National Electric Power Regulatory Authority
Islamic Republic of Pakistan

Registrar

NEPRA Tower, Attaturk Avenue (East), G-5/1, Islamabad
Ph: +92-51-9206500, Fax: +92-51-2600026
Web: www.nepra.org.pk, E-mail: registrar@nepra.org.pk

No. NEPRA/R/LAG-02/5256-61

February 13, 2020

Chief Executive Officer,
Jamshoro Power Company Limited,
Mohra Jabal Dadu Road,
Jamshoro.
Contact No. 022-2021230

Subject: **Modification-III in Generation Licence No. GL/01/2002**
Licence Application No. LAG-02
Jamshoro Power Company Limited (JPCL)

Reference: *JPCL's LPM submitted vide letter No. CEPO/JPCL/TD/14046 dated August 24, 2016 (received on August 25, 2016)*

It is intimated that the Authority has approved Modification in Generation Licence No. GL/01/2002 dated July 01, 2002 in respect of Jamshoro Power Company Limited (JPCL), pursuant to Section 26 of the NEPRA Act.

2. Enclosed please find herewith determination of the Authority in the matter of Licensee Proposed Modification in the Generation Licence of JPCL along with Modification-III in the Generation Licence No. GL/01/2002 as approved by the Authority.

Encl: As above

REGISTRAR

13.02.20

(Syed Safeer Hussain)

Copy to:

1. Secretary, Power Division, Ministry of Energy, A-Block, Pak Secretariat, Islamabad.
2. Managing Director, NTDC, 414-WAPDA House, Lahore.
3. Chief Executive Officer, CPPA-G, ENERCON Building, Sector G-5/2, Islamabad.
4. Chief Executive Officer, Hyderabad Electric Supply Company Limited (HESCO), WAPDA Offices Complex, Hussainabad, Hyderabad.
5. Director General, Environment Protection Agency, Government of Sindh, Complex Plot No. ST-2/1, Korangi Industrial Area, Karachi.

National Electric Power Regulatory Authority (NEPRA)

Determination of the Authority in the Matter of the Licensee Proposed Modification in the Generation Licence of Jamshoro Power Company Limited with respect to extension in useful life of Units 3-6 of Gas Turbine Power Station Kotri (GTPS Kotri)

February 13
~~January~~ , 2020
Case No. LAG-02

(A). Background

(i). The Authority in terms of Section-15 (now Section14-B) of Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 (the "NEPRA Act") granted a Generation Licence (No. GL/01/2002, dated July 01, 2002 and subsequent modifications dated April 16, 2014 & August 11, 2014) to Jamshoro Power Company Limited (JPCL)/GENCO-I.

(ii). According to the above mentioned Generation Licence, the cumulative installed capacity of JPCL is 2344 MW consisting of three distinctly located generation facilities including 880 MW furnace oil based Thermal Power Station at Jamshoro-I (TPS Jamshoro-I), 1320 MW imported coal based Thermal Power Station, Jamshoro-II (TPS Jamshoro-II) and 144 MW combined cycle power plant at Kotri (GTPS Kotri).

(iii). TPS Jamshoro-I consists of four (04) conventional steam units (3 x 210.00 MW + 1 x 250.00 MW), installed between 1989 and 1991. TPS Jamshoro-II is proposed to be consisting of two (02) steam turbines (2 x 660 MW) and to be installed in coming years. GTPS Kotri has an Installed Capacity of 144.00 MW, consisting of five (05) units (4x25 MW gas turbines + 1x44 MW steam turbine). The said gas turbines were installed during the period from 1979 to 1981. Whereas, the steam turbine was commissioned in 1994.

(B). Communication of Modification

(i). JPCL in accordance with Regulation-10(2) of the NEPRA Licensing (Application & Modification Procedure) Regulations, 1999 (the "Licensing Regulations"), communicated a Licensee Proposed Modification (LPM) in its existing Generation Licence on August 25, 2016. In the "Text of the Proposed Modification",

JPCL submitted that it intends to modify its Generation Licence by extending the term of useful life of the Units 3-6 (gas turbine units) of GTPS Kotri up to August 10, 2027.

(ii). Regarding "Statement of the Reason in Support of the Modification", JPCL submitted that the expected useful life of the Units 3-6 of GTPS Kotri at the time of grant of Generation Licence in 2002 was considered as 36, 36 38 and 36 years respectively since commissioning. But record shows that the said units remained standby for 06, 08, 06 and 07 years as per National Power and Control Centre (NPCC) demand or due to gas supply stoppage from Sui Southern Gas Company Limited (SSGC) during different periods since commissioning. So all these four units still have remaining useful life of about 10-13 years. Further, Unit-7 (i.e. steam turbine) of the Combine Cycle Power Plant (CCPP) operates by utilizing the exhaust heat of Units 3-6 through Heat Recovery Steam Generators (HRSG) under the efficiency improvement plan, which has the remaining useful life up to August 10, 2027. Therefore, for operating CCPP for the remaining useful life, Units 3-6 of GTPS Kotri must continue operation till August 10, 2027.

(iii). About the "Statement of the Impact on the Tariff, Quality of Service (QoS) and the Performance by the Licensee of its Obligations under the Licence", JPCL submitted that the LPM will not have any adverse impact on the tariff, QoS and its performance under the licence.

(C). Processing of LPM

(i). After completion of all the required information as stipulated under the Regulation-10(2) and 10(3) of the Licensing Regulations by JPCL, the Registrar published the communicated LPM in one (01) English and one (01) Urdu Newspaper on September 27, 2016 informing the general public about the communicated LPM and inviting their comments within a period of fourteen (14) days from the date of the said publication.

(ii). Apart from the above, separate letters were also sent to other stakeholders which included Government Ministries and their attached departments, various representative organizations and individual experts etc. In the said letters, the stakeholders were informed about the communicated LPM and publication of its notice in the press. Further, the said entities were invited for submitting their views and comments in the matter for assistance of the Authority.

