



# National Electric Power Regulatory Authority Islamic Republic of Pakistan

Registrar

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Web: www.nepra.org.pk, E-mail: registrar@nepra.org.pk

No. NEPRA/R/LAG-03/ 7134-39

May 2, 2018

Chief Executive Officer,  
Northern Power Generation Company Limited,  
Mehmood Kot Road,  
TPS, Muzaffargarh.

Subject: **Modification in Generation Licence No: GL/03/2002  
Licence Application No. LAG-03  
Northern Power Generation Company Limited, (NPGCL)**

Reference: *NPGCL's Licensee Proposed Modification (LPM) vide its letter dated September 29, 2016 (received on September 30, 2016)*

It is intimated that the Authority has approved the Modification in Generation Licence No. GL/03/2002 in respect of Northern Power Generation Company Limited (NPGCL), pursuant to Regulation 10(11)(a) of the NEPRA Licensing (Application and Modification Procedure) Regulations 1999.

2. Enclosed please find herewith determination of the Authority in the matter of Licensee Proposed Modification in the Generation Licence of NPGCL along with Modification-III in the Generation Licence No. GL/03/2002, as approved by the Authority.

**Enclosure: As above**



*(Handwritten signature)*  
2/5/18  
(Iftikhar Ali Khan)

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, Faisalabad Electric Supply Company (FESCO), Abdullahpur, Canal Bank Road, Faisalabad.
5. Director General, Environment Protection Department, Government of Punjab, National Hockey Stadium, Ferozpur Road, Lahore

**National Electric Power Regulatory Authority**  
**(NEPRA)**

**Determination of the Authority**  
**in the Matter of the Licensee Proposed Modification in the**  
**Generation Licence of Northern Power Generation Company**  
**Limited with respect to extension in useful life of Gas Turbine**  
**Power Station Faisalabad (GTPS Faisalabad) and Steam Turbine**  
**Power Station Faisalabad (SPS Faisalabad)**

May 02  
~~April~~, 2018  
**Case No. LAG-03**

**(A). Background**

(i). The Authority has granted a generation licence (No. GL/03/2002, dated July 01, 2002 and subsequent modifications dated April 18, 2014 and October 31, 2014) to Northern Power Generation Company Limited (NPGCL/GENCO-III) with a cumulative Installed Capacity of 2291.65 MW for its four (04) distinct generation facilities including Thermal Power Station Muzaffargarh (TPS Muzaffargarh), SPS Faisalabad, GTPS, Faisalabad and Combined Cycle Power Plant at Nandipur (CCPP Nandipur).

(ii). TPS Muzaffargarh of NPGCL has an installed capacity of 1350.00 MW, consisting of six (06) Conventional Steam Units (3 x 210.00 MW + 1 x 320.00 MW + 2 x 200.00 MW), installed between 1993 and 1997. SPS Faisalabad comprised of two (02) Steam Turbine Units of 66.00 MW each, commissioned during the year 1967. GTPS Faisalabad of NPGCL has an Installed Capacity of 244.00 MW, consisting of a total of Nine (09) units set up during the period from 1975 to 1994. Whereas, the 565.65 MW CCPP Nandipur which consist of 3x122 MW gas engines and 1x199 MW steam turbine, was included in the generation licence of NPGCL through modification dated October 31, 2014.

**(B). Communication of Licensee Proposed Modification**

(i). The units of GTPS and SPS Faisalabad outlive their useful lives in 2012. In view of the expired life and other degradation in operational performance (i.e. lower efficiency and high per unit cost, low utilization factor and non availability



of natural gas etc.) the Authority initiated proceedings of the Authority Proposed Modifications (APMs) under Regulation-10(1) of the National Electric Power Regulatory Authority Licensing (Application & Modification Procedure) Regulations, 1999 (the Licensing Regulations), to exclude these units from the generation licence of NPGCL. In this regard, the Authority also conducted a public hearing on July 13, 2016.

(ii). During the public hearing NPGCL took a stance that generation licence was granted to NPGCL in 2002 for a term of twenty five (25) years which is valid till 2027. Subsequently, vide Modification October 31, 2014, the Authority has re-fixed the term of generation licence up to the year 2044 with the addition of Nandipur CCPP Block. Therefore, NPGCL understands that legally its generation licence is valid and based on the said understanding it did not approach the Authority for modification of licence with respect to extension in useful life of GTPS and SPS. However, this aspect was clarified during the hearing that life of generation licence commensurate with the maximum expected useful life of the units comprised in a generation facility. GTPS and SPS are individual set of units along with other units such as CCPP Nandipur and TPS Muzaffargarh comprising NPGCL generation facilities. Useful life of a unit which expired in 2012 cannot be equated with the remaining terms of licence which is based on other units comprising the generation facilities of NPGCL. In view of foregoing, the Authority observed that if NPGCL contends that units of GTPS and SPS have been upgraded and rehabilitated and have the capacity for further operation, it may apply for extension in useful life of GTPS and SPS through LPM.

(iii). In view of the said, NPGCL communicated LPM to the Authority under Regulation-10(2) of the Licensing Regulations), on September 30, 2016. In the text of the proposed modification NPGCL proposed to extend the useful life of unit 1 & 2 of SPS Faisalabad and unit 1-9 of GTPS Faisalabad in the generation licence till 2026. Regarding statement of the reasons in support of modification, NPGCL informed that all the essential components of the power plants i.e. GTPS Faisalabad and SPS Faisalabad like HP heater, HP evaporator, economizer and LP heater are in healthy condition and the efficiency of the plant determined in 2006 is still maintainable. The actual running hours/ running life of these units



remaining. Further, various rehabilitative actions have been taken to improve the reliability, efficiency and life of these units.

(iv). About “statement of the impact on the tariff, quality of service and the performance by the licensee of its obligations under the licence”, NPGCL submitted that the proposed modification in its generation licence will not have any adverse impact on tariff, quality of the service and its performance under the Licence.

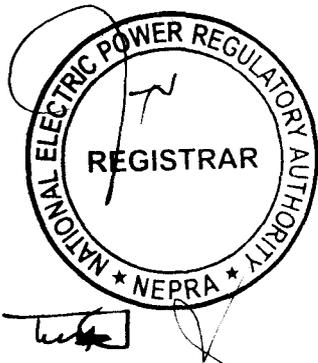
### **(C). Processing of LPM**

(i). After completion of all the required information as stipulated under the Regulation 10 (2) and 10 (3) of the Licensing Regulations by NPGCL, the Registrar published the communicated LPM on October 20, 2016 in one (01) English and one (01) Urdu newspaper (The News and Express), to inform the general public about the communicated LPM and invite their comments in the matter, within fourteen (14) days from the date of the said publication.

(ii). Apart from the above, separate letters were also sent to government ministries, their attached departments and representative organizations and others on October 24, 2016. Through the said letters, the stakeholders were informed about the communicated LPM and publication of notice in the press. Further, the said entities were invited to submit their views and comments in the matter to assist the Authority.

### **(D). Comments of Stakeholders**

(i). In reply to the above, the Authority received comments of from three (04) stakeholders including Board of Investment (BoI), Sui Northern Gas Pipelines Limited (SNGPL), Anwar Kamal Law Associates (AKLA) and Ministry of Water and Power (MoW&P). The salient points of the comments offered by the above mentioned stakeholders are summarized in the following paragraphs: -



(a). BoI submitted that it has no specific comment on the LPM. However, being an investment facilitating and promoting government agency, BoI understands that affordable and smooth supply of energy is the backbone for industrial growth as well as

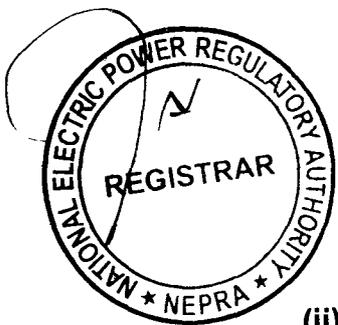
attracting Foreign Direct Investment (FDI) in the country;

(b). SNGPL informed that SPS Faisalabad and GTPS Faisalabad are its consumer and gas is supplied to these power plants on "as and when available basis" or "on demand" basis. SNGPL further clarified that it has no objection to the proposed modification, if the same arrangement stays;

(c). AKLA submitted that GTPS Faisalabad and SPS Faisalabad have outlived their useful life but these units are still in operation. The operation of these plants beyond their useful life is illegal. The capacity payment made to NPGCL against these units beyond their useful life is also illegal. Despite their low VO&M, the 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. The country's scarce resource is not being used to its optimal economic value. On one hand the power plants of 51% efficiency are not being operated due to non-availability of gas, while on the other hand the power plants of much lower efficiency (20-30%) are being operated on pipeline quality gas. In view of the said, AKLA requested the Authority to reject the LPM of NPGCL. AKLA further submitted that if, for any reason, it is necessary to have these plants in the system, their tariff should be shifted from 'Take or Pay' basis to 'take and pay' basis. and

(d). MoW&P in its comments supported the communicated LPM.

(ii). The Authority examined the above comments of the stakeholders and found that of Bol and SNGPL were found in favor of the LPM in the generation licence of NPGCL. Whereas, AKLA in its comments has opposed the grant of LPM for extension of useful life. Accordingly, the Authority considered it appropriate to seek perspective of NPGCL on the comments of AKLA. In response to the observations of AKLA, NPGCL submitted that (a). the life of these units is



extendable due to less operation (less running hours), (b). the variable O&M of these unit is lower as compared to high efficiency IPPs and (c). the FCC of Block-IV (Unit No. 5-9 of GTPS Faisalabad) remained quite competitive to new and high efficiency IPPs. Further, the merit order issued by system operator from time to time also reflect that NPGCL has priority over some IPPs due to less cost of kWh.

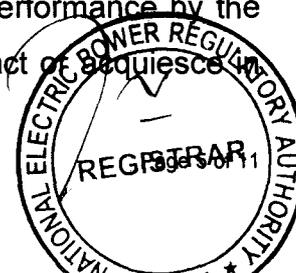
(iii). In this regard, The Authority has observed that AKLA had highlighted the same issues in the matter of APM proceedings of these units. The Authority considered the comments of AKLA and other stakeholders and held a public hearing on July 13, 2016 wherein, these issues were deliberated in detail. In view of the said, the Authority considered it appropriate to process the LPM of NPGCL as stipulated in the relevant Regulations and NEPRA Licensing (Generation) Rules 2000 (the Generation Rules).

#### **(E). Findings/Analysis**

(i). The Authority has examined the entire case in detail including the already granted generation licence, information submitted along with the application of LPM, comments of stakeholders, response of NPGCL to the comments, operational data of the units comprised in GTPS and SPS Faisalabad and relevant rules and 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 of acquiescence



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 NPGCL a generation licence (No. GL/03/2002 dated July 01, 2002 for its distinctly located thermal generation facilities/power plants. The Authority also allowed NPGCL modifications in the said generation licence at different times, for enhancement/reduction of capacity and addition/deletion of generating units/plants. According to the existing generation licence of NPGCL, the existing Installed capacity of NPGCL is 2291.65 MW, consisting of 1350 MW TPS Muzaffargarh, 244 GTPS Faisalabad, 132 MW SPS Faisalabad and 565.65 MW CCPP Nandipur.

