National Electric Power Regulatory Authority
Islamic Republic of Pakistan

Registrar

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No. NEPRA/R/LAG-02/ 3885-91

April 16, 2014

Chief Executive Officer
Jamshoro Power Company Limited
Mohra Jabal Dadu Road,
Jamshoro - Sindh

Subject: **Modification-I in Generation Licence No. GL/01/2002 — Jamshoro Power Company Limited**

Reference: *This office letter No. NEPRA/R/LAG-02/4050 dated April 27, 2012.*

It is intimated that the Authority has approved "Authority Proposed Modification" in Generation Licence No. GL/01/2002 (issued on July 01, 2002) in respect of Jamshoro Power Company Limited (JPCL) pursuant to Regulation 10(11) of the NEPRA Licensing (Application & Modification Procedure) Regulations, 1999.

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

Encl:/As above

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(Syed Safeer Hussain)

Copy to:

1. Secretary, Ministry of Water and Power, Government of Pakistan, Islamabad
2. Secretary, Ministry of Finance, Government of Pakistan, Islamabad
3. Secretary, Privatization Commission, Government of Pakistan, Islamabad
4. Chief Executive Officer, NTDC, 414-WAPDA House, Lahore
5. Chief Operating Officer, CPPA, 107-WAPDA House, Lahore
6. Director General, Pakistan Environmental Protection Agency, Plot No. 41, Street No. 6, H-8/2, Islamabad.

National Electric Power Regulatory Authority (NEPRA)

Determination of Authority Regarding Authority Proposed Modification in the Generation Licence of Jamshoro Power Company Limited

April 10, 2014
Application No. LAG-02

(A). Background

(i). The Authority had granted a Generation Licence (No. GL/01/2002, dated July 01, 2002 to Jamshoro Generation Company Limited (JPCL/GENCO-I) with a cumulative Installed Capacity of 1054.00 MW for its two distinctly located Generation Facilities at Thermal Power Station Jamshoro (TPS Jamshoro) and Gas Turbine Power Station Kotri (GTPS Kotri).

(ii). TPS Jamshoro of JPCL has an installed capacity of 880.00 MW, consisting of four (04) conventional Steam Units (1 x 250.00 MW + 3 x 210.00 MW), installed between 1989 and 1991. Whereas, GTPS Kotri of JPCL has an Installed Capacity of 174.00 MW, consisting of a total of seven (07) Gas Turbine units set up during the period from 1969 to 1994.

(B). Initiation & Processing of APM

(i). The Authority in its Regulatory Meeting (RM-12-039), considered the matter of "Adjustment in Energy Charge Part of Northern Power Generation Company Limited (NPGCL) on account of Fuel Price Variation and observed that some units of the Public Sector Generation Companies (GENCOs) had completed their useful lives. However, these inefficient units were still being operated, incurring additional cost of generation for the end consumers.

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(ii). In view of the above, it was deiced to initiate Authority Proposed Modification (APM) for the exclusion of in-efficient plants/units from the Generation Licences of GENCOs as stipulated in Regulation-10 of the National Electric Power Regulatory Authority Licensing (Application & Modification Procedure) Regulations, 1999 (the Regulations).

(iii). Accordingly, an APM was communicated to JPCL on April 27, 2012 for possible retiring/de-commissioning of Unit-1 & 2 of GTPS Kotri of JPCL commissioned in the year 1969-70 and had a remaining useful life of four (04) years at the time of grant/issue of Generation Licence to JPCL which had expired on June 30, 2006. In the "Text of the APM" as stipulated in Regulation 10(1)(a) of the Regulations, the Authority communicated that "the existing Schedule-I & II of the Generation Licence containing details about Unit No. 1 & 2 of GTPS Kotri will be replaced/changed with new/modified Schedule-I & II, excluding the said units".

(iv). Regarding "Reason in Support of Modification" as stipulated in Regulation 10(1)(b) of the Regulations, the Authority communicated that above units of GTPS Kotri had a designed efficiency of 24.50% with Natural Gas as Main fuel. However, the efficiency of these units has been declining steadily and has now dropped to 14.22% only for the FY 2010-11. This efficiency is significantly on lower side as compared to New Independent Power Producers (IPPs) which are operating at efficiency as high as 50-52%. On account of this, the Fuel Cost for these units has been costing Central Power Purchasing Agency (CPPA) of National Transmission and Despatch Company Limited (NTDC), an average price of Rs. 8.30/kwh for FY-2010-11 on Natural Gas, causing a significant increase in the consumer end tariff. Further, the utilization of these units for the FY-2020-11 was 5.9% only, making these units uneconomic and not viable for operation in the long run. Moreover, the useful life of Units No. 1 & 2 of GTPS, Kotri has expired on June 30, 2006 and the operation of these units is not authorized in the

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absence of a valid Generation Licence. In view of the said, the Authority stated that it was in the Public interest to retire the above mentioned units. The Authority directed JPCL for submitting its views in favor or against the APM.

(v). Similarly, as stipulated in Regulation 10(4)(b), for all the stakeholders, interested/affected persons and the general public a Notice was published in one English and one Urdu daily newspaper on May 05, 2012, inviting comments in favor or against the APM. Further, separate notices were also sent to Experts, Government Ministries and Representative Organizations etc. for submitting their views and comments in the matter.

(C). Comments of Stakeholders

(i). In response to the above, the Authority received comments from eight (08) stakeholders. These included the Licensee/JPCL/GENCO-I, Greshams Eastern (Pvt.) Limited (GEPL), Sehab Trust (ST), Pakistan State Oil Company Limited (PSO), Consumer Rights Commission of Pakistan (CRCP), Central Power Purchasing Agency (CPPA) of National Transmission and Desptach Company Limited (NTDC), Ministry of Water and Power (MoW&P) and Karachi Shipyard & Engineering Works Limited (KS&EWL). The salient points of the comments offered by the above mentioned stakeholders are summarized in the following paragraphs: -

(a). JPCL submitted that we have proposed to completely replace Unit No. 1 & 2 of GTPS Kotri installed in 1969-70, being inefficient, old and having completed their useful life. JPCL added that the O&M Budget available to it is not even sufficient to maintain its existing units. The proposed modification in the Generation Licence would further decrease its capacity which would affect its preventative maintenance. JPCL is already suffering from serious cash

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flow problems, the reduce capacity will further worsen this situation;