REGISTRAR

(D). Comments of Stakeholders

(i). In reply to the above, the Authority received comments from eight (08) stakeholders. These included Pakistan Mineral Development Corporation (Private) Limited (PMDC), SSGC, National Transmission & Despatch Company Limited (NTDC), Punjab Mineral Development Corporation (PbMDC), Anwar Kamal Law Associates (AKLA), Central Power Purchasing Agency (Guarantee) Limited (CPPA-G), Ministry of Water & Power (now Ministry of Energy-MoE) and National Power Control Centre (NPCC) of NTDC. The salient points of the comments offered by the said stakeholders are summarized in the following paragraphs:-

(a). PMDC in its comments supported the proposed modification in the Generation Licence of JPCL;

(b). NTDC communicated that it has no objection in the matter of communicated LPM of JPCL;

(c). SSGC informed that due to depletion of gas producing fields, the gas demand gap is increasing as a result of which SSGC is constraint to provide gas on as and when available basis at present and in the coming years;

(d). PbMDC communicated that it has no objection in the matter of proposed modification;

(e). AKLA submitted that despite their low variable O&M, the Energy Purchase Price (EPP) of these gas based units is very high. Moreover, the plant utilization factors of these power plants are very low, which in turn further increases the cost of power purchases from these units even in some case to more than Rs. 100-500/kWh. scarce resource of the country is not being used to its optimal economic value. On the one hand the power plants of 51% efficiency are not being operated due to non-availability of gas, while on the other hand, power plants of much lower efficiency (19-30%) are being operated on pipeline quality gas. In view of the said, AKLA has requested the Authority to reject the LPM of JPCL. If, for any reason, it is necessary to have these plants in the system, their Tariff should

REGISTRAR

be shifted from 'take or pay' basis to 'take and pay' basis;

(f). CPPA-G supported the LPM of JPCL for the proposed extension in the useful life of Units-3-6 of GTPS Kotri on the premise that these Units are part of combined cycle power plant comprising of steam turbine Unit No. 7 of 44 MW capacity which operates on the exhaust of these Units through heat recovery steam generator (HRSGs). So if these units are shutdown then the Unit-7 will no longer be in operation resulting in loss of investment made for converting open cycle plant into a combined cycle plant. Furthermore, CPPA-G also submitted that extension in the life of Unit-3-6 will not result into any impact on tariff and it will remain same;

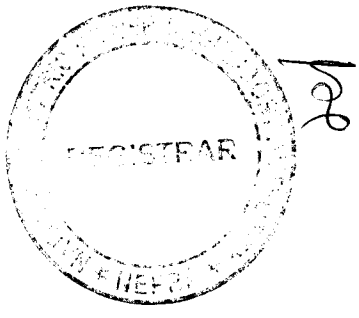
(g). MoE in its comments submitted that NEPRA may confirm the economic feasibility of the units for operation in the proposed period based upon aging of the plant from the past operation. If plant is economically viable to operate, NEPRA may process the LPM as per provisions of the NEPRA Act and GoP policy guidelines, while ensuring the relevant standards. NEPRA may also obtain comments from GHCL; and

(h). NPCC through its letter dated March 03, 2019 submitted that useful life of Unit 3-6 of GTPS Kotri in the Generation Licence may be renewed with the condition that said Unit 3-6 will be replaced by the new efficient units, so that the existing infrastructure may be utilized. Black Start Facility may also be provided with the new units so that in case of system disturbance/tripping, restoration process can be started quickly, as most of the units in South are Steam Units (Port Qasim, HUBCO, Jamshoro etc.) and do not have black start facility. Further, NPCC stated that it can only judge the efficiency of any power plant by its energy price. It is evident from the economic merit order that while operating on the same fuel (RLNG), energy price/kwh of the newly completed power plants (Bhikki, Haveli Bahadur Shah, Balloki, Nandipur Saif, Saphire, Orient and Halmore) is much lower than GTPS Kotri. These new plants are more efficient and economical than GTPS Kotri and operating the GTPS Kotri will result in higher energy price/kwh.

REGISTRAR

(ii). The Authority examined the above comments of the stakeholders and observed that AKLA and CPPA-G have raised certain observations regarding communicated LPM of JPCL. Accordingly, the Authority considered it appropriate to seek perspective of JPCL on the comments/observations of the said stakeholders.

(iii). In reply to the comments of AKLA, it was stated by JPCL that average Energy Purchase Price (EPP) cost of Units 3-6 for the last four years i.e. 2012-13 to 2015-16 remained as 6.65/kWh, 6.72/kWh, 7.06/kWh and 7.57/kWh respectively which is much less than as claimed by AKLA. It is not understandable that on what basis AKLA estimated the cost between Rs100- 500/kwh. Moreover this can be verified from the record of CPPA-G. Further, NEPRA being regulatory authority monitors EPP cost of all generation companies and for strict control issues State of Industry Report as well as Performance Analysis Report of generation companies under NEPRA Performance Generation Standards (Generation) Rules 2009. As per advice of the Authority, operation of GTPS Kotri Units 1-2 was discontinued since May, 2011 being in-efficient and later on Authority Proposed modification (APM) was carried out in 2014 in JPCL Generation Licence for retiring these units. JPCL further submitted that besides NPCC standby and stoppage of gas supply, under the efficiency improvement plan, Unit-7 i.e. 44 MW steam turbine CCPP was commissioned in October 1994 which operates by utilizing exhaust heat of Units 3-6 and still has remaining useful life till October 2027. If Units 3-6 stop operation then Unit-7 CCPP will no longer be able to operate and utilize its useful life. So these units should be in operation till October 2027. JPCL further added that GTPS Kotri is the only generating plant within the vicinity of Kotri District and Kotri Site area. When GTPS Kotri comes under complete shut down due to any reason then system voltage fluctuation issue arises within the vicinity of Kotri especially in Kotri site area. So even in underutilization operation, its continuous operation controls the system voltage problem. The GOP has realized the situation for installation of new and efficient power plants within the country to meet power crises and to meet future demand too. In this regard working for the installation 2x660 MW coal fired power project at Jamshoro is in progress and 660 MW combined cycle gas fired power project working is also under-process. At this stage, discontinuation of operation of existing units of GTPS Kotri is not suitable until and unless the said projects may come into commercial operation.



(iv). In response to the comments of CPPA-G, it was submitted by JPCL that SSGC should give priority to domestic users and power generating plants because electricity is the essential part of life and cannot be live without electricity and should explore new gas fields before depletion of existing gas producing fields because Pakistan is full of natural resources including gas resource and new gas producing fields may be explored and SSGC is fully aware of this. Moreover, gas supply agreement between GTPS Kotri and SSGC exist and operates even underutilization to share load in National Grid. As mentioned at Para D(iii) above, JPCL further added that GTPS Kotri is the only generating plant within the vicinity of Kotri District and Kotri Site area. Complete shutdown of GTPS Kotri results in fluctuation of system voltage fluctuation within the vicinity of Kotri and its continuous operation is necessary to control the system voltage problem. Due to increasing demand of electricity in the country, discontinuation of operation of existing units of GTPS Kotri is not suitable until and unless the new efficient projects may come into commercial operation satisfactorily.

(v). The Authority reviewed the observations of AKLA and CPPA-G and submissions/response of JPCL and considered it appropriate to proceed further with the communicated LPM as stipulated in the Licensing Regulations and the NEPRA Licensing (Generation) Rules, 2000 (the "Generation Rules").