#### **GTPS Faisalabad**

(i). The Authority observes that according to the generation licence of NPGCL, GTPS Faisalabad consists of a total of Nine (09) units including 8x25 MW gas turbines and 1x44 MW steam turbine. The gas turbines are of AEG Kanis Germany and were installed during the period from March to November 1975. Whereas, the steam turbine is of HPEEC China and was installed in 1994. Unit No.1-4 of GTPS operate in open cycle mode whereas Unit No. 5-9 of GTPS Faisalabad operate in combined cycle mode. At the time of grant of the above mentioned generation licence (i.e. on July 01, 2002) the remaining useful life of the said generating units of GTPS was set to ten (10) years from the date of issuance of the generation licence, which outlived their useful lives in June 30, 2012.

(ii). Regarding remaining life of Unit No. 1-9 of GTPS Faisalabad, NPGCL has submitted that these units have operated in the range of 17,058 hours (Unit No. 2) to 40, 875 hours (Unit No. 9) which translate into 2.0 years to 4.5 years maximum. Therefore, the units of GTPS Faisalabad have 2.0 to 8.0 years



remaining life/operational useful life. NPGCL has further submitted that the efficiency of GTPS Faisalabad determined by the Authority in 2006 has been maintained by the utmost efforts.

(iii). The Authority has considered the submission of NPGCL and observes that the normal operating life of a steam turbine is taken as 30-35 years based on round the year operation. However, the same can be extended upto 50 years based on proper maintenance and actual operation hours (4-5 months in a year) as in the case of sugar industry. Further, the gas turbine units (8x25 MW) of GTPS Faisalabad were commissioned in the year 1975 and have consumed about forty (40) years from COD. Based on the very fact and other operational parameters, at the time of grant of licence the remaining useful lives of the generating units of GTPS and SPS Faisalabad was set as (10) years till June 30, 2012. According to the generation licence, the generating units of GTPS Faisalabad have also outlived their useful lives in 2012. However, based on numbers of hours of operation as stated by NPGCL, these units have about 5-10 years remaining life/operational years.

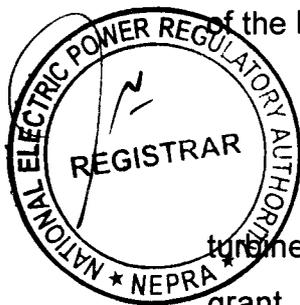
(iv). Regarding operational performance of the units of GTPS Faisalabad, the Authority observes that this generation facility of NPGCL is comprised of two (02) blocks. One block which consists of Unit No.1-4 (i.e. 4x25 MW gas turbines) operates in open cycle mode whereas the other block which consists of Unit No.5-9 (i.e. 4x25 MW gas turbines +1x44 MW steam turbine) operates in combined cycle mode.

(v). Regarding, Unit No.1-4 of GTPS Faisalabad, the Authority has observed that the designed efficiency of these units was 27.60% and in the tariff determination of 2006 the efficiency approved by the Authority is 22.21 % and the revised approved efficiency in 2016 tariff determination is 24.58%. Whereas, according the E-Forms, the reported gross efficiency of these units remained 20.15%, 20.22%, and 20.33% for the FY-2014-15, FY-2015-16 and FY-2016-17 respectively. Further, the net efficiency of these units remained 19.05%, 19.92% and 17.37%, which is on very low side. Moreover, load factor and utilization factor of these units have remained less than 2.0% for many consecutive years. 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.

(vi). Regarding, Unit No. 5-9 of GTPS Faisalabad, the Authority has observed that the Unit No. 5-8 were installed during July-November in the year 1975 whereas the steam turbine was added on December 28, 1994 for operation in combined cycle mode. The designed efficiency of each of the gas turbine of the GTPS Faisalabad is 27.60% whereas in the tariff determination of 2006 the efficiency determined by the Authority for Unit No. 5-9 of GTPS Faisalabad is 39.71% and in the tariff determination of 2016, the Authority has set the efficiency of these units as 38.33%. However, according to the E-Forms the reported gross efficiency of these units remained 30.54%, 29.75%, and 30.18% for the FY-2014-15, FY-2015-16 and FY-2016-17 respectively. Further, for the said period the net efficiency of these units remained very low i.e. 28.97%, 29.07% and 29.46% respectively. Further, load factor and utilization factor of this combined cycle block has remained about 20-25%. In this regard, the Authority has observed that if operated on gas, despite being less efficient the combined block of GTPS attains good position in the merit order. The primary fuel for GTPS Faisalabad is natural gas whereas HSD is used as alternative respectively by GTPS. In case of non availability of natural gas the operation of these units is un-economical due to higher per unit cost. 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, except replacement of functional group control system with new distributed control system in 2012. However, according to the Boiler Inspector Report dated December 31, 2015 all the essential components like HP heater, HP evaporator, Economizer and LP heater of the combined cycle block of GTPS are in healthy condition and these units should remain in operation to maintain healthiness of the boiler.



**SPS Faisalabad**

(i). SPS Faisalabad consists of 2x66 MW steam turbines. The steam turbines are of Westing House USA and were installed in June 1967. At the time of grant of the above mentioned generation licence (i.e. on July 01, 2002) the remaining useful life of the said generating units of SPS Faisalabad was set to ten

(10) years from the date of issuance of the generation licence, which outlived their useful lives in June 30, 2012.

(ii). Regarding remaining life of Unit No. 1-2 of SPS Faisalabad, NPGCL has submitted that from the date of grant of the licence 2002, the units of SPS have operated for 53,133 hours (Unit No. 1) and 54,050 hours (Unit No. 2) respectively which translate into from 6.07 years to 6.17 years maximum, whereas the standby hours do not contribute to the life of units. Therefore, these units have about four (04) years remaining life/operational years. NPGCL has further submitted that the efficiency of SPS Faisalabad determined by the Authority in 2006 has been maintained by the utmost efforts.

(iii). The Authority has considered the submissions of NPGCL and observes that the normal operating life of a steam turbine is taken as 30-35 years based on round the year operation. However, the same can be extended upto 50 years based on proper maintenance and actual operation hours (4-5 months in a year) as in the case of sugar industry. In this regard, it is observed that steam turbine units (2x66 MW) of SPS Faisalabad were commissioned in the year 1967 and have consumed about fifty (50) years from COD. As per the generation licence, the generating units of SPS Faisalabad have outlived their useful lives in 2012. However, based on numbers of hours of operation as stated by NPGCL, these units have about four (04) years remaining life/operational years.

(iv). Regarding operational performance of the units of SPS Faisalabad, the Authority observes that one of steam turbines (i.e. Unit No. 1) is out of operation for the last many years. The designed efficiency of SPS was 32.06% whereas the efficiency approved by the Authority in the tariff determination of 2006 is 23.75 % and the revised efficiency of SPS as approved by the Authority in the tariff determination dated January 22, 2016 is 26.29% which has reportedly dropped down to about 20% which is on lower side. Load factor and utilization factor of these units have remained very low for many consecutive years as the same 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.



### **Site visit of GTPS and SPS Faisalabad**

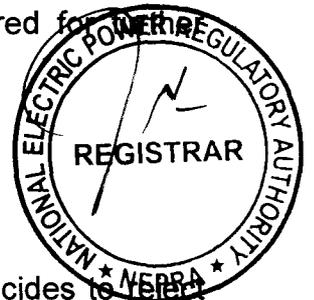
(i). In order to further assess the matter, the Authority also carried out detailed analysis of performance of GTPS and SPS Faisalabad based on the parameters of efficiency (designed, approved and reported/actual), unit make/model, utilization factor, load factor, availability factor, per unit cost, 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, possibility of extension in term of the units, number of employees etc. In order to ascertain the physical condition of GTPS and SPS Faisalabad, a site visit was also carried out by the professionals of the Authority along with Member Licensing.

(ii). In consideration of the above, the Authority concluded that units of GTPS and SPS Faisalabad 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, Unit No. 1-2 of the SPS Faisalabad and Unit No.1-4 of the GTPS Faisalabad are mostly not operative or required to be operated on alternate fuels (i.e. HSD and RFO), which makes these plant un-economical due to higher per unit cost.

(iii). Foregoing in view, the Authority considers that operation of Unit No. 1-2 of the SPS Faisalabad and Unit No.1-4 of the GTPS Faisalabad is technically and economically not viable therefore the same cannot be allowed for extension in useful life. However, keeping in view the relatively better position in merit order, operational record and combined cycle mode operation, and the report of the Boiler Inspector, Unit No. 5-9 of the GTPS Faisalabad can be considered for further operation for another five (05) years, subject to availability of gas.

### **(F). Decision of the Authority**

(i). In view of the above analysis, the Authority hereby decides to ~~grant~~ the request of NPGCL to grant extension in useful life of Unit No. 1-4 of the GTPS Faisalabad (operating in open cycle mode) and Unit No. 1-2 of SPS Faisalabad.

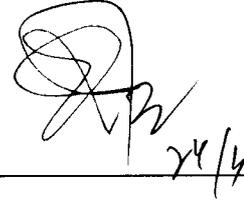


However, the Authority further decides to extend the useful life of the Unit No. 5-9 of GTPS Faisalabad (operating in combined cycle mode) till June 30, 2022.

(ii). Accordingly, the generation licence (No. GL/03/2002 dated July 01, 2002) is hereby modified. The revised/modified schedules of the generation licence are attached as annexure to this determination. The approval of the LPM 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**

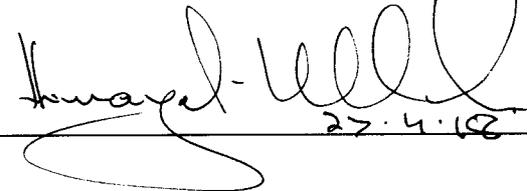
Rehmatullah  
(Member)

  
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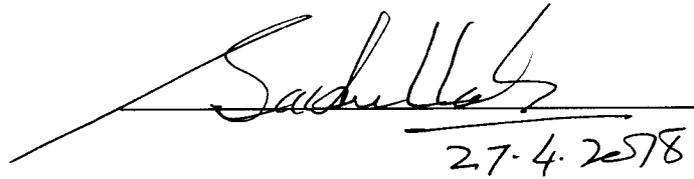
Syed Masood-ul-Hassan Naqvi  
(Member)

  
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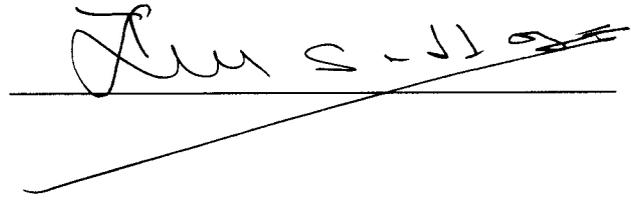
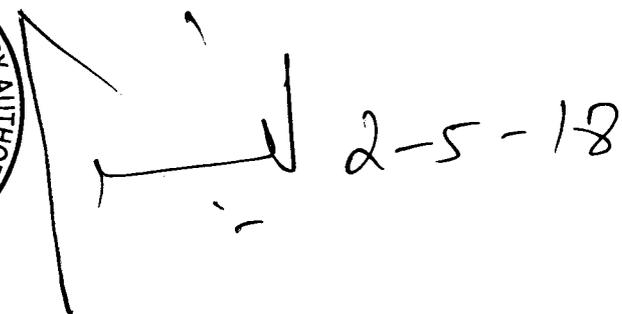
Himayat Ullah Khan  
(Member)

  
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Saif Ullah Chattha  
(Member/Vice Chairman)

  
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Tariq Saddozai  
(Chairman)

  
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2-5-18



**National Electric Power Regulatory Authority  
(NEPRA)**

Islamabad – Pakistan

**GENERATION LICENCE**

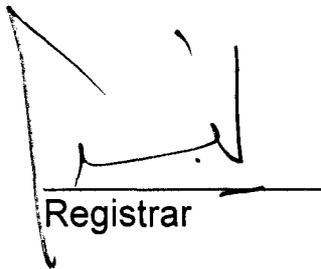
**GL/03/2002**

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/03/2002) granted to Northern Power Generation Company/NPGCL/GENCO-III (issued on July 01, 2002, modified dated April 18, 2014 & October 31, 2014 and expiring on June 30, 2027), to the extent of changes mentioned as here under:-

- (i). Changes in **Schedule-I** of the generation licence are attached as Revised/Modified Schedule-I; and
- (ii). Changes in **Schedule-II** of the generation licence are attached as Revised/Modified Schedule-II.