(b). GEPL remarked that at GTPS Kotri, the then WAPDA had installed four (04) Standby power units to meet power load of a temporary nature. Since the operation was to be for peaking load of 4-5 hours per day at best, it was not considered expedient to install a Heat Recovery System to make the units efficient and operate at 50-52 % level. A similar project was also installed by then WAPDA with 8 Nos. identical Gas Turbine at GTPS at Faisalabad. Four (04) units were later converted to combined cycle. Similar projects at Shahdara, Quetta and other locations exist. At KESC the same turbine were installed at SITE Power Station and Korangi Gas Turbine Station for Peaking Load but never converted to combined cycle. GEPL, in 1998 offered to WAPDA/PEPCO conversion of all these Gas Turbines to Combined Cycle operations on a Build operate own basis and sell the extra power to National Grid at a rate of USD 0.032 per KWe. WAPDA/PEPCO accepted the Unsolicited Bid for the GTPS Faisalabad and the feasibility study made in this regard was also accepted. However, power rate is still to be finalized. The Gas Turbines never really "die off". They are re-furnished and zero rated. The Gas Turbines "inefficiency" is converted back to efficiency by: (a) Combined Cycle set up which will increase the total efficiency to 50-52%. (b) Additional Efficiency by utilizing the Steam turbine exhaust for chilling inlet air will boost the turbine efficiency to 55%. (c) Using the ORC patent of GRESHAM will increase the efficiency to 58%. (d) Or we can increase the efficiency to 80% + using the exhaust gas to generate HP Steam and first sending to a ST/ORC machine and then using low grade

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heat for cold storage/greenhouse. We demand that since the Asset is a national property, the following options may be considered (a) The Project is handed over to Gresham in the "as is where is condition" (b) GRESHAM will convert the project to high efficiency power plant at its own cost. (c) The JPCL/GENCO-I should negotiate a power rate with us or NEPRA should direct JPCL/GENCO-I to appoint a Consultant from a list of high integrity Energy Consultants to give a report based on a terms of Reference that we shall generate and submit to NEPRA which will establish the facts through the Energy Consultant. We shall demand NG for only 3 years after which we shall install our own integrated coal Gasification unit to produce required Syngas from coal/biomass. Our intent to save the Scrapping of a useful National Asset is serious and we will resort to filing a Constitutional Petition if need be. We are at disposal of the Authority for any additional information from our side and look as always to your prompt and positive reply.

(c). ST submitted that the Authority has proposed de-commissioning of Unit No. 1 & 2 of GENCO-I based on their de-rated efficiency. Under a scenario of rising load not being met, it is questionable and contrary to the responsibility of the Authority to safeguard the interests of consumers as provided under section 7(6) of the NEPRA Act. Whatever power is available is required to be supplied to the National Grid as the shortage is touching 6000 MW under peak scenario. Even if these Units are used occasionally, its sparing usage shows its utilization under extreme circumstances, a need which demands availability of all power units unless replaced by more efficient units. The Authority assumes replacement of

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Public Sector Power Plants with IPP which is misplaced as rates of IPPs are not comparable to public power plants. Actually, the former are far more expensive than the later. Hence, de-rated efficiency is not a valid ground of de-commissioning unless substitute public plants at the same sites (where infrastructure worth billions is already constructed) is made like replacement of these machines with efficient ones. In case of GTPS Kotri, besides overhaul and replacement of defective parts, a steam turbine can be added to the GTs to increase the efficiency by 50% as already done at Faisalabad GTPs, where that system is running satisfactorily. A lesson is to be learnt that excellent combined cycle projects of Chichokimalian and Nandipur in the Public Sector, costing less than 65% of the IPPs (tenders received in 2005) both on supplier credit and scheduled to be commissioned by 2009 as per original plan have been sabotaged before the eyes of NEPRA which resulted in the most expensive rentals which actually produced power @ Rs.42/kwh, under approval of NEPRA and without any APM for such rental plants which had efficiency lesser that 30% and being on furnace oil the cost of electricity produced was at least Rs. 22/kwh. This was allowed by the Authority however, through this APM the power plants producing power @Rs. 8.75 at GTPS Kotri (which is further improvable through the suggested measures), are being proposed for decommissioning. It is pointed out that the levellized tariff approved by NEPRA even for coal plants is of the order of Rs. 14/kwh, which in case of low (4.74%) utilization as being done for GENCOs will become something like Rs. 75/kwh, much more than for GENCOs. Instead of decommissioning, NEPRA should have strived for allocation of higher quotas of gas in order to reduce the

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electricity tariff for all categories of consumers. It is noteworthy that the tariff for Industrial consumers of Pakistan is about 15.00 U.S. cents/kwh while the same in India, Bangladesh and Sri Lanka is around 10.7 U.S. cents/kwh. It is also pointed out that the NEPRA did not allow the dismantling of similar Korangi machines of KESC, applied to NEPRA, few year back unless the matter was thrashed fully and the KESC installed and commissioned new higher and efficient combined cycle machines and it was ensured that the remaining infrastructure of the old plant will be utilized fully giving benefit to the consumers. The APM highlights an important concern in the eyes of Electric Power Consumers, i.e. generation of power in private and public domain. The regulator needs to evaluate the sector from the perspective of affordability of power by its consumers. The proposed modification bases decommissioning of units on their comparison with IPPs, without letting us know as to how much it costs us to obtain private power. The regulator therefore needs to have a more mature outlook of the sector not only in the interest of the consumers but the overall economic well-being of the country. Even developed countries like USA have public power then why the regulator and not even the Government have any vision about public power and to maintain a reasonable balance between public and private power. The consumers therefore, demand a concerted effort on the part of regulator to advise Government of Pakistan for facilitation of public power projects and mode adopted for private power projects can also be adopted for public projects along with an additional advantage to get comparably easy financing as compared to private developers. In this regard, attention of the Authority is

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invited to section 37 of the NEPRA Act regarding compulsory advice of the Authority in respect of public sector projects. The consumers therefore, urge the Authority to ensure its effective role in maintaining an adequate balance between public and private power which also assures affordable power. The proposed modification is premised on de-rating of efficiency of different units of GTPS Kotri. The Authority appears to equate efficiency of these units of GENCOs with that of IPPs however, no data regarding price of power received from similar IPP plants has been shared. In view of the above, a realistic consideration before the Authority should not be just efficiency but the resulting price of power produced, as well. Needless to state that de-rating of capacity of IPPs shall also be taken note of by the Authority as fuel cost is a pass-through and IPPs have no incentive in utilizing the funds allocated under O&M for better up-keep of their plants. Another aspect linked to the proposed decommissioning of units of GENCOs is the possibility of diversion of this gas quota to plants other than public plants. Under situations when sector like fertilizer and other are competing with power sector for gas allocations, NERPA as the regulator of power sector needs to take effective measures in bid to secure interests of its consumers. Under widening demand supply gap of electricity, NEPRA's responsibilities have become manifold and require a more active role rather than sit back and routine disposal of petitions. NEPRA therefore is requested to ensure that gas consumed by units proposed to be decommissioned should not be diverted to any other sector other than public plants. NEPRA proposed to decommission units of GENCOs due to expiry of their useful life, claiming that they cannot operate without

