai Khwar Hydel Power Station

1.	Location	On left bank tributary of the River Indus at Besham in Distt. Battagram in KPK.				
2.	Plant	Type	Total Capacity	No. of Units		
		Storage	121 MW	2		
3.	Head	Maximum	Minimum			
		697 m	687 m			
4.	Technology	Pelton Wheel Vertical Shaft Nozzel operated Turbine				
5.	Tunnel	No.	Length	Diameter		
				At Intake	At Penstock	
	Total No. of Channel	1				
	(i). Power Tunnels (Headrace)	1	2366 m	2.2 m	-	
	(ii). Irrigation Tunnels	Nil				
6.	Peak/Base Load Operation	Generally during High Flow Period, the plant will be operated for base load whereas during Low Flow Period, it will be utilized for peaking.				
7.	Expected Date of Commissioning of the Latest Unit	June 30, 2012				
8.	Minimum Expected Useful Life of the Generation Facility	50 years				
9.	Plant Characteristics	Generator Voltage	Units (1-2) = 11 KV			
		Power Factor	0.85			
		Frequency	50 Hz			
		Automatic Generation Control	Yes			

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		CCT	Voltage (KV)	Length (KM)
10.	Interconnection Arrangements (CCT details, length of Transmission Line, voltage level details etc.)	AKHP-DKHP	132	50.5
		AKHP-KKHP	132	16.5
		AKHP-NEW MANSEHRA	220	83.3
		NEW MANSEHRA-ISLAMABAD	220	100.5

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Hydel Power Station
Duber Khwar

(a). Location

(b). Plant: run of the river, storage, veir

(c). Head: minimum, maximum

(d). Technology: Francis, Pelton, etc. size, number of units

(e). Tunnel(s) if existing: length, diameter

(f). expected life

(g). Interconnection with national grid company, length of transmission line(s)

(h). Peaking/base load operation

(i). Plant characteristics: generation voltage, power factor, frequency, automatic generation control, ramping rate, control metering and instrumentation

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Duber Khwar Hydel Power Station

1.	Location	On left bank tributary of the River Indus at Duber Pattan in Distt. Kohistan in KPK				
2.	Plant	Type	Total Capacity	No. of Units		
		Storage	130 MW	2		
3.	Head	Maximum	Minimum			
		540.5 m	531 m			
4.	Technology	Pelton Wheel Vertical Shaft Turbines				
5.	Tunnel		No.	Length	Diameter	
					At Intake	At Penstock
	Total No. of Channel		2		At Intake	At Penstock
	(i).	No. of Power Tunnels (Headrace)	1	4873	3.5 m	-
	(ii).	No. of Power Tunnels (Pressure)	1	1694.84	-	2.6 m
	(iii).	No. of Irrigation Tunnels	Nil			
6.	Peak/Base Load Operation	Generally during High Flow Period, the plant will be operated for base load whereas during Low Flow Period, it will be utilized for peaking.				
7.	Expected Date of Commissioning of the Latest Unit	December 31, 2012				
8.	Minimum Expected Useful Life of the Generation Facility	50 years				
9.	Plant Characteristics	Generator Voltage	Units (1-2) = 11 KV			
		Power Factor	0.85			

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		Frequency	50 Hz	
		Automatic Generation Control	Yes	
10.	Interconnection Arrangements (CCT details, length of Transmission Line, voltage level details etc.)	CCT	Voltage (KV)	Length (KM)
		DKHP-KKHP	132	32.3
		DKHP-AKHP	132	50.5
		AKHP-NEW MANSEHRA	220	83.3
		NEW MANSEHRA-ISLAMABAD	220	100.5

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

Hydel Power Station
Khan Khwar

(a). Location

(b). Plant: run of the river, storage, veir

(c). Head: minimum, maximum

(d). Technology: Francis, Pelton, etc. size, number of units

(e). Tunnel(s) if existing: length, diameter

(f). expected life

(g). Interconnection with national grid company, length of transmission line(s)

(h). Peaking/base load operation

(i). Plant characteristics: generation voltage, power factor, frequency, automatic generation control, ramping rate, control metering and instrumentation

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Khan Khwar Hydel Power Station

1.	Location	Right tributary of the River Indus at Besham in Distt. Shangla in KPK.				
2.	Plant	Type	Total Capacity	No. of Units		
		Storage	72 MW	2		
3.	Head	Maximum		Minimum		
		257 m		247 m		
4.	Technology	Francis Turbine				
5.	Tunnel	No.	Length	Diameter		
	Total No. of Tunnel	1	-	At Intake	At Penstock	
	(i). No. of Power Tunnels (Headrace)	1	4540	3.8 m	3.25m	
6.	Peak/Base Load Operation	Generally during High Flow Period, the plant will be operated for base load whereas during Low Flow Period, it will be utilized for peaking.				
7.	Expected Date of Commissioning of the Latest Unit	January 31, 2011				
8.	Minimum Expected Useful Life of the Generation Facility	50 Years				
9.	Plant Characteristics	Generator Voltage	Units (1-3) = 11 KV			
		Power Factor	0.85			
		Frequency	50 Hz			
		Automatic Generation Control	Yes			

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		CCT	Voltage (KV)	Length (KM)
10.	Interconnection Arrangements (CCT details, length of Transmission Line, voltage level details etc.)	KKHP-DKHP	132	32.3
		KKHP-KKHP	132	16.5
		AKHP-NEW MANSEHRA	220	83.2
		NEW MANSEHRA-ISLAMABAD	220	100.48