This **Modification-III** is given under my hand on this 2nd day of <sup>May</sup>~~April~~

**Two Thousand & Eighteen**

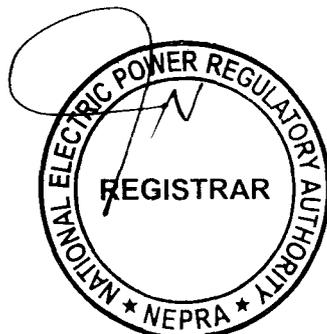
  
Registrar



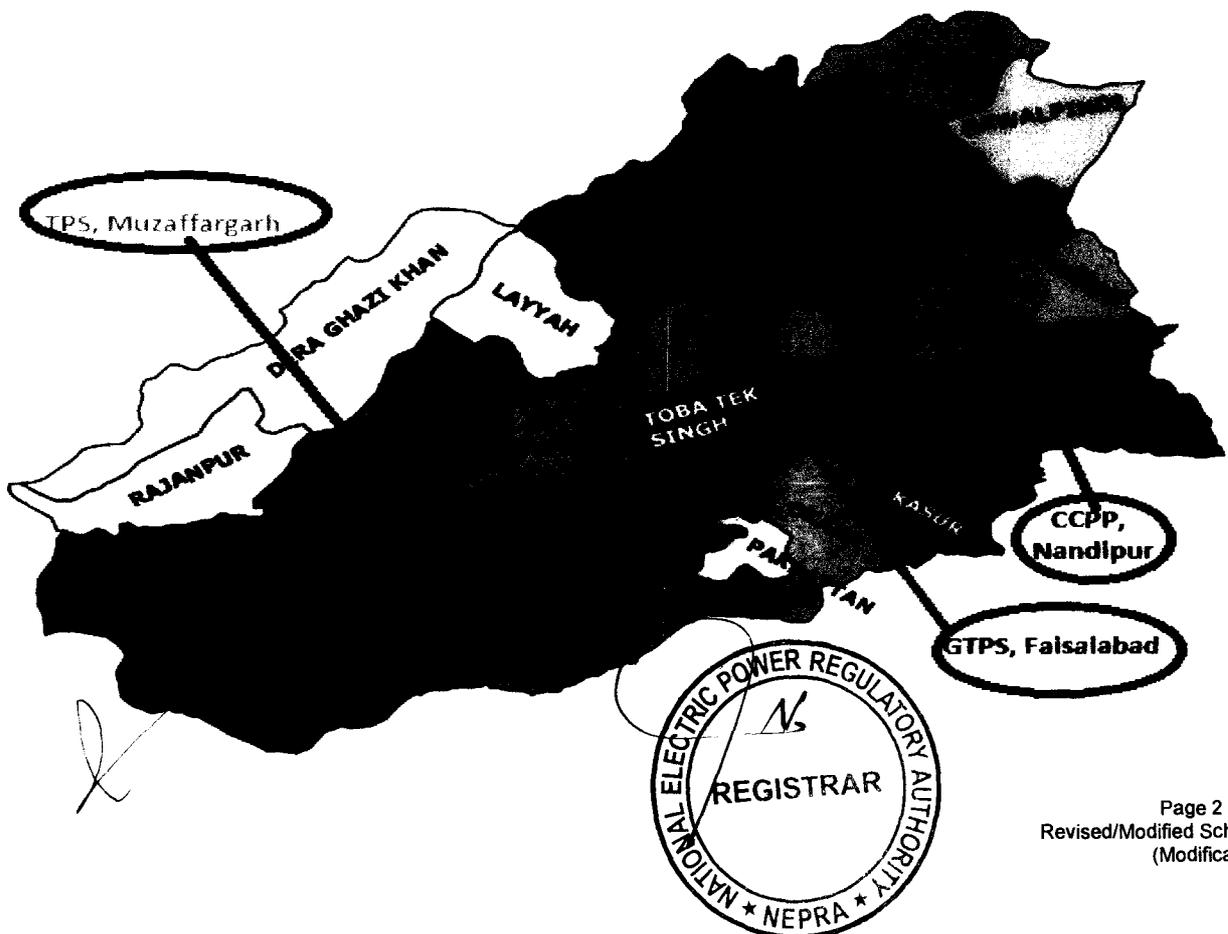
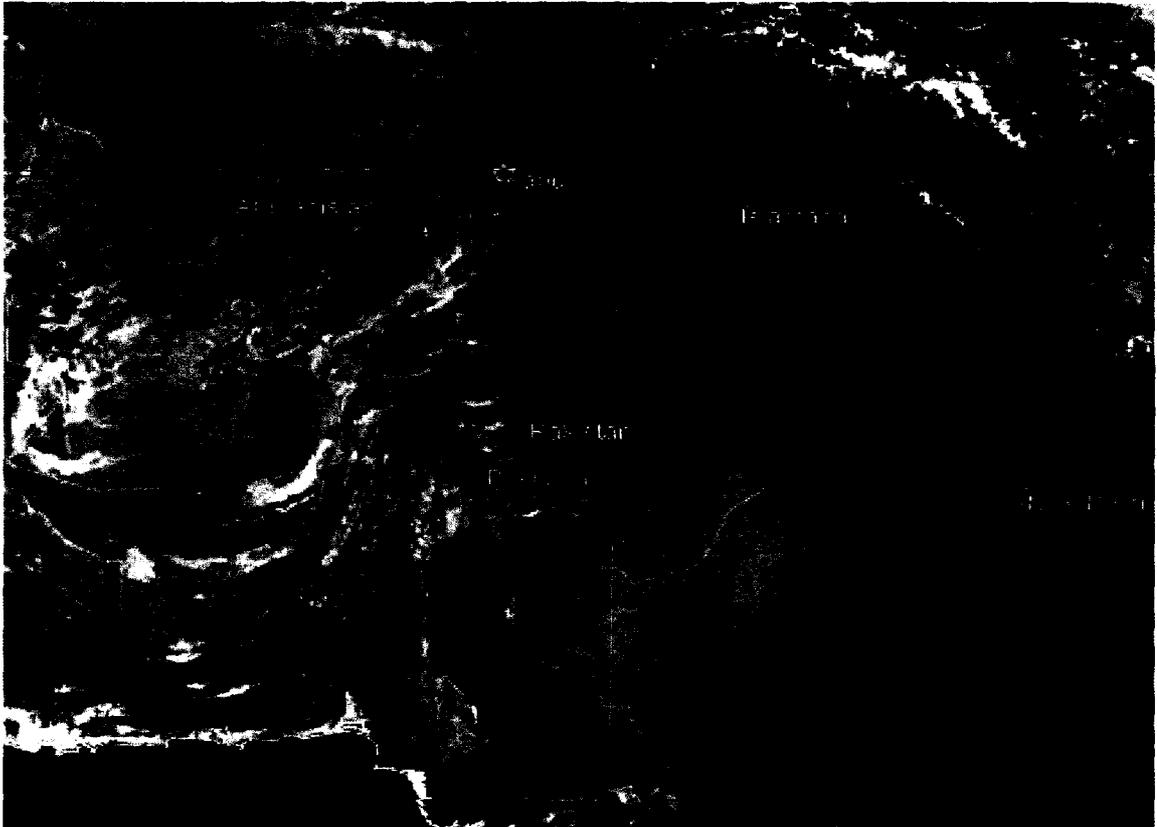
**SCHEDULE-I**  
**(Revised/Modified)**  
**Modification-III**

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.

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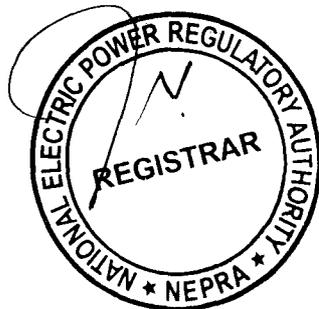


## Location of Power Plants/Generation Facilities of NPGCL



**General Information**  
**About the Company/Licensee**

(i).	Name of the Company/ Licensee	Northern Power Generation Company Limited (NPGCL)/GENCO-III		
(ii).	Registered /Business Office	Thermal Power Station Muzaffargarh (TPS Muzaffargarh), Punjab		
(iii).	Location the of Plants	Plant-I	Plant-II	Plant-III
		TPS, Muzaffargarh	Gas Turbine Power Station Faisalabad (GTPS, Faisalabad)	Combined Cycle Power Station at Nandipur (CCPP, Nandipur)
(iv).	Type of the Generation Facilities	Thermal Power Generation		



**Details**  
**of Generation Facility at**  
**Plant-I/TPS, Muzaffargarh**

**(A). Plant Configuration**

(i).	Plant Size/ Installed Capacity (Gross ISO)	1350 MW					
(ii).	Type of Technology	Conventional Steam Turbine Thermal Power Plant					
(iii).	Number of Units/Size (MW)	Unit No.1	Unit No.2	Unit No.3	Unit No.4	Unit No.5	Unit No.6
		210 MW Steam Turbine	210 MW Steam Turbine	210 MW Steam Turbine	320 MW Steam Turbine	200 MW Steam Turbine	200 MW Steam Turbine
(iv).	Unit Make & Model	Unit No.1	Unit No.2	Unit No.3	Unit No.4	Unit No.5	Unit No.6
		T.P.E USSR	T.P.E USSR	T.P.E USSR	CMEC China	CMEC China	CMEC China
(v).	Commercial Operation date (of each Unit)	Unit No.1	Unit No.2	Unit No.3	Unit No.4	Unit No.5	Unit No.6
		Sep. 1993	Mar. 1994	Feb. 1995	Dec. 1997	Dec. 1995	Dec. 1995
(vi).	Expected Useful Life of the Generation Facility/Plant-I from Commercial Operation Date (of each Unit)	Unit No.1	Unit No.2	Unit No.3	Unit No.4	Unit No.5	Unit No.6
		39 Years	38 Years	37 Years	35 Years	37 Years	37 Years
(vii).	Expected Useful Life of the Generation Facility/Plant-I (Each Unit) at the time of Grant of Original Generation Licence	Unit No.1	Unit No.2	Unit No.3	Unit No.4	Unit No.5	Unit No.6
		30 Years	30 Years	30 Years	30 Years	30 Years	30 Years