(E). Findings/Analysis

(i). The Authority examined the entire case in detail including the Generation Licence granted to JPCL, the communicated LPM, comments of the stakeholders, response of JPCL, operational data of the units comprised in GTPS Kotri and relevant rules & regulations.

(ii). The Authority observes that in terms of Regulation-10(2) of the Licensing Regulations, a licensee may, at any time during the term of a licence, communicate to the Authority an LPM setting out (a). the text of the proposed modification, and (b). a statement of the reasons in support of the modification, and (c). a statement of the impact on the tariff, quality of service and the performance by the licensee of its obligations under the licence.

(iii). Regarding criteria of modification in a licence, the Authority observes that in terms of Regulation-10(5) of the Licensing Regulations, it is entitled to modify

a licence in accordance with an APM or LPM, subject to and in accordance with such further changes as the Authority may deem fit if, in the opinion of the Authority such modification (a). does not adversely affect the performance by the licensee of its obligations; (b). does not cause the Authority to act or acquiesce in any act or omission of the licensee in a manner contrary to the provisions of the NEPRA Act or the rules or regulations made pursuant to it; (c). is or is likely to be beneficial to the consumers; (d). is reasonably necessary for the licensee to effectively and efficiently perform its obligations under the licence; and (e).is reasonably necessary to ensure the continuous, safe and reliable supply of electric power to the consumers keeping in view the financial and technical viability of the licensee.

(iv). The main features of the LPM under consideration are that the Authority granted a Generation Licence (No. GL/01/2002, dated July 01, 2002 and subsequently modified through modification-I dated April 16, 2014 & modification-II dated August 11, 2014) to JPCL for a cumulative Installed Capacity of 2344 MW for its three distinctly located generation facilities at TPS Jamshoro-I, TPS Jamshoro-II and GTPS Kotri in the province of Sindh.

(v). TPS Jamshoro-I consists of four steam turbine units (i.e. 1x250 MW steam turbine of Mitsui Japan installed in 1990 and 3x210 MW steam turbines of CMEC China installed during 1989 to 1991). TPS Jamshoro-II is proposed to be consisting of 2x660 MW steam turbines of Siemen/Harbin China/Ansaldo or equivalent and is expected to be commissioned by the end of 2022. Whereas GTPS Kotri consist of five generating units (i.e. 2x25 MW gas turbines of Thom B.V. Holland commissioned in 1979, 2x25 MW gas turbines of Hitachi Japan commissioned in 1981 and 1x44 MW steam turbine of HPEEC China, installed in 1994).

(vi). Regarding the units of GTPS Kotri, the Authority has observed that according to the existing Generation Licence of JPCL, the useful life of the Thom B.V. units (Unit 3&4 of GTPS Kotri) was valid up to August 10, 2016 and the useful life of the Hitachi units (Unit 5&6 of GTPS Kotri) was up to August 10, 2018 whereas, the steam turbine of HPEEC (Unit-7 of GTPS Kotri) has validity up to August 10, 2027.

(vii). Accordingly, through the communicated LPM, JPCL proposed to extent the term/useful life of Unit 3-6 of GTPS Kotri in its Generation Licence till 2027. In this regard, JPCL submitted that the expected useful life of the Units 3-6 of GTPS Kotri have remained standby for 06, 08, 06 and 07 years as per NPCC demand and gas

REGISTRAR

supply stoppage from SSGC during different periods since commissioning. So all these four units still have remaining useful life about 10-13 years. Further, Unit-7 (i.e. steam turbine) operates by utilizing the exhaust heat of Units 3-6 through HRSG under the efficiency improvement plan, which has the remaining useful life up to August 10, 2027. Therefore, for operation of the CCPP for the remaining useful life, operation of Units 3-6 of GTPS Kotri must continue operation till August 10, 2027.

(viii). Regarding renewal of term of a Generation Licence, the Authority has observed that Rule-5(2) of the Generation Rules stipulates that upon the expiry of the term of the Generation Licence, the Generation Licence may be renewed by the Authority for such further term as it may deem appropriate in the manner provided for in the Generation Licence keeping in view the remaining maximum expected useful life of the units comprised in the generation facility, the performance of the licensee during the then expiring term and the interests of the consumers and the electric power industry as a whole.

(ix). The Authority has considered the submissions of JPCL and observed that the normal operating life of a thermal generating units is taken as 30-35 years based on round the year operation. In this regard, the Authority has observed that Unit 3&4 of GTPS Kotri were commissioned in 1979 having estimated useful life of thirty six (36) years which expired on August 10, 2016. However, based on numbers of hours of operation as stated by JPCL, these units have about ten (10) years remaining life/operational years.

(x). Similarly, Unit 5-6 of GTPS Kotri were commissioned in 1981 having estimated useful life of thirty six (36) years and according to the modification dated August 11, 2014 the remaining useful life of these units was four (04) years which expired on August 10, 2018. In this regard, the running hours mentioned in the E-forms submitted by JPCL reveal that these units have been operated for twenty five (25) years only and have a remaining life/operational years of thirteen (13) years.

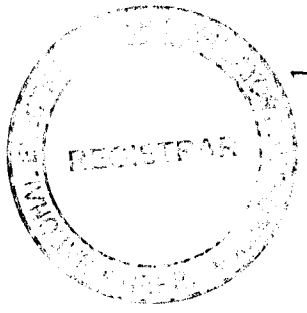
(xi). In addition to the above, the Authority has noted that Unit-7 (i.e. Steam Turbine) of GTPS Kotri was commissioned in October 1994 having estimated useful life of thirty two (32) years and according to the existing Generation Licence, this unit has remaining useful life of thirteen (13) years which will expire in October, 2027. The said unit operates on the exhaust of the gas turbines of Unit 3 to 6 of GTPS Kotri.

REGISTRAR

(xii). Regarding operational performance of the units of GTPS, the Authority has observed that the designed efficiency of Unit 3-6 of GTPS was 27.85% which has now dropped to 20%. Further, the Authority approved efficiency for CCPP of GTPS Kotri is 33.33 % which has now reportedly dropped to 22.54 %, which is very low. Regarding the Load factor and utilization factor of these units, the Authority has observed that the same have remained very low for many consecutive years as the said units do not fall in the merit order of system operator. Further, after expiry of the useful life no proper rehabilitation, up-gradation or major overhauling has been carried out to make the units feasible for further operation.

(xiii). In order to further asses the matter, the Authority also carried out detailed analysis of performance of GTPS Kotri based on the parameters of efficiency (designed, approved and reported/actual), unit make/model, utilization factor, load factor, availability factor, per unit cost, availability of fuel/fuel constraint, energy produced throughout the years under consideration, previous performance of the units, rehabilitation carried out, optimal use of scarce resource, useful life of the units as per the generation licence, remaining life of the units based on operational hours and possibility of extension in term of the units etc. In order to ascertain the physical condition of GTPS Kotri, a site visit was also carried out by the professionals of the Authority.