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licence. Here it is pertinent to mention that the licence is held by the GENCOs and not by individual units based on the provisions of NERPA Licensing (Generation) Rules, 2000 (the Rules). Rule 5 of the Rules provides for calculation of term of the licence based on maximum expected useful life of the units comprised in a Generation Licence. Upon expiry of the licence, a number of considerations have been listed under Rule 5(2) i.e., remaining maximum useful life of the units comprised in the generation facility, the performance of the licensee during the then expiring term, interest of the consumers and the electric power industry as a whole. It is pointed out that old machines of steam turbines of similar type as old as 1955 are still operational even in USA one of the richest counties in the world, and their regulator did not order for their laying off. Further, no mention of the treatment to be meted out to expired units in provided in these rules however, certain governing factors have been provided and interests of the consumers is one of them. Expiry of these units occurred much before this year. Hence, under current severe power shortages decommissioning is neither a legal requirement nor prudent. Besides all above, it is equally important to highlight the role of NEPRA in checking and rectifying the Economic Dispatch in last so many years. Whereas NEPRA is bound to see that the plants are dispatched in a manner that the power production is possible @ most economic/optimized rates, and the problem of old plants gets already resolved when they are dispatched only when they are needed @ their cost according to the need for production. To note that wind power also costs about Rs. 18-20/kwh, as approved by NEPRA and Solar Power is over Rs. 30/kwh, and Pakistan has to generate power

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from these renewable sources. The state of affairs of GENCOs is alarming and we the voiceless consumers of this country expect NEPRA to come forward in their interest. The rehabilitation works at some of the GENCOs have taken unreasonable time thus denying consumer to get timely benefits of the required works. NEPRA did take some interest in 2008, as also reported in its State of Industry Report for FY 2009-10. GOP as owner of these companies was recommended to take stern measures; however, consumers are yet to gain benefits of such actions. We believe the present state of non-transparent handling of GENCOs is also a key element toward mishandling of these public assets, developed with the blood of poor people of this country. Consumer urge NEPRA to obtain information about the current steps being taken in respect of proper management of GENCOs and make it public and ensure that all remedial and management steps are in its knowledge and implemented in time in order to run these plants in the best interest of the consumers. Another concern of the consumers is inability of NEPRA to ensure implementation of its tariff, not only the consumer-end tariff but the generation tariff allowed to GENCOs. It is believed that if GENCOs are allowed adequate O&M (a proper balance with IPPs O&M need to be maintained by NEPRA) and the same is also actually transferred by the GOP/Ministry of Water and Power in GENCO's account, allowing financial autonomy as envisaged under their licences, the state of affairs, as exists today would have been much better. Under the circumstance, NEPRA therefore, is required to act not as an entity comprising with the GOP/Ministry of Water and Power rather a regulator gauging its powers and functions towards the well being of the sector, thus safeguarding the

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economic frontiers of our beloved homeland. The whole philosophy behind creation of NEPRA, as a distinct statutory body from government calls for its urgent action towards a stable operation of this sector and its early recovery from the current crisis.

(d). PSO expressed its no reservation on the APM;

(e). CRCP commented that any change in Generation Capacity through de-commissioning without any proper replacement plan would enhance the difficulties of end consumers;

(f). NTDC remarked that the proposed APM should not be done in haste and before finalization of the same, the plan for rehabilitation, augmentation and replacement of units should be kept in view to avoid disturbance in system; and

(g). MoW&P submitted that GTPS Kotri is located at an important load point. Instead of retiring, the Authority should have suggested refurbishment/up-gradation of these units. MoW&P has directed JPCL to explore the possibility of refurbishment/up-gradation on an urgent basis.

(h). KSY&WW opined that retiring of old units at this stage would be appropriate.

(ii). In consideration of the above comments, the Authority decided to hold a Public Hearing in the matter and the same was held on June 14, 2013. All the stakeholders, interested/affected persons and the general public were informed about the Public Hearing through notices in different newspapers published on May 23, 2013. Furthermore, separate notices were also sent to

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experts, Government Ministries and Representative Organizations etc. inviting them to participate in the proposed Public Hearing and for submitting their views and comments in the matter through this office letters dated June 01, 2012.

(iii). In the above mentioned Public Hearing, different stakeholders including JPCL/GENCO-I, GEPL, ST, CRCP and CPPA participated. The said stakeholders gave their arguments to justify their point of view as explained above.

(D). Review of Comments of Stakeholders

(i). The Authority examined the comments of the all the stakeholders as explained at Para C(a)-C(h) above. The Authority has noted that JPCL has not raised any significant observations against the APM. Actually, JPCL conceded the very fact that Unit No. 1 & 2 of GTPS Kotri (to be excluded through APM) are older units and have already completed their useful life. JPCL expressed its apprehension that exclusion of the said units would decrease its O&M budget. In this regard, it is clarified that the O&M Budget is meant only for the operating units and not for those which are no more operational. As the Unit No. 1 & 2 of GTPS Kotri are either not used or being used to a very low level therefore, the apprehension of JPCL that its O&M budget would be reduced does not make sense and cannot be considered as a valid ground to continue the operation of these units which have outlived their useful life.

(ii). Regarding the observations of GEPL, the Authority has observed that it proposed that the Unit No. 1 & 2 of GTPS Kotri be converted to Combined Cycle to achieve efficiency of 50%-52%. In this regard, the Authority observes that keeping in view the size and remaining useful life of these units, this option may not be viable at this stage. Furthermore, considering the depleting Natural Gas reserves, the Power Sector is already

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facing difficulties in getting allocation for Natural Gas. Therefore, this option may not be worth considering at this stage.

(iii). The Authority has also taken into account the observations of ST. In this regard, ST suggested that Unit No. 1 & 2 of GTPS Kotri may not de-commissioned despite their low efficiency as the demand-supply gap has approached 6000 MW. The Authority considers that although there is supply-demand gap and efforts should be made to use maximum available capacity. However, at the same time it must be ensured that the available resources are best utilized. However, the performance data of Unit No. 1 & 2 of GTPS Kotri reveals that these units are not efficient to justify their operation. Further, ST has stressed that Public Sector Power Plants should not be compared with Thermal Power Plants in the Private Sector. On this, the Authority considers that being a regulator of the Electric Power Sector it cannot differentiate between the Public Sector GENCOs and the IPP. Furthermore, the Authority is obligated to bring efficiency in the sector by utilizing the available resources to be utilized in the most efficient way irrespective of the Public or Private Sector. In view thereof, the Authority does not find any merit to the said observations of ST.

(iv). It has been noticed that CRCP, NTDC and MoW&P have commented that the de-commissioning should not be carried out in haste and without proper replacement plan. In this regard, the Authority observes that de-commissioning is not being carried out in haste. The Authority has observed that JPCL is planning to set up 2 x 660 MW Coal fired Power Plant at Jamshoro. Therefore, the Authority is satisfied that the APM for excluding of these Units is being carried out with proper replacement plan.