(viii).	Expected Useful Life of Expected Useful Life of the Generation Facility/Plant-I (Each Unit) at the time of Modification-I dated April 16, 2014	Unit No.1	Unit No.2	Unit No.3	Unit No.4	Unit No.5	Unit No.6
		19 Years					
(ix).	Expected Useful Life of the Generation Facility/Plant-I (Each Unit) at the time of this Modification-II in Generation Licence (dated October 31, 2014)	Unit No.1	Unit No.2	Unit No.3	Unit No.4	Unit No.5	Unit No.6
		19 Years					
(ix).	Expected Useful Life of the Generation Facility/Plant-I (Each Unit) at the time of this Modification-II in Generation Licence (dated April , 2018)	Unit No.1	Unit No.2	Unit No.3	Unit No.4	Unit No.5	Unit No.6
		15 Years					

**(B). Fuel Details**

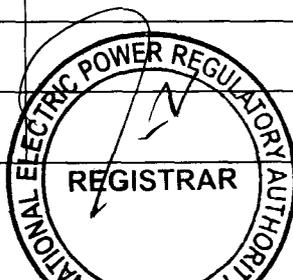
(i).	Primary Fuel	Unit No.1	Unit No.2	Unit No.3	Unit No.4	Unit No.5	Unit No.6
		Furnace Oil					



(ii).	Alternative Fuel	Unit No.1	Unit No.2	Unit No.3	Unit No.4	Unit No.5	Unit No.6
		Natural Gas					
(iii).	Start-Up Fuel	Unit No.1	Unit No.2	Unit No.3	Unit No.4	Unit No.5	Unit No.6
		Natural Gas / HSD					
(iv).	Fuel Source for each of the above (i.e. Imported/Indigenous)	Imported/Indigenous					
(v).	Fuel Supplier for each of the above	Unit No.1	Unit No.2	Unit No.3	Unit No.4	Unit No.5	Unit No.6
		PSO / Shell & SNGPL					
(vi).	Supply Arrangement for each of the above	Unit No.1	Unit No.2	Unit No.3	Unit No.4	Unit No.5	Unit No.6
		Railway Wagons / Tankers / Pipelines					
(vii).	No of Storage Tanks	Primary Fuel		Alternative Fuel		Start-Up Fuel	
		11		N/A		2	
(viii).	Storage Capacity of each Tank	Primary Fuel		Alternative Fuel		Start-Up Fuel	
		6*18500 MT 3*25000 MT 2*18500 MT		N/A		2*1000 MT	
(ix).	Gross Storage	Primary Fuel		Alternative Fuel		Start-Up Fuel	
		223000 M.Ton		N/A		2000 M.Ton	

**(C). Emission/Effluents Values**

(i).	SO <sub>x</sub> (mg/Nm <sup>3</sup> )	164 M.Ton/Day
(ii).	NO <sub>x</sub> (mg/Nm <sup>3</sup> )	55 M.Ton/Day
(iii).	CO <sub>2</sub>	7988 M.Ton/Day
(iv).	Effluents	525 M.Ton/Day
(v).	CO (mg/Nm <sup>3</sup> )	Negligible
(vi).	PM <sub>10</sub>	6.4 M.Ton/Day



**(D). Cooling System**

(i).	Cooling Water Source/Cycle	Tube Wells
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**(E). Plant Characteristics**

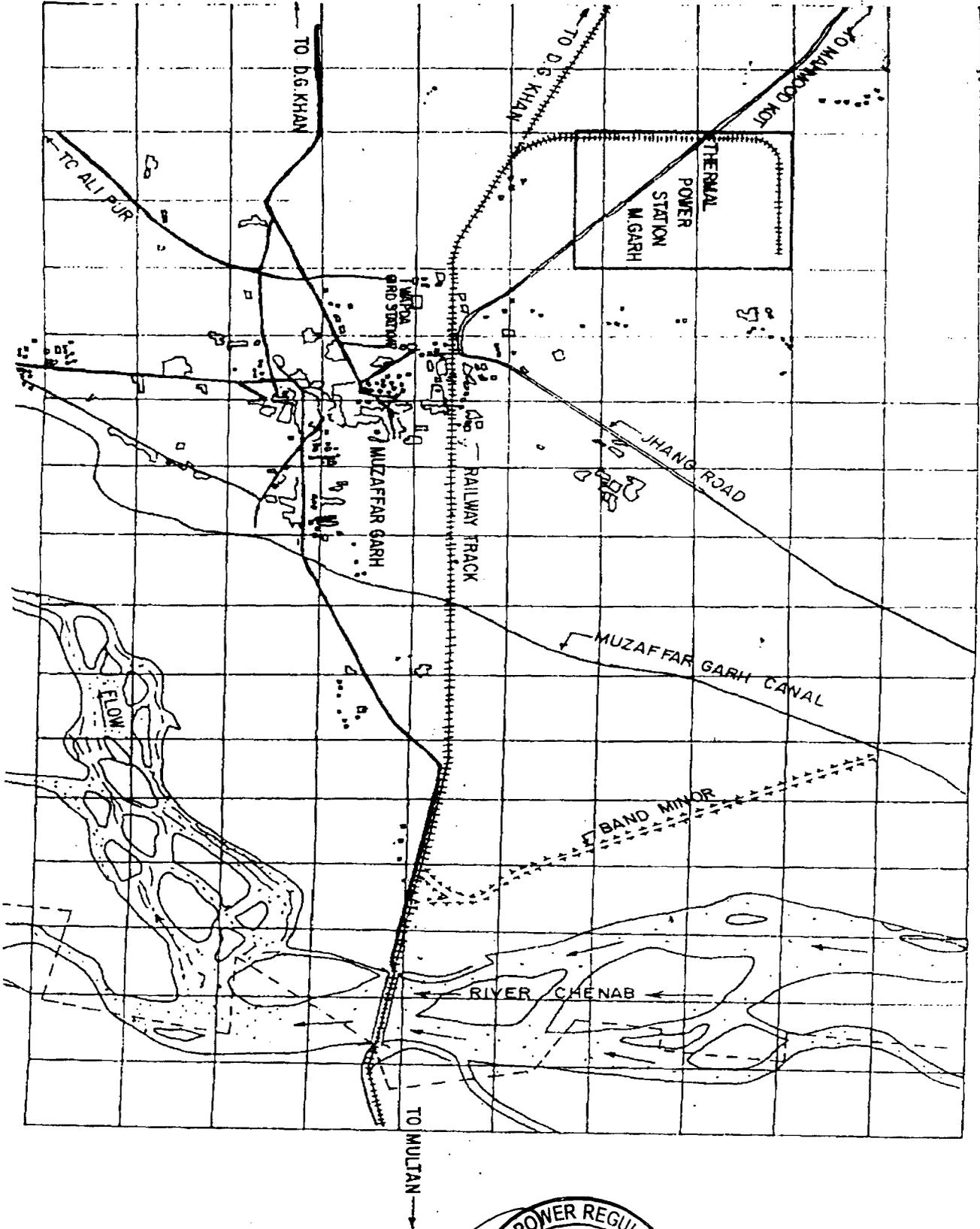
		Unit No.1	Unit No.2	Unit No.3	Unit No.4	Unit No.5	Unit No.6
(i).	Generation Voltage (KV)	15.75	15.75	15.75	15.75	15.75	15.75
(ii).	Frequency (HZ)	50	50	50	50	50	50
(iii).	Power Factor	0.85	0.85	0.85	0.85	0.85	0.85
(iv).	Automatic Generation Control (AGC) (MW control is the general practice)	-	-	-	-	-	-
(v).	Ramping Rate	-	-	-	-	-	-
(vi).	Time required to Synchronize to Grid (Hrs.)	2-6	2-6	2-6	3-4	3-5	3-5

**(F). Interconnection Arrangement**

(i).	Interconnection & Transmission Arrangement	The Generation Facility/TPS Muzaffargarh has its own 220KV Grid Station in the premises of Power Plant.
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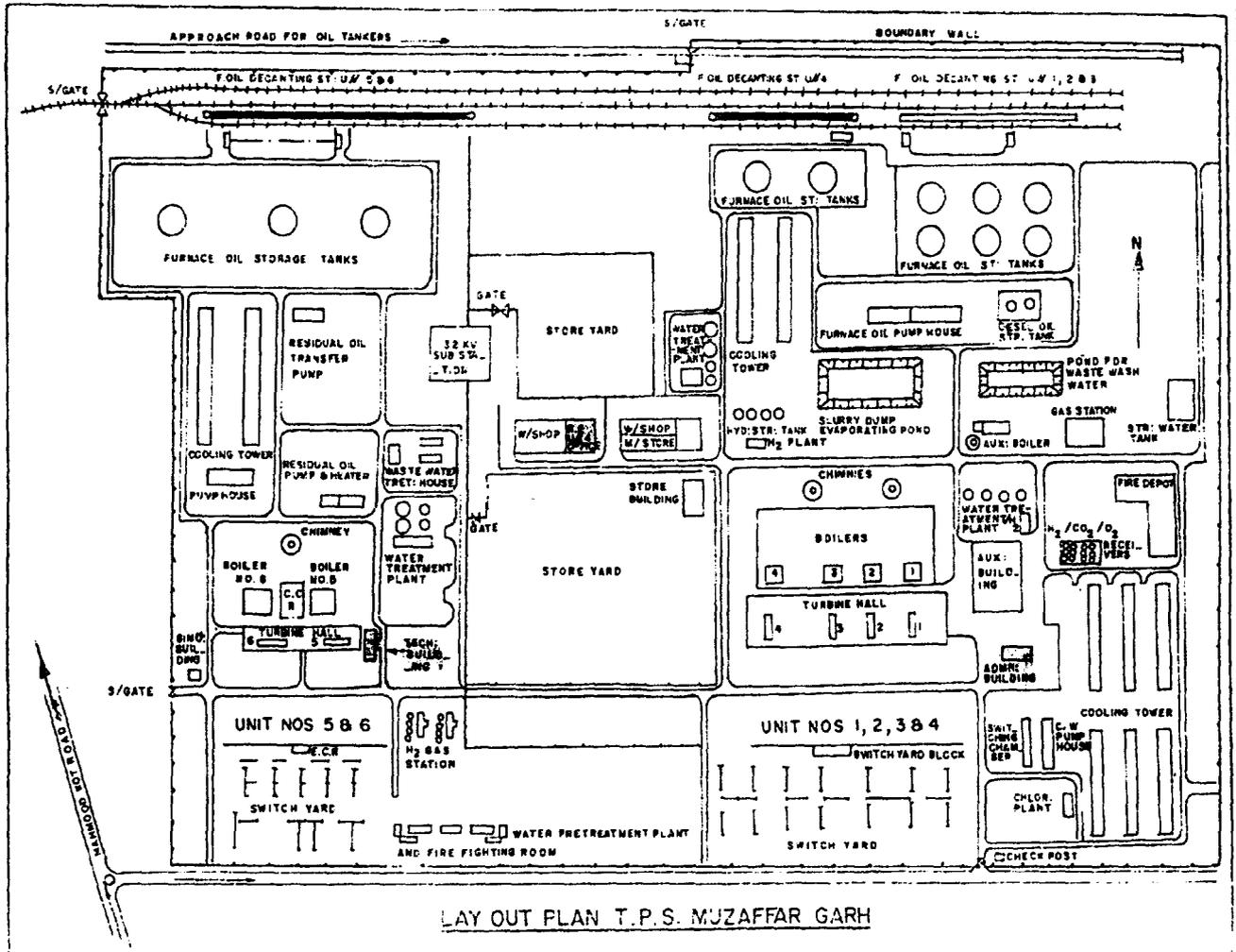