(xiv). In consideration of the above, the Authority concluded that units of GTPS Kotri are operating quite below their designed efficiency as well as the net efficiency determined by the Authority. Further, due to non-availability of natural gas, the said are mostly not operative or required to be operated on alternate fuel (i.e. RLNG or HSD), which makes these plant un-economical due to higher per unit cost. Further, now more efficient plants are available in the system to meet the demand efficiently and in the presence of most efficient units, the utilization of these least efficient units will result in mere wastage of scarce resources and does not make economic sense and does not merit consideration. Foregoing in view, the Authority considers that further operation of Unit No. 3-6 of GTPS Kotri is technically and economically not viable therefore, the same cannot be allowed for extension in useful life. Further, operation of Unit No. 7 of GTPS Kotri also cannot be allowed, as its operation depends on the operation of Unit No. 3-6.



(F). Decision of the Authority

(i). In view of the above analysis, the Authority hereby decides to reject the request of JPCL to grant extension in useful life of Unit No. 3-6 of GTPS Kotri and decides to exclude GTPS Kotri from the Generation Licence of JPCL. Accordingly, the Generation Licence (No. GL/01/2002) is hereby modified to the extent of exclusion of GTPS Kotri.

(ii). The revised/modified schedules of the Generation Licence are attached as annexure to this determination. The modification in the Generation Licence is subject to the provisions contained in the NEPRA Act, relevant rules framed there under, terms & conditions of the Generation Licence and other applicable documents.

Authority

Rafique Ahmed Shaikh
(Member)

Rehmatullah Baloch
(Member)

Saif Ullah Chattha
(Member)

Engr. Bahadur Shah
(Member/Vice Chairman)

Tauseef H. Farooqi
(Chairman)

REGISTRAR

13 02 20

National Electric Power Regulatory Authority
(NEPRA)
Islamabad – Pakistan

GENERATION LICENCE

No. GL/01/2002

In exercise of the powers conferred under Section-26 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997, the Authority hereby modifies the Generation Licence (No. GL/01/2002) granted to Jamshoro Power Company Limited (issued on July 01, 2002, subsequently modified on April 16, 2014 & August 11, 2014), to the extent of changes mentioned as here under:-

(a). Changes made in the **Schedule-I** of the Generation Licence regarding net capacity are attached as **Revised/ Modified Scheduled-I.**

(b). Changes made in the **Schedule-II** of the Generation Licence regarding net capacity are attached as **Revised/ Modified Scheduled-II.**

This **Modification-III** is given under my hand on this 13th day of **February Two Thousand & Twenty**

13 02 20

Registrar

REGISTRAR

SCHEDULE-I
(Revised/Modified)
Modification-III

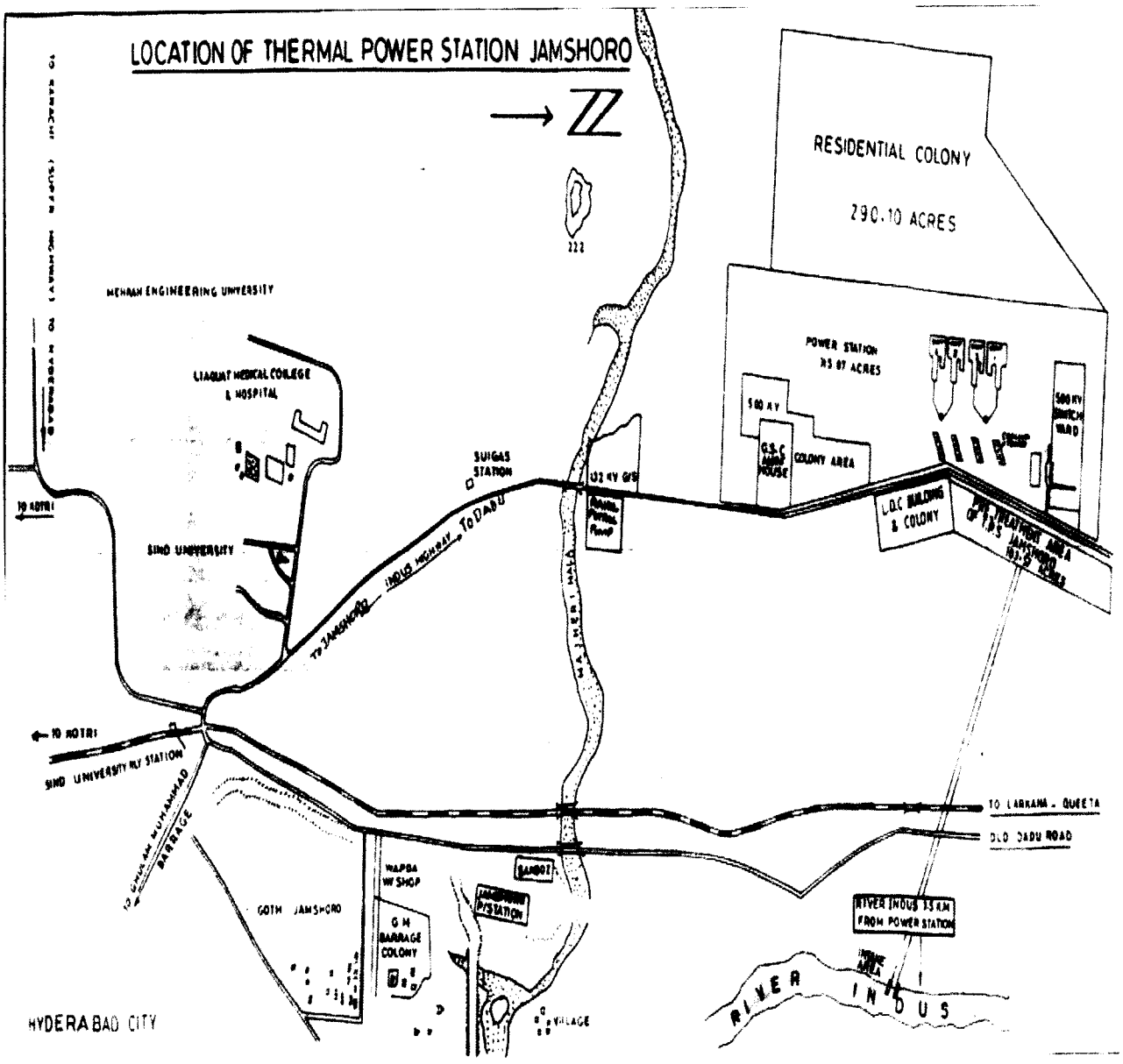
The Location, Size (i.e. Capacity in MW), Type of Technology, Interconnection Arrangements, Technical Limits, Technical/Functional Specifications and other details specific to the Generation Facilities of the Licensee are described in this Schedule.