(E). Decision of the Authority

(i). The Authority considered the submissions of the stakeholders in its Regulatory Meeting held on August 28, 2012 and decided sending an advisory to MoW&P (which disagreed to the APM), on the negative impacts of the minimum and costly generation of Unit No. 1 & 2 of GTPS Kotri.

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However, no reply to the advisory was received by the Authority. Therefore, Authority reconsidered the matter in its Regulatory Meeting held on October 30, 2012 and decided to further analyze the operational aspects pertaining to Unit No. 1 & 2 of GTPS Kotri.

(ii). The Authority observed that Unit 1 and 2 of GTPS, Kotri, having an Installed Capacity of 30.00 MW, consisting of two (02) Gas Turbines of CEM France were commissioned during the period December 1969 and January 1970. These Units have duel firing capability with Natural Gas as Primary Fuel and High Speed Diesel (HSD) as Alternative Fuel. The designed efficiency of these units was 24.00% on Natural Gas. According to the data for the FY 2010-11, the reported efficiency of Unit No. 1-2 has dropped to 14.22% (which is very low when compared to new Natural Gas based Power Plants which are designed to be operation around 50%-52%. According to the Merit Order for dispatch of plants, the Unit 1-2 of GTPS Kotri are placed on 33rd place when operated on Natural Gas, costing Rs. 10.6544/kwh which is the highest price for gas operated Power Plants/Units in the system in the Public and Private Sector. Similarly, the Unit 1-2 of GTPS Kotri while operating on Alternative Fuel of HSD are placed at the bottom position of 76th in the Merit Order, costing Rs. 50.44020/kwh which is the highest in the system in the Public and Private Sector. The Authority observed that in view of the shortage of Natural Gas in the country, the only likely operation of Unit 1-2 of GTPS Kotri is possible on alternative fuel of HSD. However, the operation of these units is the most expensive in the system and there operation does not make economic sense. In view of the said, the Authority decided that it will be more appropriate that the operation of Unit-1 & 2 of GTPS Kotri is discontinued.

(iii). Accordingly, the already granted Generation Licence (No. GL/01/2002, dated July 01, 2002) in the name of JPCL is hereby modified. The Face Sheet indicating the required changes alongwith Revised/Modified Schedule-I & II of the Generation Licence are attached as Annexure to this

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determination. The approval of APM will be subject to the provisions contained in the NEPRA Act and relevant rules framed there under.

Authority

Habibullah Khilji
Member

15/4/2014

Maj. (R) Haroon Rashid
Member

15/4/14

Khawaja Muhammad Naeem
Member/Vice Chairman

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16.04.14

National Electric Power Regulatory Authority (NEPRA)

Islamabad – Pakistan

GENERATION LICENCE

GL/01/2002

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, the Authority hereby modifies the Generation Licence granted to Jamshoro Power Company Limited/GENCO-I (issued on July 01, 2002 and expiring on June 30, 2021), to the extent of changes mentioned as here under:-

(i). Changes in **Schedule-I** are attached as Revised/Modified Schedule-I; and

(ii). Changes in **Schedule-II** are attached as Revised/Modified Schedule-II.

This **Modification-I** is given under my hand on this 16th of **April Thousand** & **Fourteen**

Registrar

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SCHEDULE-I
(Revised/Modified)
Modification-I

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.

General Information About 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	Gas Turbine Power Station, (GTPS), Kotri.
(iv).	Type of Generation Facility	Plant-I	Plant-II
		Thermal Power Plant	Thermal Power Plant

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Detail
of Generation Facility of TPS Jamshoro

(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-I	Unit-II	Unit-III	Unit-IV
		250 MW Steam Turbine	210 MW Steam Turbine	210 MW Steam Turbine	210 MW Steam Turbine
(iv).	Unit Make & Model	Unit-I	Unit-II	Unit-III	Unit-IV
		Mitsui, Japan	CMEC, China	CMEC, China	CMEC, China
(v).	Commercial Operation date (of each Unit)	Unit-I	Unit-II	Unit-III	Unit-IV
		Jan. 27, 1990	Dec.03, 1989	June 27, 1990	Jan. 21, 1991
(vi).	Expected Useful Life of the Facility from Commercial Operation Date (of each Unit)	Unit-I	Unit-II	Unit-III	Unit-IV
		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 License	Unit-I	Unit-II	Unit-III	Unit-IV
		25 Years	25 Years	25 Years	26 Years
(viii).	Remaining useful life of the Generation Facility at the time of this Modification dated April 16, 2014	Unit-I	Unit-II	Unit-III	Unit-IV
		14 Years	14 Years	14 Years	14 Years

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(B). Fuel Details

(i).	Primary Fuel	Unit-I	Unit-II	Unit-III	Unit-IV
		Furnace Oil			
(ii).	Alternative Fuel	Unit-I	Unit-II	Unit-III	Unit-IV
		Furnace Oil	Natural Gas		
(iii).	Start-Up Fuel	Unit-I	Unit-II	Unit-III	Unit-IV
		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	

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(C). Emission Values

S.No	Description	Furnace Oil	Natural Gas
(i).	SO_x (mg/Nm^3)	1550 to 1650	-
(ii).	NO_x (mg/Nm^3)	300 to 400	350 to 425
(iii).	CO_2 %	10.8 % to 14.0%	10.5 % to 14.0 %