**Location of TPS Muzaffargarh**



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# Lay out of TPS Muzaffargarh



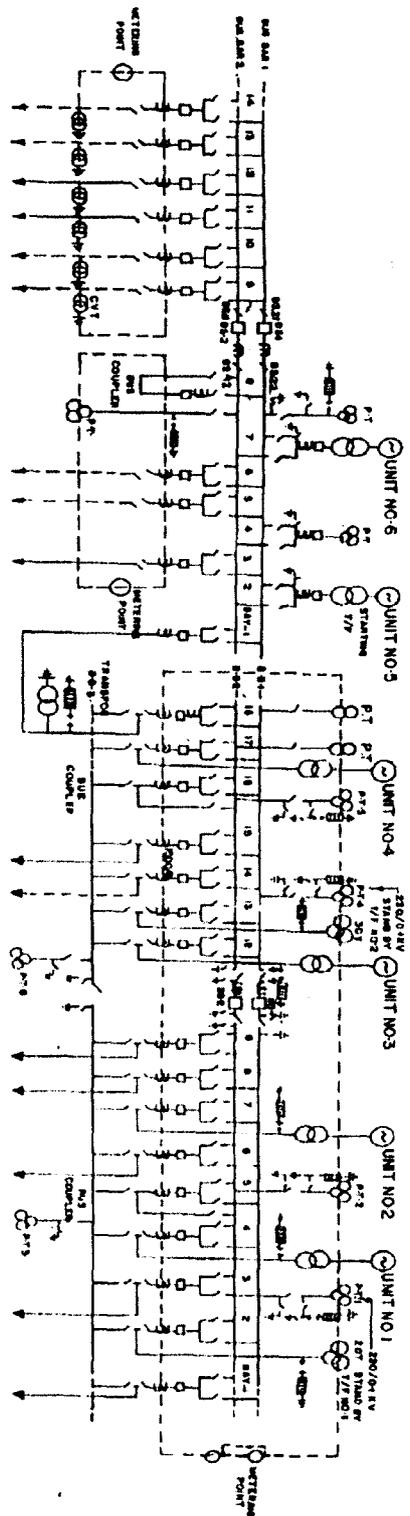
LAY OUT PLAN T.P.S. MUZAFFAR GARH



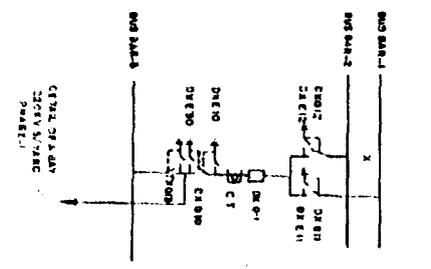
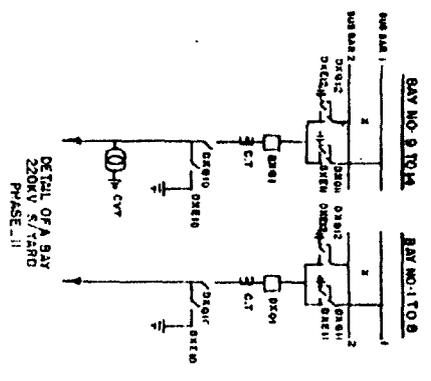
# Single line diagram of TPS Muzaffargarh

220KV S/YARD  
 PHASE-II

220KV S/YARD  
 PHASE-I



PRESENT POSITION	NO. OF UNITS	NO. OF TRANSFORMERS	NO. OF BREAKERS	NO. OF BUSBARS	NO. OF DISCONNECTORS	NO. OF EARTH SWITCHES	NO. OF ISOLATORS	NO. OF TAPERS	NO. OF OTHERS
	6	6	6	14	14	14	14	14	14



NO.	REV. NO.	DESCRIPTION
01	01	ISOLATOR
02	01	ISOLATOR CONNECTED TO 220KV
03	01	ISOLATOR CONNECTED TO 220KV
04	01	ISOLATOR CONNECTED TO 220KV
05	01	EARTH SWITCH

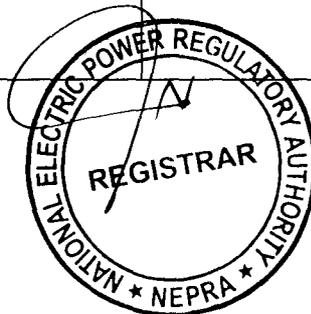


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**Details**  
**of Generation Facility at**  
**Plant-II/GTPS Faisalabad**

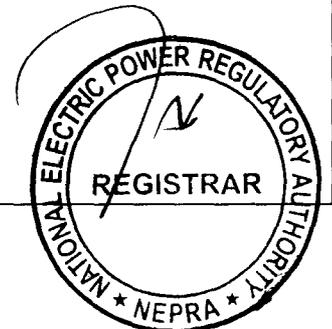
**(A). Plant Configuration**

(i).	Plant Size/ Installed Capacity (Gross ISO)	144 MW				
(ii).	Type of Technology	Thermal Power Plant/Gas Turbine/G.T. and Steam Turbine/S.T. (Combined Cycle Power Plant-CCPP)				
(iii).	Number of Units/Size (MW)	Unit No.5	Unit No.6	Unit No.7	Unit No.8	Unit No.9
		25 MW G.T.	25 MW G.T.	25 MW G.T.	25 MW G.T.	44 MW S.T.
(iv).	Unit Make & Model	Unit No.5	Unit No.6	Unit No.7	Unit No.8	Unit No.9
		AEG Kanis Germany	AEG Kanis Germany	AEG Kanis Germany	AEG Kanis Germany	HPEEC China
(v).	Commercial Operation date (of each Unit)	Unit No.5	Unit No.6	Unit No.7	Unit No.8	Unit No.9
		July 1975	July 1975	July 1975	Nov 1975	Dec 1975
(vi).	Expected Useful Life of the Generation Facility/Plan t-II from Commercial Operation Date (of each Unit)	Unit No.5	Unit No.6	Unit No.7	Unit No.8	Unit No.9
		37 Years	37 Years	37 Years	37 Years	37 Years
(vii).	Expected Useful Life of the Generation Facility/Pl- ant-II (Each Unit) at the time of Grant of Original Generation Licence	Unit No.5	Unit No.6	Unit No.7	Unit No.8	Unit No.9
		10 Years	10 Years	10 Years	10 Years	10 Years



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(viii).	Expected Useful Life of the Generation Facility/Plant-II (Each Unit) at the time of Modification -I in Generation Licence dated April 16, 2014)	Unit No.5	Unit No.6	Unit No.7	Unit No.8	Unit No.9
		08 Years	08 Years	08Years	08 Years	08 Years
(ix).	Expected Useful Life of the Generation Facility/Plant-II (Each Unit) at the time of Modification -II in Generation Licence (dated October 31, 2014)	Unit No.5	Unit No.6	Unit No.7	Unit No.8	Unit No.9
		08 Years	08 Years	08Years	08 Years	08 Years
(x).	Expected Useful Life of the Generation Facility/Plant-II at the time of this Modification -III in Generation Licence (dated April 2018)	Unit No.5	Unit No.6	Unit No.7	Unit No.8	Unit No.9
		05 Years (Valid upto June 30, 2022)				



**(B). Fuel Details**

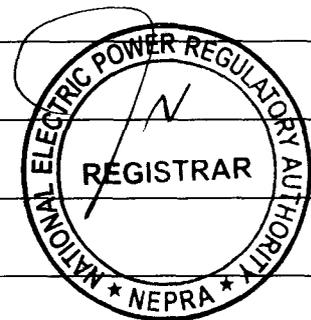
(i).	Primary Fuel	Unit No.5	Unit No.6	Unit No.7	Unit No.8	Unit No.9
		Natural Gas				

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(ii).	Alternative Fuel	Unit No.5	Unit No.6	Unit No.7	Unit No.8	Unit No.9
		HSD				
(iii).	Start-Up Fuel	Unit No.5	Unit No.6	Unit No.7	Unit No.8	Unit No.9
		Natural Gas				
(iv).	Fuel Source for each of the above (i.e. Imported/ Indigenous)	Unit No.5	Unit No.6	Unit No.7	Unit No.8	Unit No.9
		Indigenous/Imported				
(v).	Fuel Supplier for each of the above	Primary Fuel		Alternative Fuel		Start-Up Fuel
		SNGPL		PSO & Shell		SNGPL
(vi).	Supply Arrangement for each of the above	Primary Fuel		Alternative Fuel		Start-Up Fuel
		Pipe Lines		Tankers		Pipe Lines
(vii).	No of Storage Tanks	Primary Fuel		Alternative Fuel		Start-Up Fuel
		N/A		02 Nos. main HSD tanks & 04 Nos. daily HSD tanks		-----
(viii).	Storage Capacity of each Tank	Primary Fuel		Alternative Fuel		Start-Up Fuel
		N/A		-		-
(ix).	Gross Storage	Primary Fuel		Alternative Fuel		Start-Up Fuel
		N/A		6.2 Million Liters		-

**(C). Emission/Effluents Values**

(i).	SO <sub>x</sub> (mg/Nm <sup>3</sup> )	0 Ton/Day
(ii).	NO <sub>x</sub> (mg/Nm <sup>3</sup> )	1 Ton/Day
(iii).	CO <sub>2</sub>	935 Tons/Day
(iv).	Effluents	-
(v).	CO (mg/Nm <sup>3</sup> )	Negligible
(vi).	PM <sub>10</sub>	Negligible



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**(D). Cooling System**

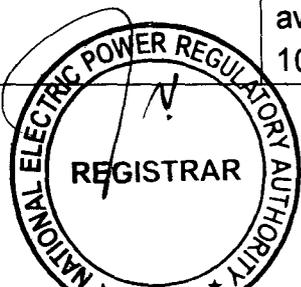
(i).	Cooling Water Source/ Cycle	Canal water (Closed Cycle)/Tube well Water
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**(E). Plant Characteristics**