REGISTRAR

General Information About the Generation Facilities/Power Plants of the Licensee/ Jamshoro Power Company Limited

(i).	Name of Licensee/ Company	Jamshoro Power Company Limited	
(ii).	Registered /Business Office	Thermal Power Station (TPS), Mohro Jabal, Dadu Road, Jamshoro, Sindh.	
(iii).	Plant Locations	Plant-I	Plant-II
		TPS Jamshoro (Unit No. 1, 2, 3 & 4)	TPS Jamshoro (Unit No. 5 & 6)
(iv).	Type of Generation Facility	Plant-I	Plant-II
		Thermal Power Plant	Thermal Power Plant

Location of Generation Facilities of the Licensee



Detail of Generation Facility of Plant-I/ TPS Jamshoro (Unit No. 1, 2, 3 & 4)

(A). Plant Configuration

(i).	Plant Size Installed Capacity (Gross ISO)	880 MW			
(ii).	Type of Technology	Thermal Power Plant			
(iii).	Number of Units/ Size (MW)	Unit-1	Unit-2	Unit-3	Unit-4
		250 MW Steam Turbine	210 MW Steam Turbine	210 MW Steam Turbine	210 MW Steam Turbine
(iv).	Unit Make & Model	Unit-1	Unit-2	Unit-3	Unit-4
		Mitsui, Japan	CMEC, China	CMEC, China	CMEC, China
(v).	Commercial Operation date (of each Unit)	Unit-1	Unit-2	Unit-3	Unit-4
		Jan. 27, 1990	Dec.03, 1989	June 27, 1990	Jan. 21, 1991
(vi).	Expected Useful Life of the Generation Facility/Plant-I from Commercial Operation Date (of each Unit)	Unit-1	Unit-2	Unit-3	Unit-4
		37 Years	38 Years	37 Years	36 Years
(vii).	Expected Useful Life of the Facility (Each Unit) at the time of Grant of Original Generation Licence	Unit-1	Unit-2	Unit-3	Unit-4
		25 Years	25 Years	25 Years	25 Years

(viii).	Remaining useful life of the Generation Facility at the time of this Modification dated April 16, 2014	Unit-1	Unit-2	Unit-3	Unit-4
		14 Years	14 Years	14 Years	15 Years
(ix).	Remaining useful life of the Generation Facility at the time of Modification-II dated August 11, 2014	Unit-1	Unit-2	Unit-3	Unit-4
		14 Years	14 Years	14 Years	15 Years
(x).	Remaining useful life of the Generation Facility at the time of this Modification-III dated February , 2020	Unit-1	Unit-2	Unit-3	Unit-4
		08 Years	08 Years	08 Years	09 Years

(B). Fuel Details

(i).	Primary Fuel	Unit-1	Unit-2	Unit-3	Unit-4
		Furnace Oil			
(ii).	Alternative Fuel	Unit-1	Unit-2	Unit-3	Unit-4
		Furnace Oil	Natural Gas		
(iii).	Start-Up Fuel	Unit-1	Unit-2	Unit-3	Unit-4
		High Speed Diesel (HSD)			
(iv).	Fuel Source for each of the above (i.e. Imported/ Indigenous)	Imported/Indigenous			
(v).	Fuel Supplier for each of the above	Primary Fuel		Alternative Fuel	
		PSO/SHELL		SSGC	

(vi).	Supply Arrangement for each of the above	Primary Fuel	Alternative Fuel
		Tank/Lorries and Railway Wagons	Gas Pipelines
(vii).	No of Storage Tanks	Primary Fuel	Alternative Fuel
		4	N/A
(viii).	Storage Capacity of each Tank	Primary Fuel	Alternative Fuel
		27000 K Liters	N/A
(ix).	Gross Storage	Primary Fuel	Alternative Fuel
		108000 K Liters	N/A

(C). Emission Values

		Furnace Oil	Natural Gas
(i).	SO_x (mg/Nm^3)	1550 to 1650	-
(ii).	NO_x (mg/Nm^3)	300 to 400	90 to 130
(iii).	CO_2 %	10.8 % to 14.0%	2.5 % to 2.7%

(D). Cooling System

(i).	Cooling Water Source/Cycle	River Water (Open Cycle)

(E). Plant Characteristics

		Unit-1	Unit-2	Unit-3	Unit-4
(i).	Generation Voltage	16.5	15.75	15.75	15.75
(ii).	Frequency	50	50	50	50
(iii).	Power Factor	0.85 Lag	0.85 Lag	0.85 Lag	0.85 Lag