(D). Cooling System

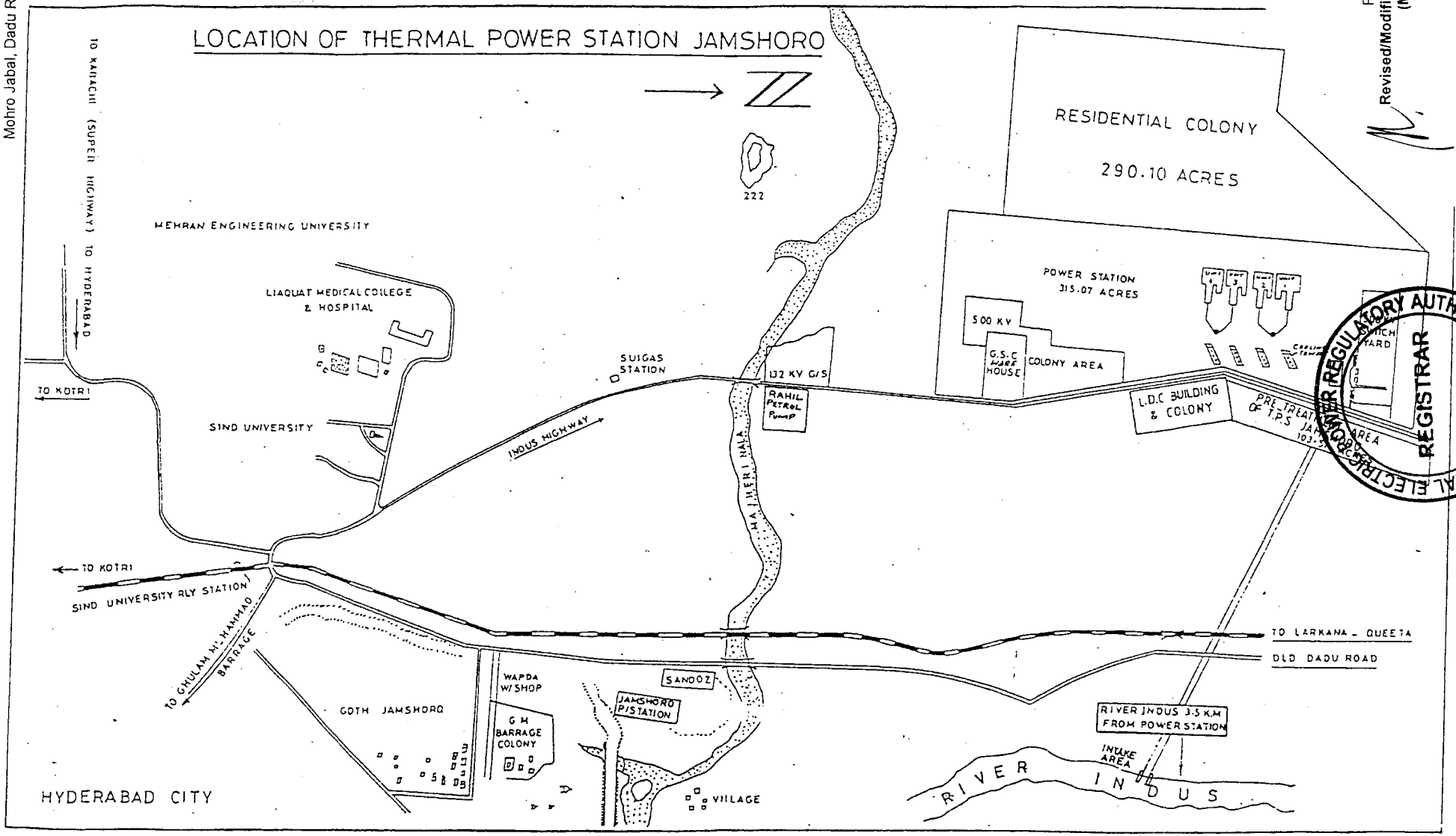
(i).	Cooling Water Source/Cycle	River Water (Open Cycle)