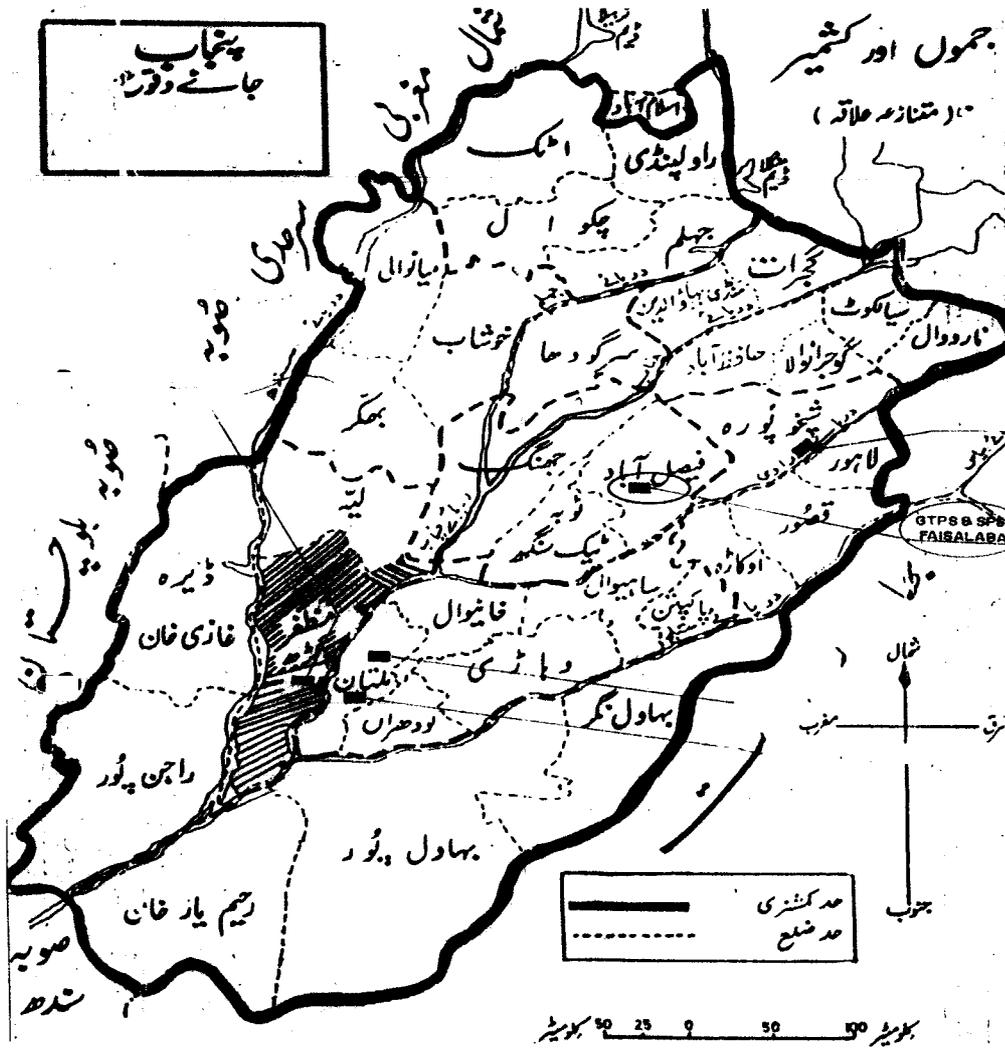
		Unit No.5	Unit No.6	Unit No.7	Unit No.8	Unit No.9
(i).	Generation Voltage	10.5 KV				
(ii).	Frequency	50 HZ				
(iii).	Power Factor	0.8	0.8	0.8	0.8	0.8
(iv).	Automatic Generation Control (AGC) (MW control is the general practice)	--	--	--	--	--
(v).	Ramping Rate	1 MW/Min				
(vi).	Time required from hot start upto Synchronization to Grid	5-8 min	5-8 min	5-8 min	5-8 min	4 hours

**(F). Interconnection Arrangement**

(i).	Interconnection & Transmission Arrangement	<p>This Station has 132 KV Transmission lines NBD-I and NBD-II, JDL-I and JDL-II.</p> <p>NBD-I and NBD-II are connected to 220 KV Nishatabad Grid, Faisalabad.</p> <p>JDL-I is connected with the 132 KV old thermal Grid Station and JDL-II is connected to 220 KV Grid Jaranwala Road.</p> <p>The 220 KV Nishatabad Grid Station is located about 2 KM away old Thermal Grid to 3 KM away and Jaranwala Road is 10 KM away from this Power Station.</p>
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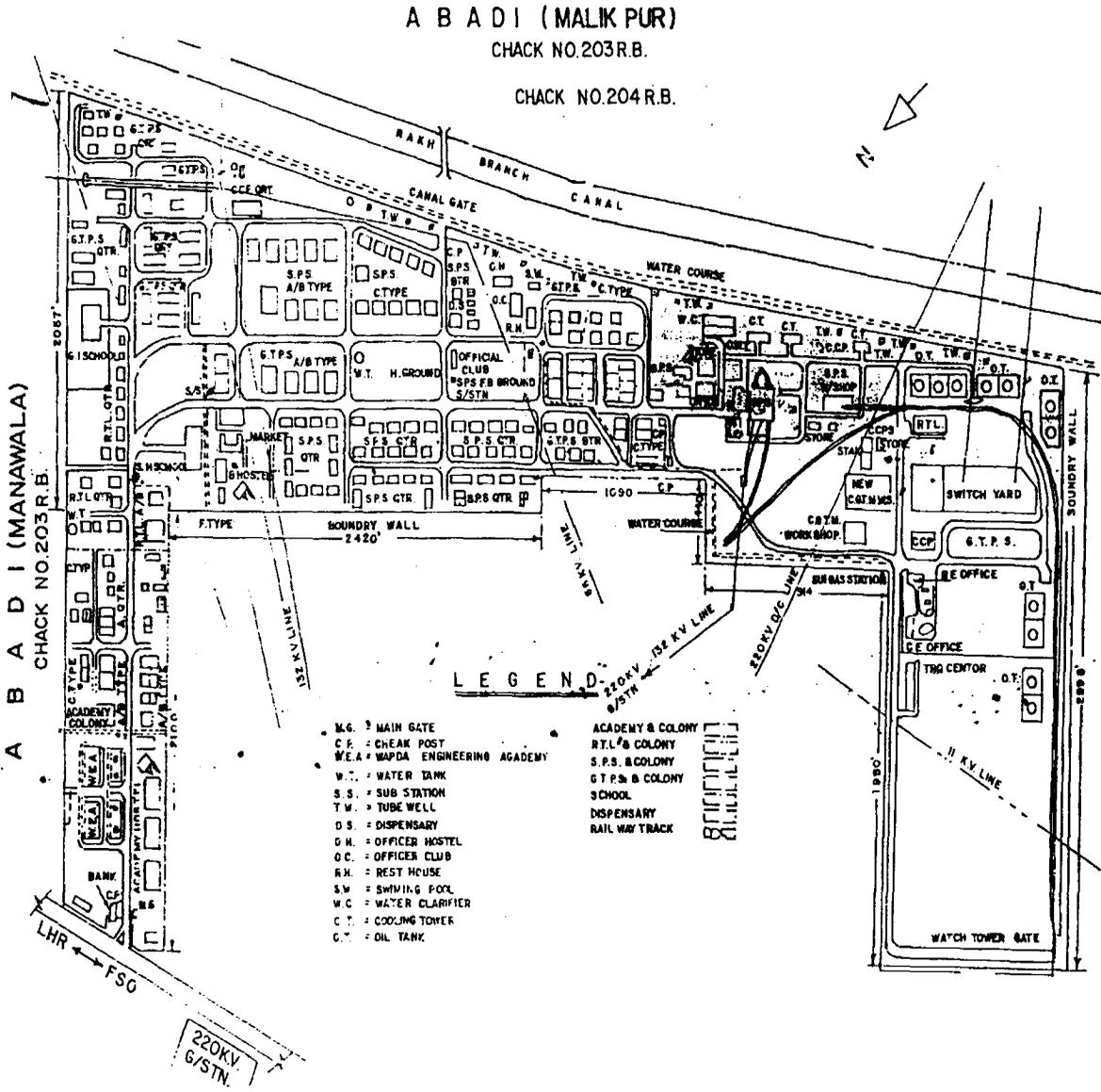
**Location of GTPS Faisalabad**



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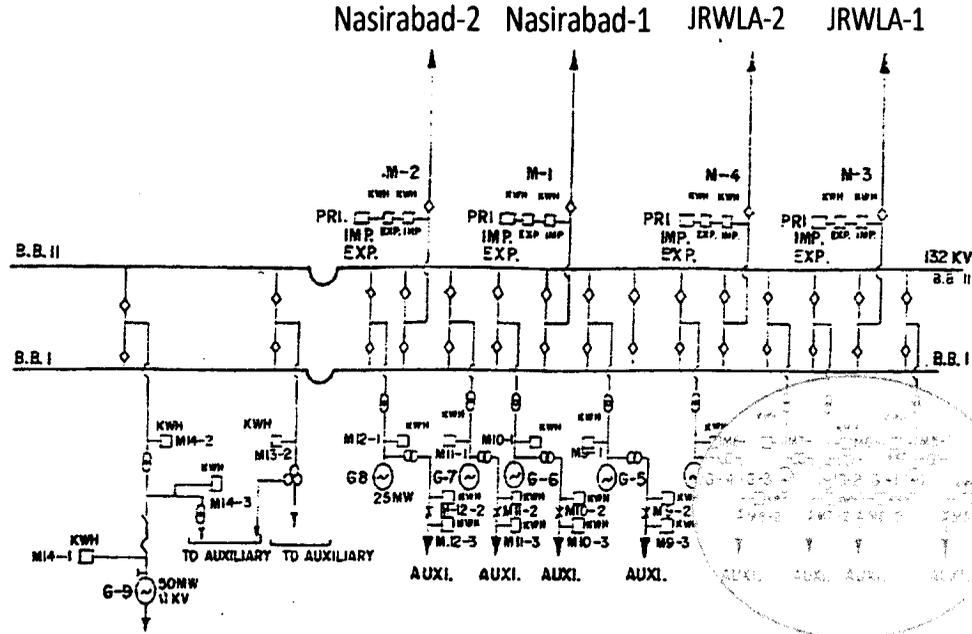
**Lay out of GTPS Faisalabad**



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# Single Line Diagram of GTPS Faisalabad



**LEGEND.**

- M-1 IMP-EXP ENERGY METER ON NISHATABAD FEEDER-I
- M-2 " " " " FEEDER-II
- M-3 IMP-EXP ENERGY METER ON JARANWALA FEEDER-I
- M-4 " " " " FEEDER-II

Unit No. 1-4 of GTPS excluded from the generation licence.