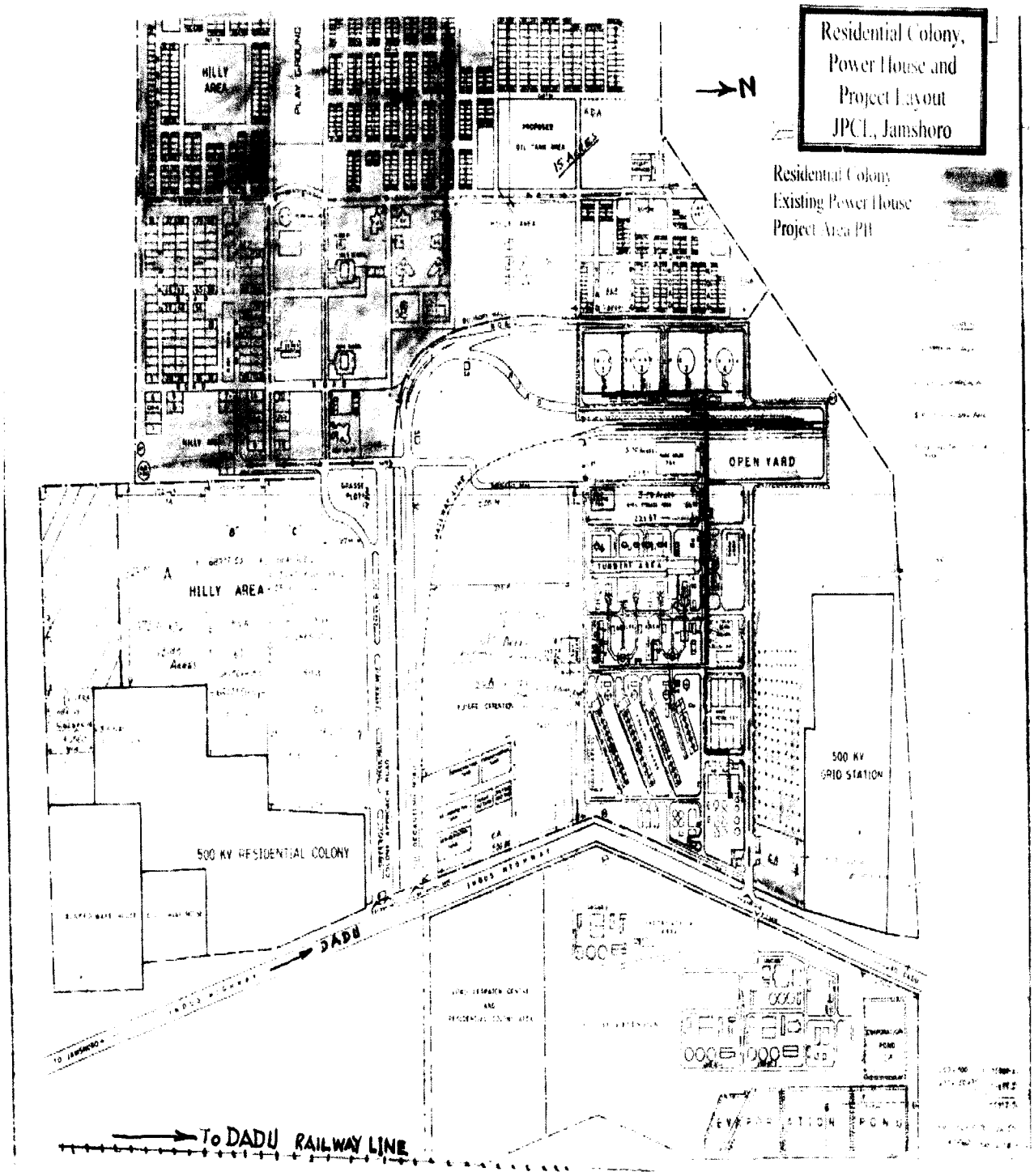
REGISTRAR

(iv).	Automatic Generation Control (AGC) (MW control is the general practice)	No	No	No	No
(v).	Ramping Rate (MW/min)	2.0	1.0	1.0	1.0
(vi).	Time required to Synchronize to Grid (Hrs.)	12	6	6	6

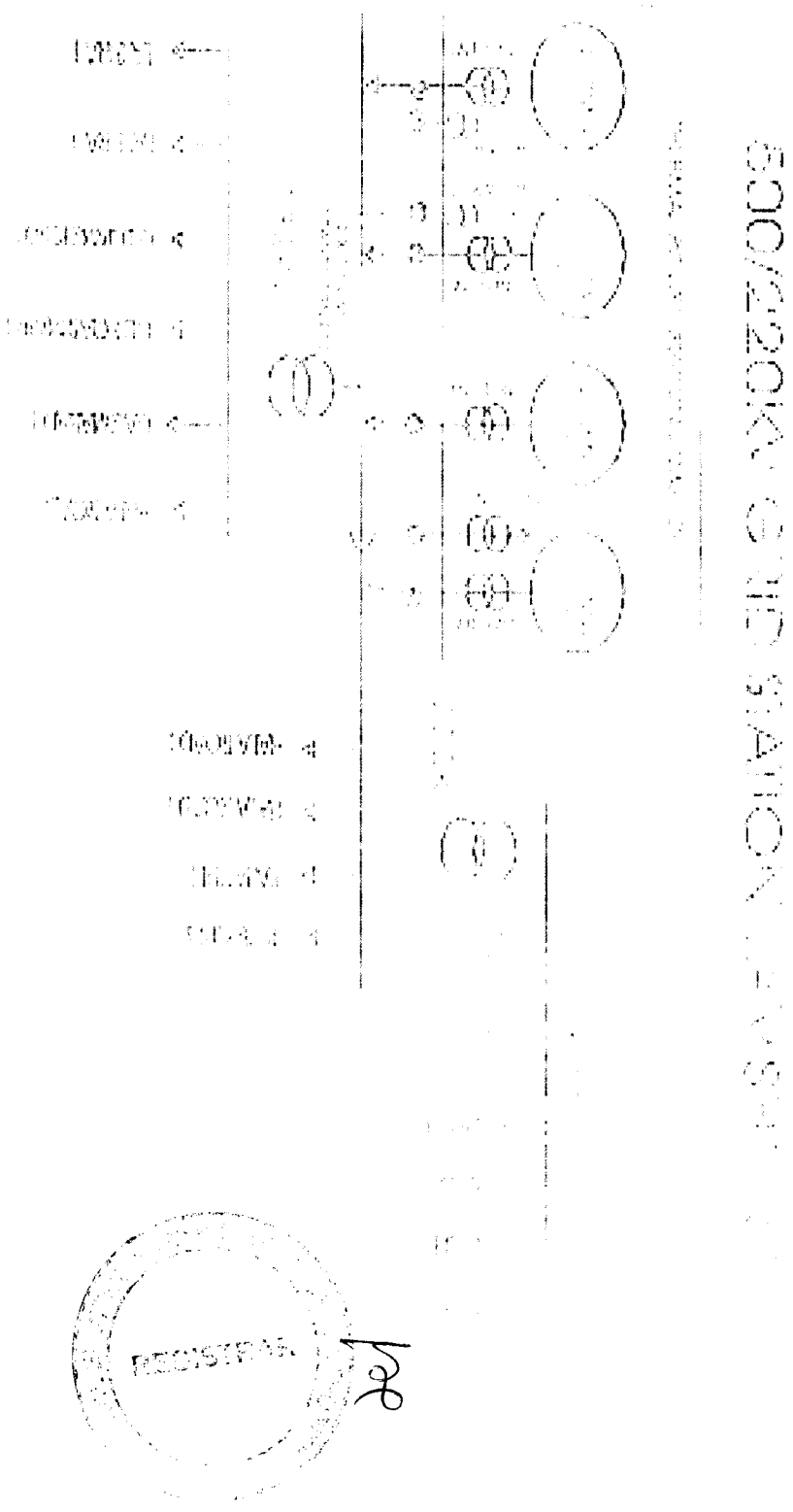
(F). Interconnection Arrangement

(i).	Interconnection & Transmission Arrangement	TPS Jamshoro-I/PInat-I is connected with 500KV/ 220KV/132KV Grid Station Jamshoro through 220 KV & 132 KV Power Cables which is situated at a distance approximately 1.5 Km.