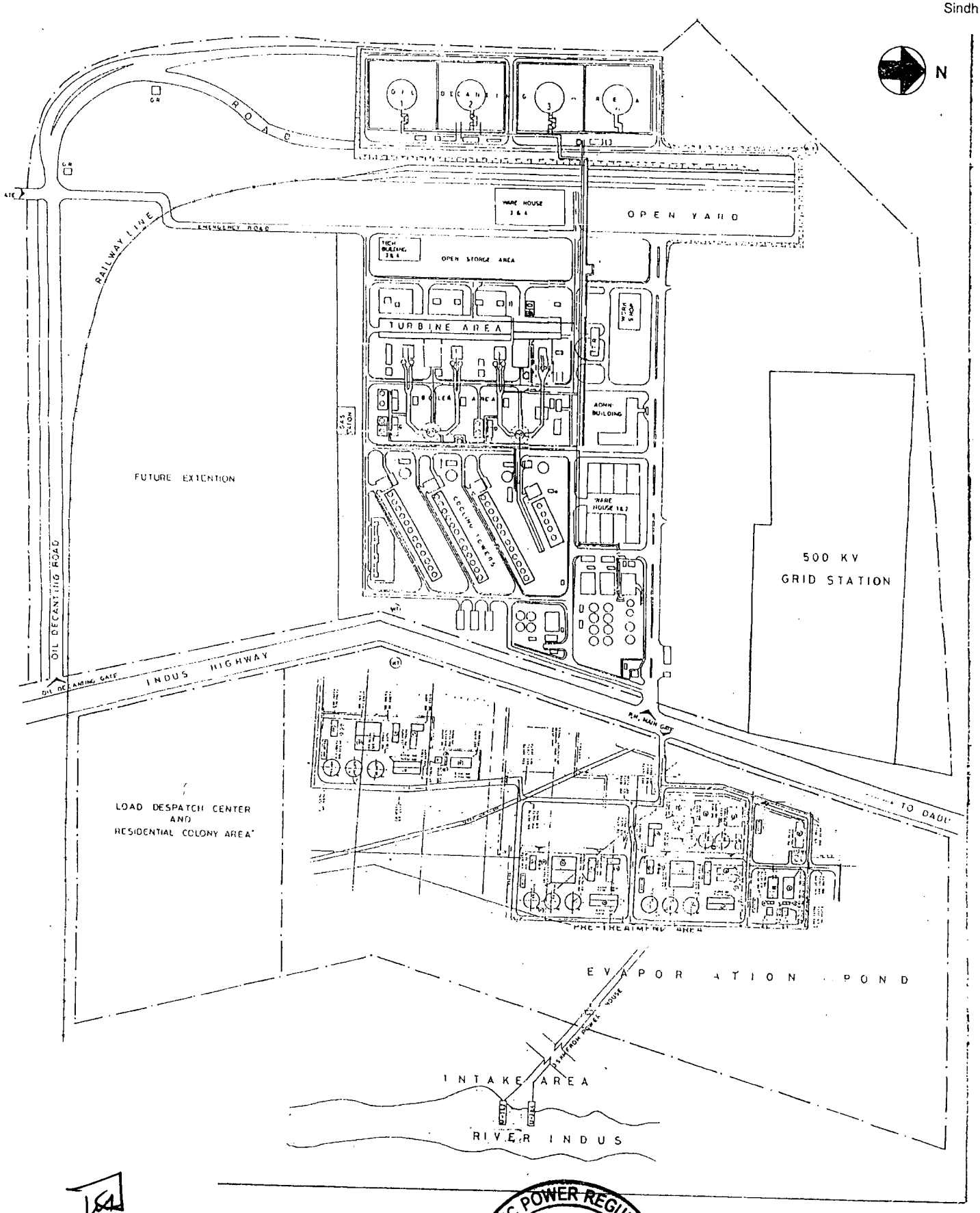
(E). Plant Characteristics

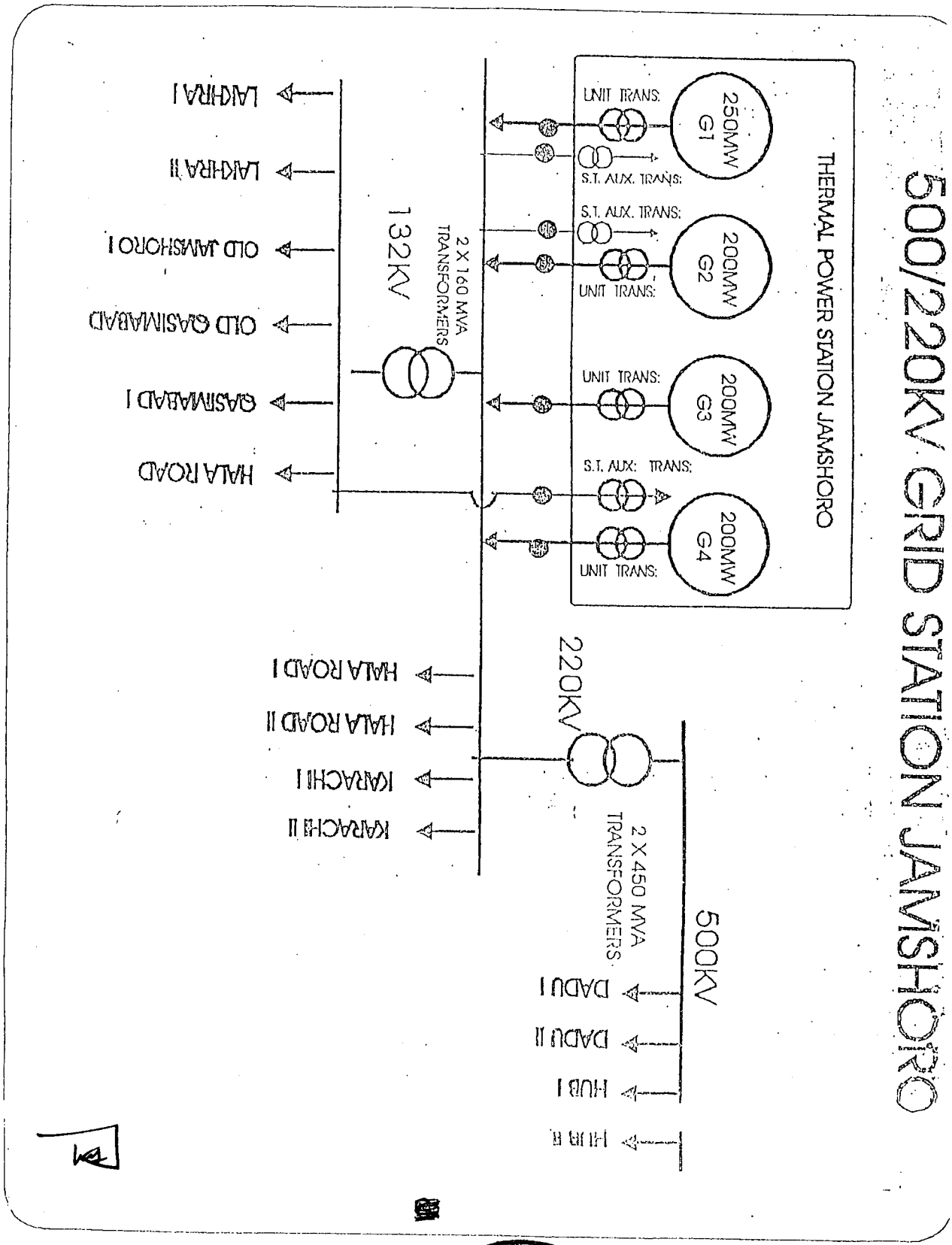
		Unit-I	Unit-II	Unit-III	Unit-IV
(i).	Generation Voltage	16.5	15.75	15.75	15.75
(ii).	Frequency	50	50	50	50
(iii).	Power Factor	0.85 Lag	0.85 Lag	0.85 Lag	0.85 Lag
(iv).	Automatic Generation Control (AGC) (MW control is the general practice)	No	No	No	No
(v).	Ramping Rate (MW/min)	2.0	1.0	1.0	1.0
(vi).	Time required to Synchronize to Grid (Hrs.)	12	6	6	6

(F). Interconnection Arrangement

(i).	Interconnection & Transmission Arrangement	TPS Jamshoro 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.







Detail of Generation Facility/ GTPS, Kotri

(G). Plant Configuration

(i).	Plant Size Installed Capacity (Gross ISO)	144 MW				
(ii).	Type of Technology	Thermal Power Plant/Combined Cycle Power Plant				
(iii).	Number of Units/Size (MW)	Unit-3	Unit-4	Unit-5	Unit-6	Unit-7
		25 MW Gas Turbine	25 MW Gas Turbine	25 MW Gas Turbine	25 MW Gas Turbine	44 MW Steam Turbine
(iv).	Unit Make & Model	Unit-3	Unit-4	Unit-5	Unit-6	Unit-7
		Thom B.V. Holland	Thom B.V. Holland	Hitachi Japan	Hitachi Japan	HPEEC China & Cockrill Mech: Indus Belgium
(v).	Commercial Operation date (of each Unit)	Unit-3	Unit-4	Unit-5	Unit-6	Unit-7
		May 1979	May 1979	April 1981	May 1981	October 1994
(vi).	Expected Useful Life of the Facility from Commercial Operation Date (of each Unit)	Unit-3	Unit-4	Unit-5	Unit-6	Unit-7
		36 Years	36 Years	38 Years	38 Years	47 Years
(vii).	Expected Useful Life of the Facility (Each Unit) at the time of Grant of Original Generation Licence	Unit-3	Unit-4	Unit-5	Unit-6	Unit-7
		13 Years	13 Years	15 Years	15 Years	24 Years
(viii).	Remaining useful life of the Generation Facility at the time of this Modification dated April 16, 2014	Unit-3	Unit-4	Unit-5	Unit-6	Unit-7
		2 Years	2 Years	4 Years	4 Years	13 Years

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(H). Fuel Details

(i).	Primary Fuel	Unit-3	Unit-4	Unit-5	Unit-6	Unit-7
		Natural Gas				
(ii).	Alternative Fuel	Unit-3	Unit-4	Unit-5	Unit-6	Unit-7
		HSD				
(iii).	Start-Up Fuel	Unit-3	Unit-4	Unit-5	Unit-6	Unit-7
		Nil				
(iv).	Fuel Source for each of the above (i.e. Imported/ Indigenous)	Primary Fuel			Alternative Fuel	
		Indigenous			Indigenous/Imported	
(v).	Fuel Supplier for each of the above	Primary Fuel			Alternative Fuel	
		SSGC			PSO/SHELL	
(vi).	Supply Arrangement for each of the above	Primary Fuel			Alternative Fuel	
		Gas Pipelines			Tank/Lorries and Railway Wagons	
(vii).	No of Storage Tanks	Primary Fuel			Alternative Fuel	
		N/A			4	
(viii).	Storage Capacity of each Tank	Primary Fuel			Alternative Fuel	
		N/A			2,000,000 Liter	
(ix).	Gross Storage	Primary Fuel			Alternative Fuel	
		N/A			8,000,000 Liter	

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(I). Emission/Effluents Values

S.No	Description	Natural Gas
(i).	SO_x (mg/Nm^3)	-
(ii).	NO_x (mg/Nm^3)	90 to 130
(iii).	CO_2 %	2.5 % to 2.7 %

Note: Subject to variation in Load.