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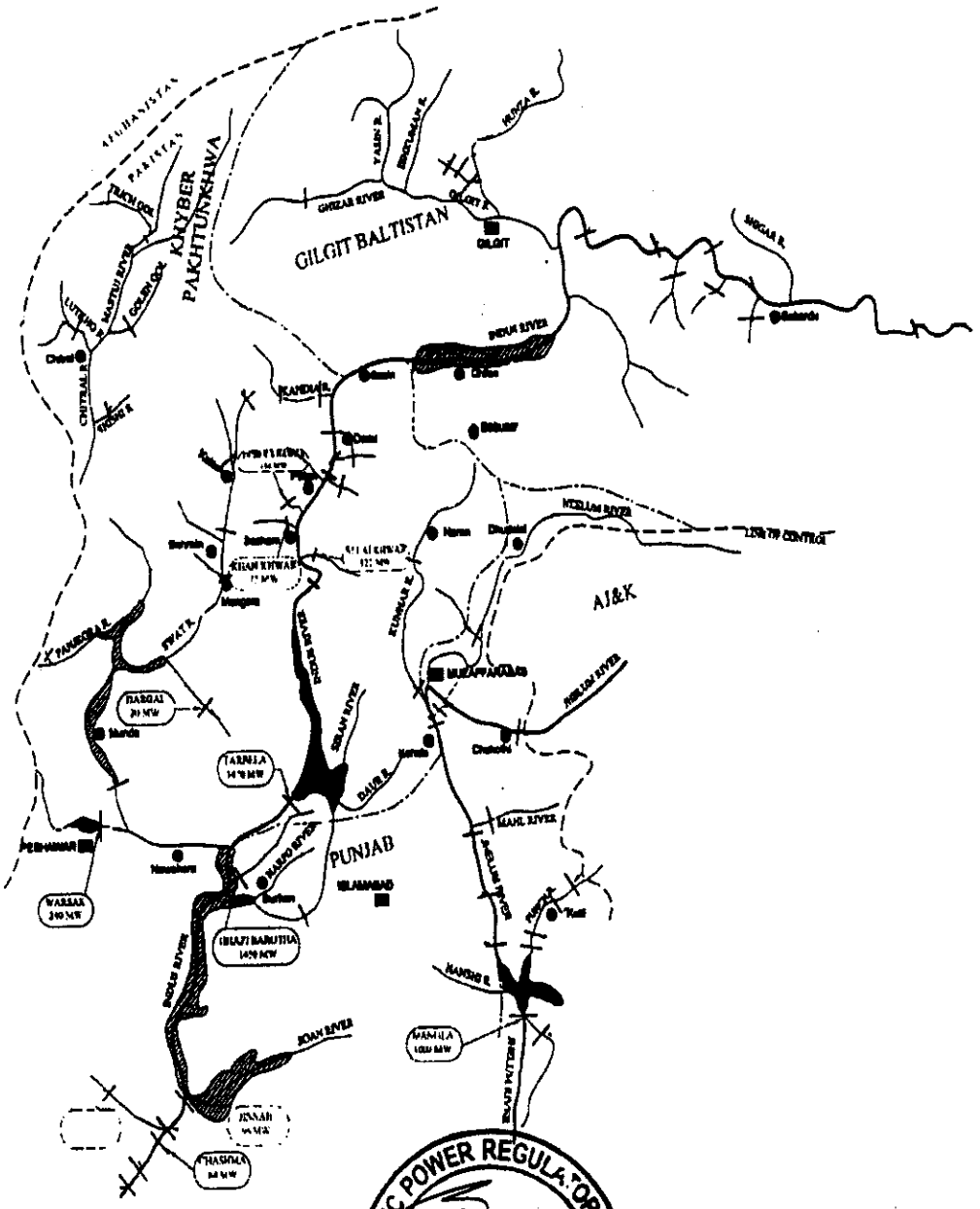
LOCATION OF HYDEL POWER STATIONS



SCHEDULE-II
(Revised)
Modification-II

The Installed, De-Rated, Auxiliary and Net Capacity of the Licensee's Generation Facilities

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
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SCHEDULE-II

Sr. No.	Power Station	Installed Capacity (MW)	Auxiliary Consumption (MW)	Net Capacity (MW)
1.	Hydel Power Station Tarbela	3478.00	16.00	3462.00
2.	Hydel Power Station Mangla	1000.00	25.00	975.00
3.	Hydel Power Station Warsak	242.96	5.50	237.46
4.	Hydel Power Station Ghazi Brotha	1450.00	18.00	1432.00
5.	Hydel Power Station Chashma	184.00	1.50	182.50
6.	Hydel Power Station Renala	1.10	0.014	1.086
7.	Hydel Power Station Chichoki	13.20	1.50	11.70
8.	Hydel Power Station Nandipur	13.80	0.70	13.10
9.	Hydel Power Station Shadiwal	13.50	0.40	13.10
10.	Hydel Power Station Rasul	22.00	2.32	19.68
11.	Hydel Power Station Dargai	20.00	0.05	19.95
12.	Hydel Power Station Chitral	1.00	0.003	0.997
13.	Hydel Power Station Kurram Garhi	4.00	0.30	3.70
14.	Hydel Power Station Gomal Zam	17.00	0.70	16.30
15.	Hydel Power Station Jinnah Hydel	96.00	2.00	94.00
16.	Hydel Power Station Allai Khwar	121.00	0.50	120.50
17.	Hydel Power Station Duber Khwar	130.00	0.50	129.50
18.	Hydel Power Station Khan Khwar	72.00	0.70	71.30
Grand Total		6879.56	75.687	6803.873

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