Layout of the Generation Facility/TPS Jamshoro-I /Plant-I (Unit No. 1, 2, 3 & 4)



Single Line Diagram of the Generation Facility/TPS Jamshoro-I /Plant-I (Unit No. 1, 2, 3 & 4)



Detail of Generation Facility of Plant-II/ TPS Jamshoro (Unit No. 5 & 6)

(A). Plant Configuration

(i).	Plant Size Installed Capacity (Gross ISO)	1320 MW			
(ii).	Type of Technology	Thermal Power Plant			
(iii).	Number of Units/Size (MW)	Unit-5		Unit-6	
		660MW Steam Turbine		660 MW Steam Turbine	
(iv).	Unit Make & Model	Unit-5		Unit-6	
		Boiler	Harbin International, China	Boiler	Harbin International, China
		Steam Turbine	Siemens AG Germany	Steam Turbine	Siemens AG Germany
		Generator	Siemens AG Germany	Generator	Siemens AG Germany
(v).	Commercial Operation date (of each Unit)-Anticipated	Unit-5		Unit-6	
		December 31, 2022		June 30, 2023	
(vi).	Expected Useful Life of the Generation Facility/Plant-II from Commercial Operation Date (COD) of each Unit	Unit-5		Unit-6	
		30 Years		30 Years	
(vii).	Expected Useful Life of the Facility (Each Unit) at the time of Grant of Original Generation License	Unit-5		Unit-6	
		Not Installed at that time		Not Installed at that time	

(viii).	Remaining useful life of the Generation Facility/Plant-II at the time of this Modification dated April 16, 2014	Unit-5	Unit-6
		Not Installed at that time	Not Installed at that time
(ix).	Remaining useful life of the Generation Facility/Plant-II at the time of Modification-II dated August 11, 2014	Unit-5	Unit-6
		30 Years from COD	30 Years From COD
(x).	Remaining useful life of the Generation Facility/Plant-II at the time of this Modification dated February ___, 2020.	Unit-5	Unit-6
		30 Years from COD	30 Years From COD

(B). Fuel Details

(i).	Primary Fuel	Unit-5	Unit-6
		Imported/Local Coal	Imported/Local Coal
(ii).	Alternative Fuel	Unit-5	Unit-6
		Nil	Nil
(iii).	Start-Up Fuel	Unit-5	Unit-6
		HSD	HSD
(iv).	Fuel Source for each of the above (i.e. Imported/ Indigenous)	Imported/Indigenous	
(v).	Fuel Supplier for each of the above	Primary Fuel	Start-Up Fuel
		Imported/Local Coal will be supplied through Long Term	PSO/SHELL

		Contract (Name of the Supplier will be Indicated after signing of Coal Supply Agreement)	
(vi).	Supply Arrangement for each of the above	Primary Fuel	Start-Up Fuel
		Tank/Lorries and Railway Wagons	Tank/Lorries and Railway Wagons
(vii).	No of Storage Bunkers/Tanks/ Open Yard	Primary Fuel	Start-Up Fuel
		To be communicated later	To be communicated later
(viii).	Storage Capacity of each Bunkers/Tanks/ Open Yard	Primary Fuel	Start-Up Fuel
		To be communicated later /40 Acres	To be communicated later
(ix).	Gross Storage	Primary Fuel	Start-Up Fuel
		To be communicated later	To be communicated later

(C). Emission Values

		Primary Fuel	Start-Up Fuel
(i).	SO_x (mg/Nm^3)	As per guidelines of ADB & NEQs	As per guidelines of ADB & NEQs
(ii).	NO_x (mg/Nm^3)	-do-	-do-
(iii).	CO_2 %	-do-	-do-

(D). Cooling System

(i).	Cooling Water Source/Cycle	River Water (Open Cycle)/Tube wells at site.

(E). Plant Characteristics

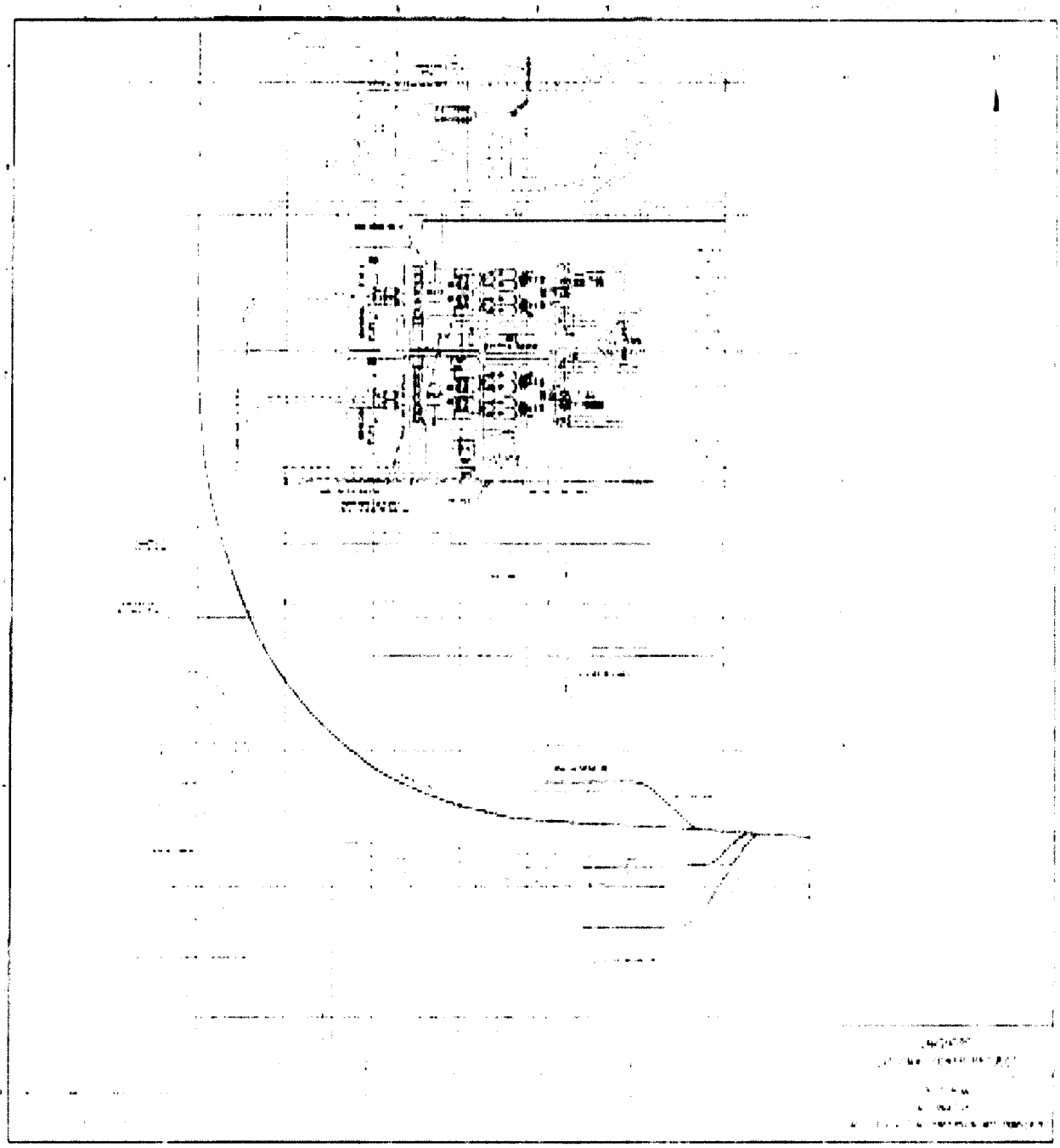
		Unit-I	Unit-II
(i).	Generation Voltage	24 KV	24 KV
(ii).	Frequency	50	50