(J). Cooling System

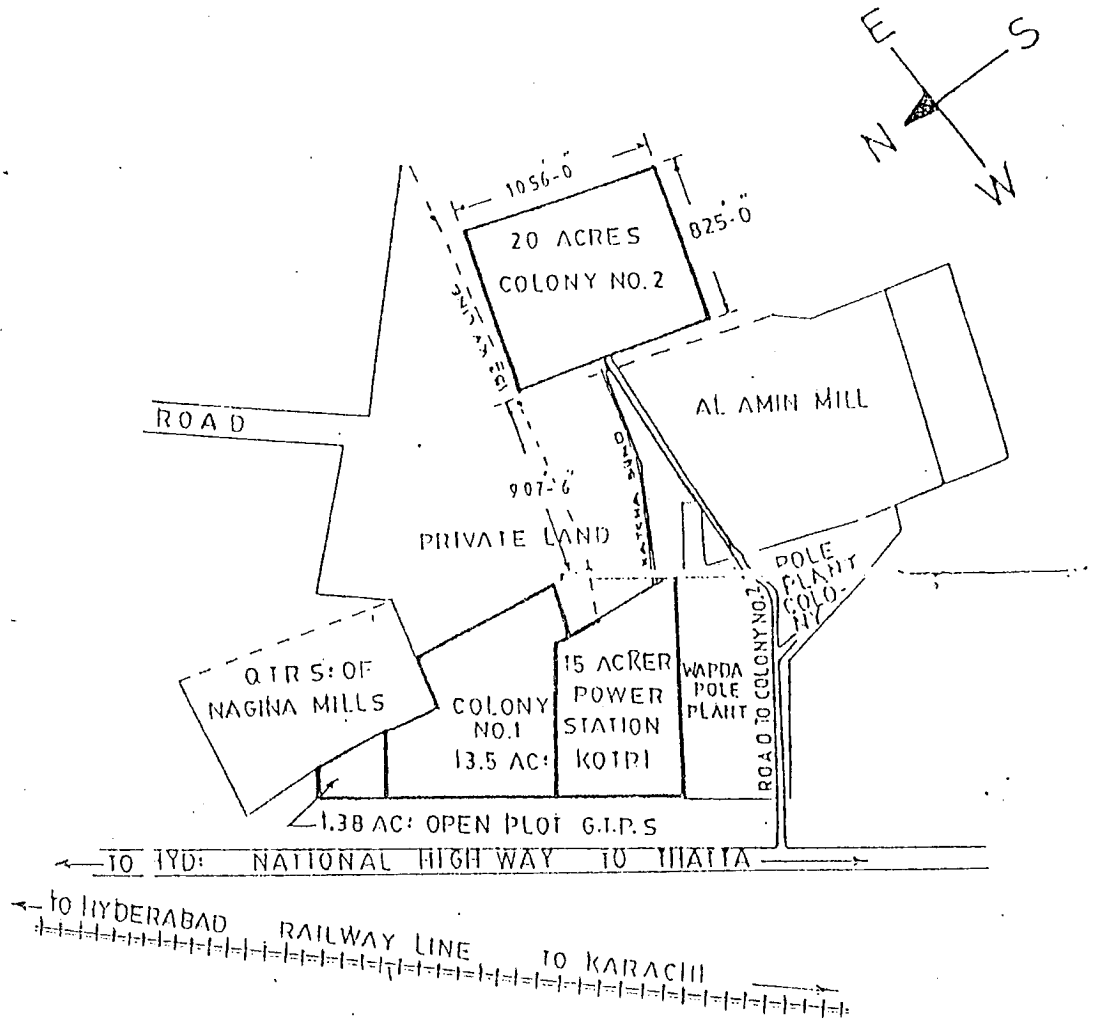
(i).	Cooling Water Source/Cycle	Cooling Water is Canal Water (Open Cycle)

(K). Plant Characteristics

		Unit-3	SSGC	Unit-5	Unit-6	Unit-7
(i).	Generation Voltage	11.0	11.0	11.0	11.0	11.0
(ii).	Frequency	50	50	50	50	50
(iii).	Power Factor	0.80	0.80	0.80	0.80	0.80
(iv).	Automatic Generation Control (AGC) (MW control is the general practice)	No	No	No	No	No
(v).	Ramping Rate MW/Min	2.0	2.0	2.0	2.0	1.0
(vi).	Time required to Synchronize with Grid (Minutes)	20	20	20	20	20

(L). Interconnection Arrangement

(i).	Interconnection & Transmission Arrangement	The Gas Turbine Power Station, Kotri has its 132KV Grid Station in the Premises of Power Plant.