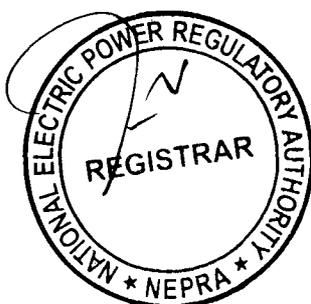


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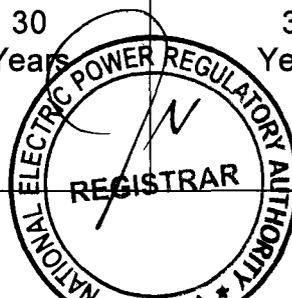
**Details**  
**of Generation Facility at**  
**Plant-III/**  
**CCPP Nandipur**

**(A). Plant Configuration**

(i).	Plant Size/ Installed Capacity (Gross ISO)	Natural Gas		Furnace Oil	
		565.65 MW		473.99 MW	
(ii).	Type of Technology	Combined Cycle Power Plant (CCPP)			
(iii).	Number of Units/Size (MW)	Unit No. 1	Unit No. 2	Unit No. 3	Unit No. 4
		122.1 MW Gas Turbine	122.1 MW Gas Turbine	122.1 MW Gas Turbine	199.35 MW Steam Turbine
(iv).	Unit Make & Model	Unit No. 1	Unit No. 2	Unit No. 3	Unit No. 4
		General Electric/G.E. PG 9171E (Frame 9E)	G.E./PG 9171E (Frame 9E)	G.E./PG 9171E (Frame 9E)	Dong Fong Electric Company Limited, China.
(v).	Commercial Operation Date (of each Unit)	Unit No. 1	Unit No. 2	Unit No. 3	Unit No. 4
		May 2014	July 2014	September 2014	December 2014
(vi).	Expected Useful Life of the Generation Facility/Plan t-III from Commercial Operation Date (of each Unit)	Unit No. 1	Unit No. 2	Unit No. 3	Unit No. 4
		30 Years	30 Years	30 Years	30 Years



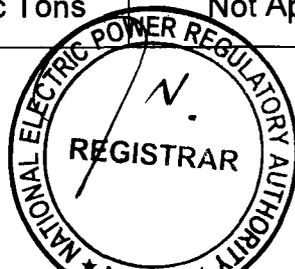
(vii).	Expected Useful Life of the Generation Facility/Plant-III (Each Unit) at the time of Grant of Original Generation Licence	Unit No. 1	Unit No. 2	Unit No. 3	Unit No. 4
		Not Installed	Not Installed	Not Installed	Not Installed
(viii)	Expected Useful Life of the Generation Facility/Plant-III (Each Unit) at the time of Modification -I in Generation Licence dated April 16, 2014)	Unit No. 1	Unit No. 2	Unit No. 3	Unit No. 4
		Not Installed	Not Installed	Not Installed	Not Installed
(ix).	Expected Useful Life of the Generation Facility/Plant-III (Each Unit) at the time of this Modification -II in Generation Licence (dated October 31, 2014)	Unit No. 1	Unit No. 2	Unit No. 3	Unit No. 4
		30 Years	30 Years	30 Years	30 Years
	Expected Useful Life of the Generation Facility/Plant-III (Each Unit) at the time of this Modification -II in	Unit No. 1	Unit No. 2	Unit No. 3	Unit No. 4
		30 Years	30 Years	30 Years	30 Years



	Generation Licence (dated April , 2018)				
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**(B). Fuel Details**

(i).	Primary Fuel	Furnace Oil (FO)			
(ii).	Alternative Fuel	Natural Gas (NG)			
(iii).	Start-Up Fuel	High Speed Diesel Oil (HSD)			
(iv).	Fuel Source for each of the above (i.e. Imported/ Indigenous )	Indigenous/Imported			
(v).	Fuel Supplier for each of the above	Primary Fuel	Alternative Fuel	Start-Up Fuel	
		PSO/Shell/Total	SNGPL	PSO/Shell/Total	
(vi).	Supply Arrangement for each of the above	Primary Fuel	Alternative Fuel	Start-Up Fuel	
		Oil Tankers	Pipeline	Oil Tankers	
(vii).	No of Storage Tanks	Primary Fuel	Alternative Fuel	Start-Up Fuel	
		8	Not Applicable	2	
(viii).	Storage Capacity of each Tank	Primary Fuel	Alternative Fuel	Start-Up Fuel	
		10,000 Metric Tons	Not Applicable	10,000 Metric Tons	
(ix).	Gross Storage	Primary Fuel	Alternative Fuel	Start-Up Fuel	
		80,000 Metric Tons	Not Applicable	20,000 Metric Tons	



**(C). Emission/Effluents Values**

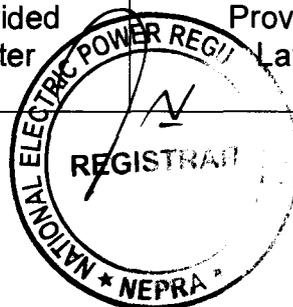
		Primary Fuel	Alternative Fuel	Start-Up Fuel
(i).	SO <sub>x</sub> (mg/Nm <sup>3</sup> )	146.6 MT/day	< 1% Very Low	Not Applicable
(ii).	NO <sub>x</sub> (mg/Nm <sup>3</sup> )	200 PPM	Very Low	-Do-
(iii).	CO (mg/Nm <sup>3</sup> )	Very Low	Very Low	-Do-
(iv).	PM <sub>10</sub>	Very Low	Very Low	-Do-

**(D). Cooling System**

(i).	Cooling Water Source/ Cycle	Canal water (Closed Cycle)/Tube well Water
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**(E). Plant Characteristics**

		Unit-I	Unit-II	Unit-III	Unit-IV
(i).	Generation Voltage	15KV	15KV	15 KV	15 KV
(ii).	Frequency	50 HZ	50 HZ	50 HZ	50 HZ
(iii).	Power Factor	0.85Lagging	0.85Lagging	0.85Lagging	0.85Lagging
(iv).	Automatic Generation Control (AGC) (MW control is the general practice)	Yes	Yes	Yes	Yes
(v).	Ramping Rate	To be Provided Later			



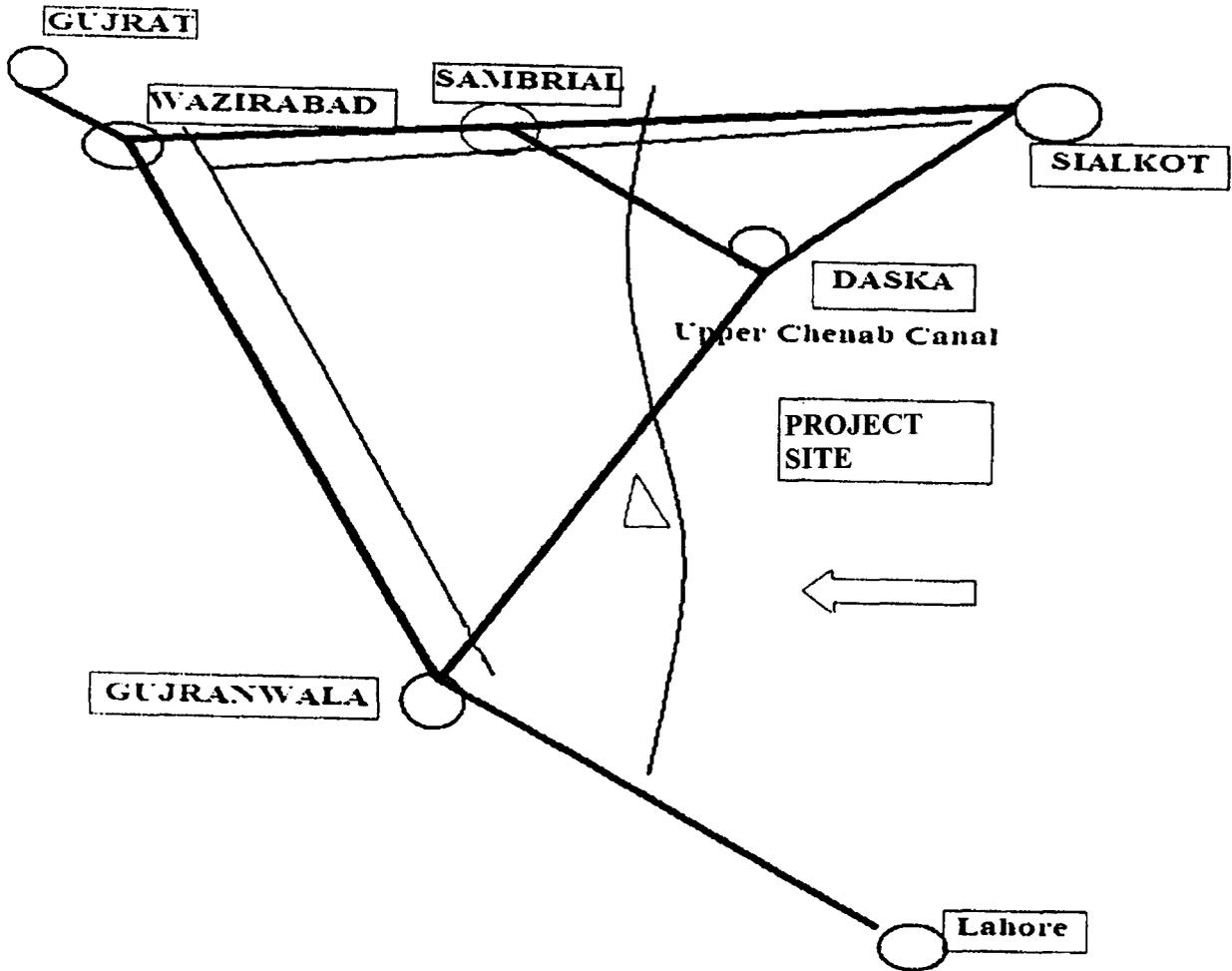
(vi).	Time required from hot start upto Synchronization to Grid	-Do-	-Do-	-Do-	-Do-
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**(F). Interconnection Arrangement**