(iii).	Power Factor	0.85 Lag	0.85 Lag
(iv).	Automatic Generation Control (AGC) (MW control is the general practice)	Yes	Yes
(v).	Ramping Rate (MW/min)	To be provided Later	To be provided Later
(vi).	Time required to Synchronize to Grid (Hrs.)	-Do-	-Do-

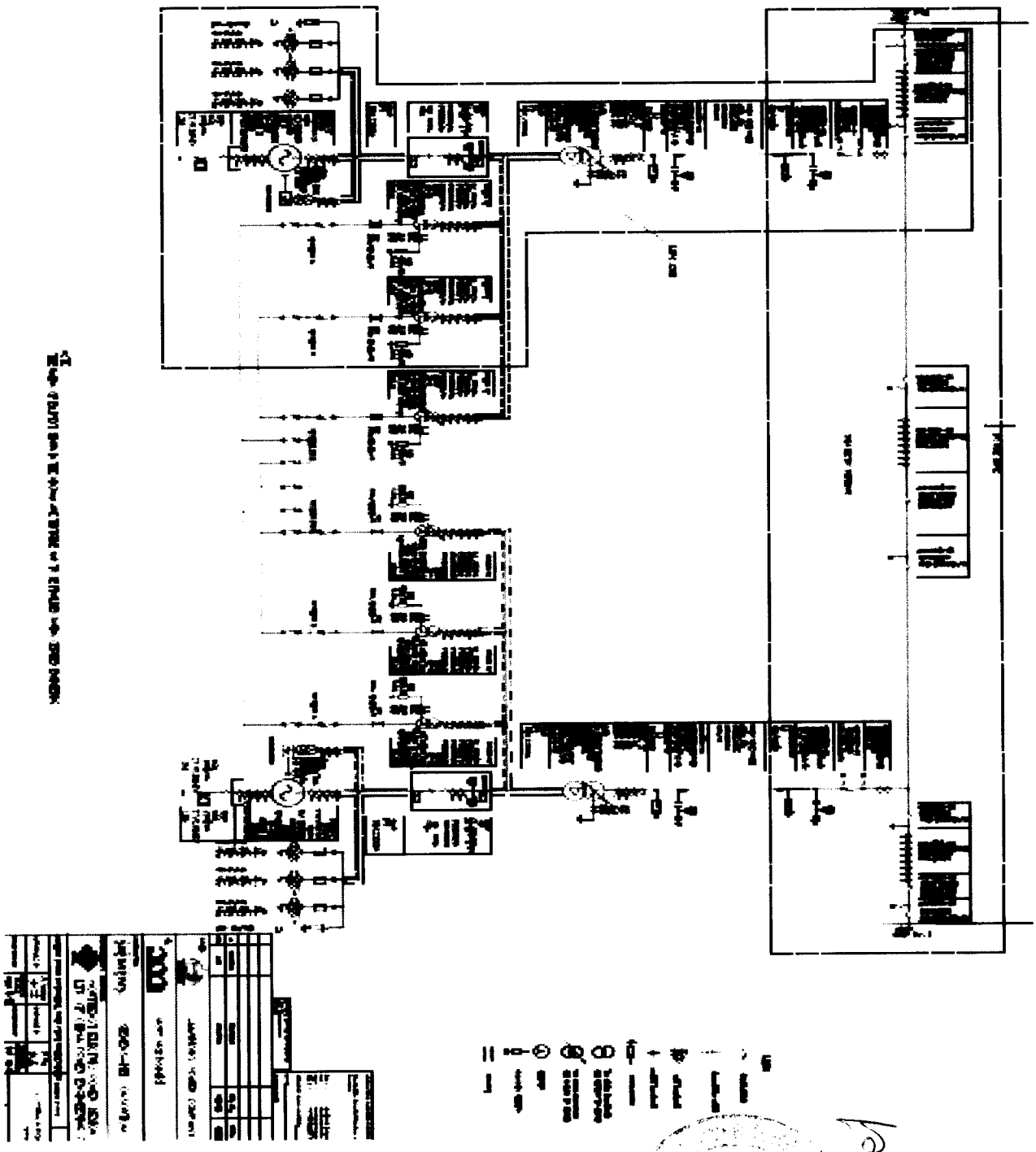
(F). Interconnection Arrangement

(i).	Interconnection & Transmission Arrangement	The Interconnection/Transmission Facilities for Plant-II of TPS Jamshoro for evacuation of power will be consisting of the following:-:- (i). New 500 kV switching station at Moro. (ii). 500 kV Jamshoro-Moro (S/C) transmission line (with Series Compensation) measuring about 200 km on quad bundled AASC Greeley Conductor; (iii). 500 kV Moro-Dadu S/C transmission line 55 km on quad bundled AASC Greeley conductor; (iv). 500 kV Moro-R.Y.Khan S/C transmission line 355 km on quad bundled AASC Greeley conductor; and (v). Extension at Jamshoro, Dadu and R.Y. Khan 500 kV substations.

Layout of the Generation Facility/TPS Jamshoro-II /Plant-II (Unit No. 5 & 6)



Single Line Diagram of the Generation Facility/ TPS Jamshoro-II /Plant-II (Unit No. 5 & 6)



SCHEDULE-II
(Revised/Modified)
Modification-III

The Installed/ISO Capacity (MW), De-Rated Capacity at Mean Site Conditions (MW), Auxiliary Consumption (MW) and the Net Capacity (MW) of the Generation Facilities of the Licensee is given in this Schedule

SCHEDULE-II

Power Station	Unit Detail	Installed Capacity (MW)	De-Rated Capacity (MW)		Net Capacity (MW)	
TPS Jamshoro (Plant-I)	Unit-1	250	Unit-1	200	Unit-1	182.00
	Unit-2	210	Unit-2	170	Unit-2	154.70
	Unit-3	210	Unit-3	170	Unit-3	154.70
	Unit-4	210	Unit-4	170	Unit-4	154.70
	Sub-Total-I	**880**		**710**		**646.1**
TPS Jamshoro (Plant-II)	Unit-5	660	Unit-5	660	Unit-5	600
	Unit-6	660	Unit-6	660	Unit-6	600
	Sub-Total-II	**1320**		**1320**		**1200**
	Grand Total	**2200**		**2030**		**1846.10**