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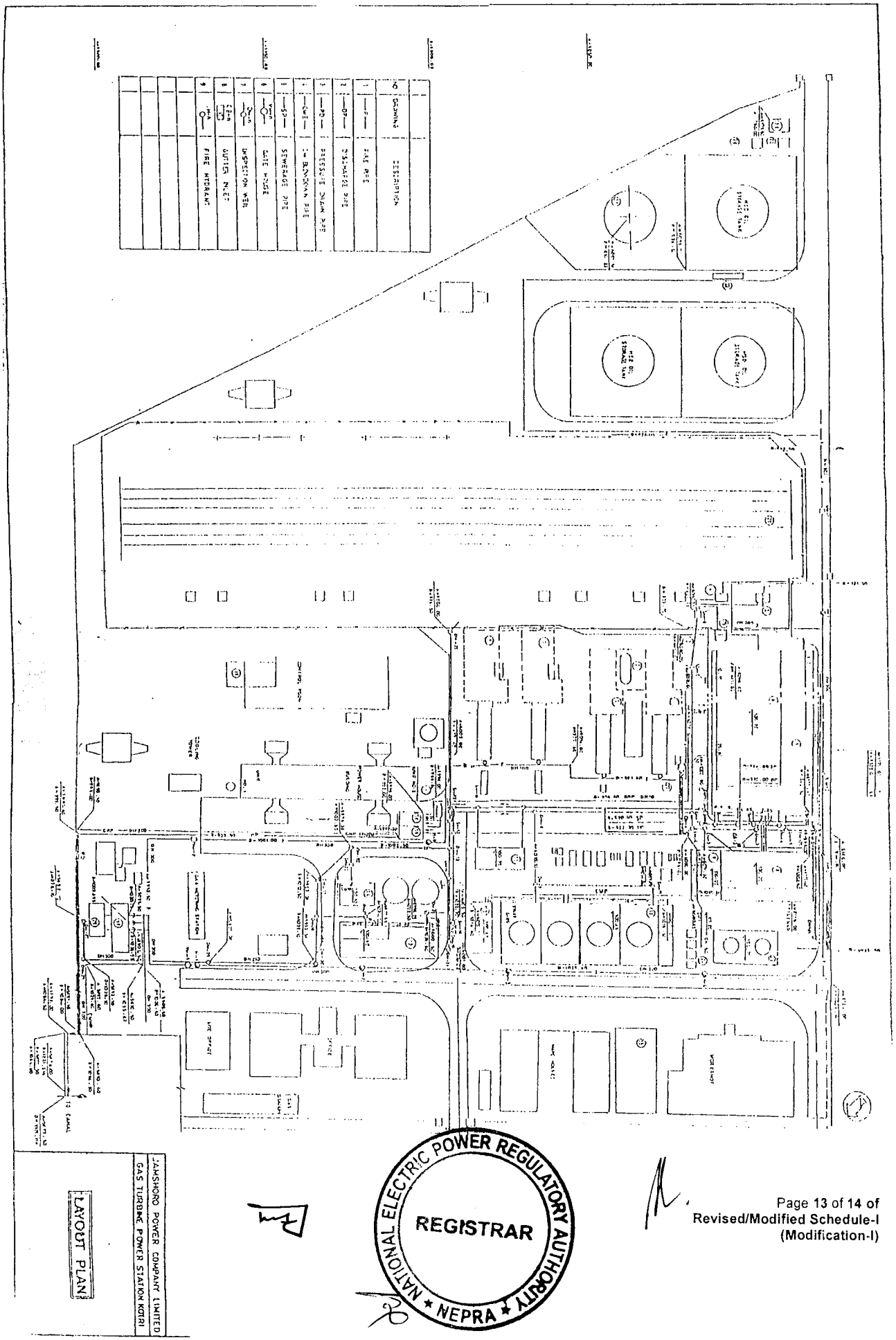

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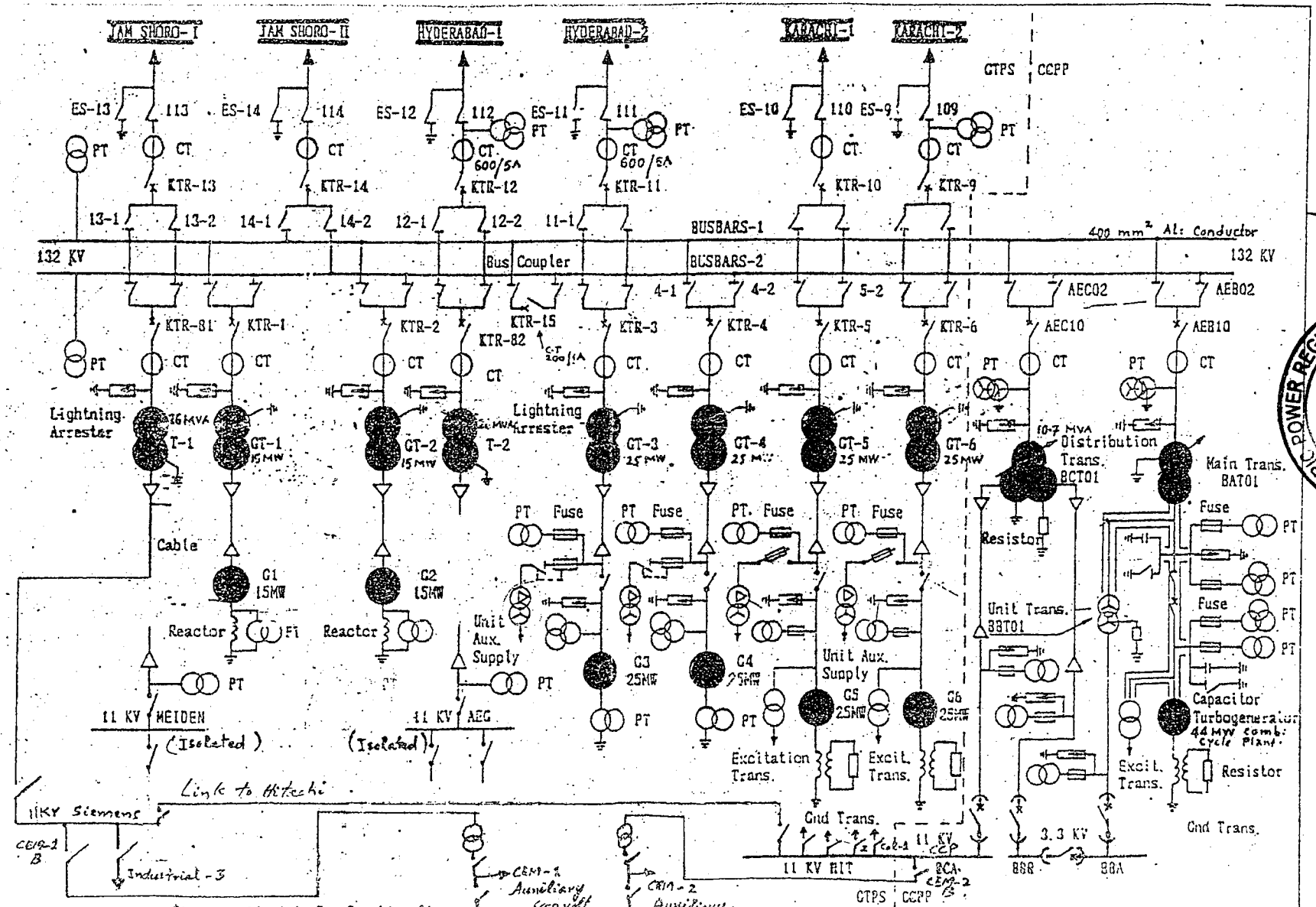

Fig 1.1 Electric Key One Line Diagram

SCHEDULE-II
(Revised/Modified)
Modification-I

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 Licensee is given in this Schedule

SCHEDULE-II

Power Station	Unit Detail	Installed Capacity (MW)	De-Rated Capacity (MW)		Net Capacity (MW)	
TPS Jamshoro	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**
GTPS Kotri	Unit-3	25	Unit-3	22	Unit-3	21.91
	Unit-4	25	Unit-4	22	Unit-4	21.91
	Unit-5	25	Unit-5	22	Unit-5	21.91
	Unit-6	25	Unit-6	22	Unit-6	21.91
	Unit-7	44	Unit-7	44	Unit-7	40.82
	Sub-Total-II	**144**	-	**132**	-	**128.46**
	Grand Total	**1024**	-	**842**	-	**774.56**

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