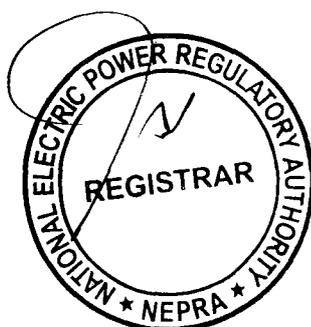
(i).	Interconnection & Transmission Arrangement	<p>The Power generated from the Power Plant shall be dispersed to power system directly within GEPCO load center at 132kV voltage level through six circuits comprising three transmission lines as follows:-</p> <p>(a). A 132kV Double Circuit (D/C) transmission line, approx. 33 KMs long on twin bundle Rail Conductor from Nandipur CCPP to Sahowala 220/132 kV substation;</p> <p>(b). A 132 kV D/C transmission line, approx 7 KMs long on Rail conductor from Nandipur CCPP to Gujranwala-Sialkot road 132 kV substation (Aroop).</p> <p>(c). A 132 kV D/C transmission line, approximately 6.5 KMs long on Rail conductor for looping In/Out of one circuit of the existing Gujranwala Pasrur Road-Gujranwala Sialkot road 132 kV D/C transmission line at Nandipur CCPP.</p>
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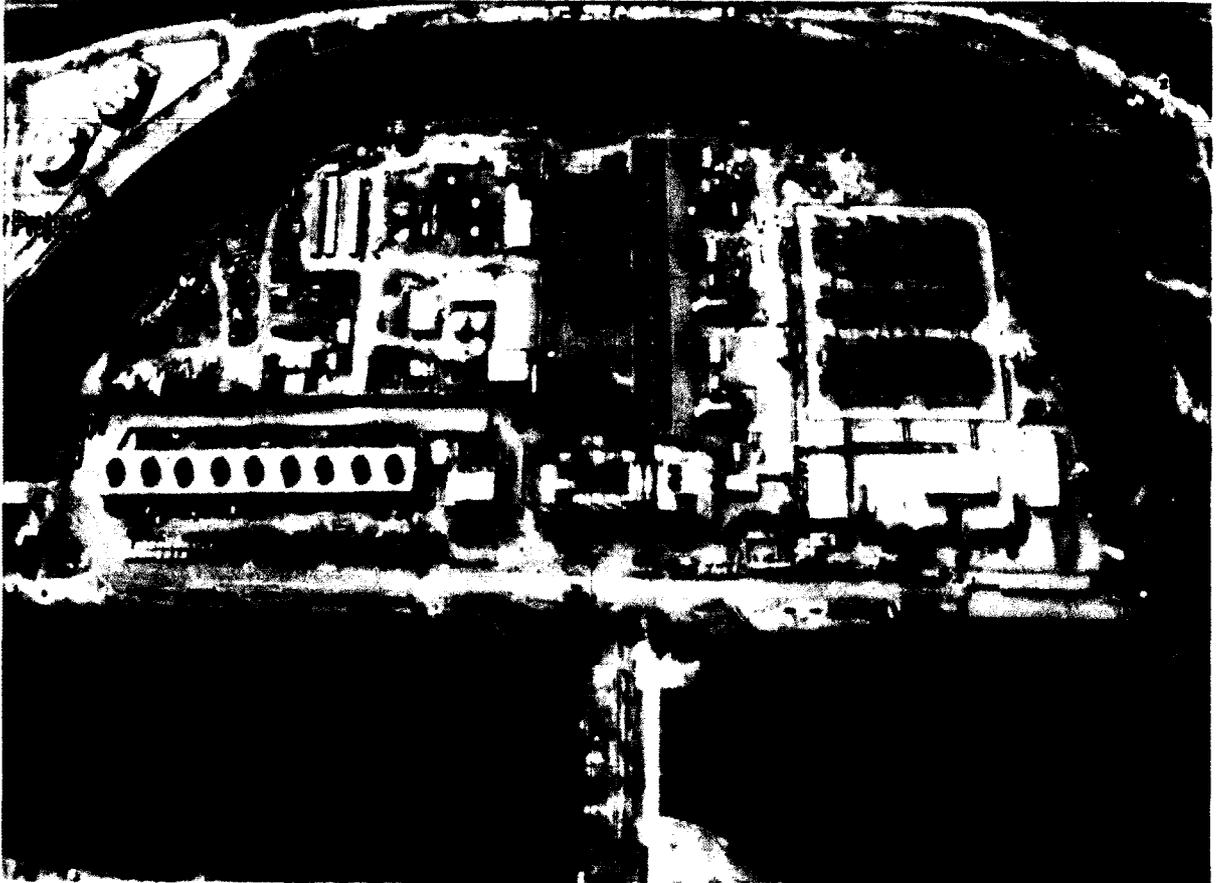
## Location of CCPP Nandipur



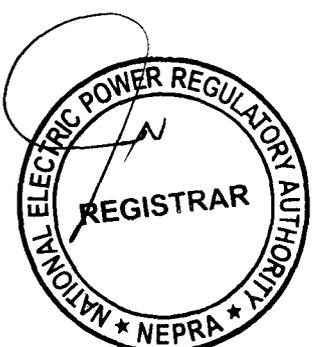
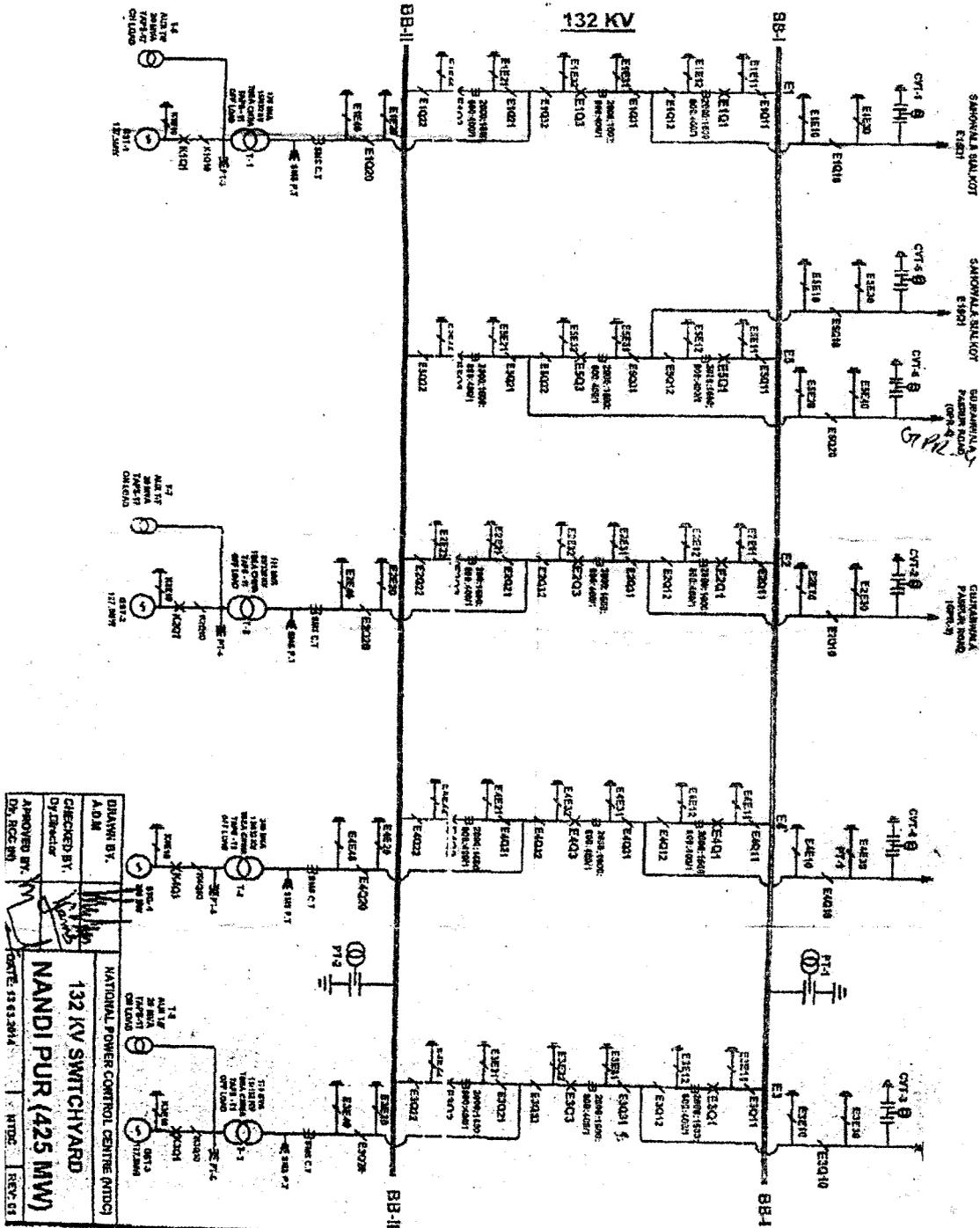
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## Lay out of CCPP Nandipur



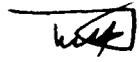
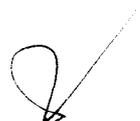
# Single Line Diagram of CAPP-Nandipur

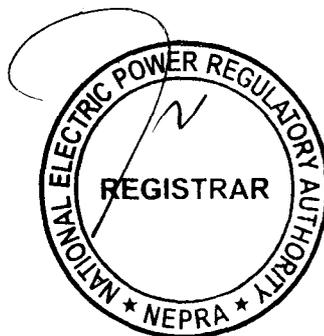


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**SCHEDULE-II**  
**(Revised/Modified)**  
**Modification-III**

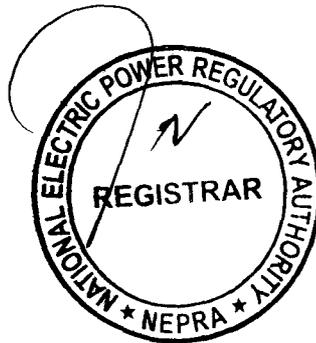
**The Installed/ISO Capacity (MW), De-Rated Capacity At Mean Site Conditions (MW), Auxiliary Consumption (MW) and the Net Capacity (MW) of the Generation Facilities of the Licensee is given in this Schedule**



## SCHEDULE-II

Power Station	Unit Detail	Installed Capacity (MW)	De-Rated Capacity (MW)		Net Capacity after Auxiliary Consumption (MW)	
Thermal Power Station (TPS) Muzaffargarh/Plant-I	Unit No.1	210	Unit No.1	200	Unit No.1	188
	Unit No.2	210	Unit No.2	200	Unit No.2	188
	Unit No.3	210	Unit No.3	200	Unit No.3	188
	Unit No.4	320	Unit No.4	300	Unit No.4	276
	Unit No.5	200	Unit No.5	200	Unit No.5	182
	Unit No.6	200	Unit No.6	200	Unit No.6	182
	<b>Sub-Total-I</b>	<b>1350</b>	=	<b>1300</b>	=	<b>1204</b>
Gas Turbine Power Station (GTPS) Faisalabad/Plant-II	Unit No. 5-7	(25 x 3) = 75	Unit No. 5-7	58.57	Unit No.5-7	57
	Unit No. 8	25	Unit No. 8	19	Unit No.8	18.81
	Unit No. 9	44	Unit No. 9	38	Unit No.9	35.72
	<b>Sub-Total-II</b>	<b>144</b>	=	<b>115.57</b>	=	<b>111.53</b>
CCPP Nandipur/Plant-III	Unit No.1-3	366.30	Unit No.1-3	331.8	Unit No.1-3	321.53
	Unit No. 4	199.35	Unit No. 4	194.49	Unit No.4	188.47
	<b><sup>1</sup>Sub-Total-III</b>	<b>565.65</b>	=	<b>526.29</b>	=	<b>510.00</b>
<b>Grand Total (Sub-Total-I+ Sub-Total-II + Sub-Total-III)</b>		<b>2059.65</b>	=	<b>1941.86</b>	=	<b>1825.53</b>



<sup>1</sup> Based on Natural Gas based Operation