



Registrar

National Electric Power Regulatory Authority Islamic Republic of Pakistan

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No. NEPRA/R/DL/LAG-325/ 7024-28

May 19, 2016

Mr. Muhammad Ali Jaffery
Plant Manager,
Pakistan Atomic Energy Commission (PAEC),
Chashma Nuclear Power Plant Unit-4,
P.O Box No. 3094, Islamabad.

Subject: **Grant of Generation Licence No. GL/25/2016**
Licence Application No. LAG-325
Pakistan Atomic Energy Commission (PAEC)

Reference: *Your application vide letter No. nil, dated November 27, 2015.*

Enclosed please find herewith Determination of the Authority in the matter of Application of "Pakistan Atomic Energy Commission (PAEC)" for the Grant of Generation Licence along with Generation Licence No. GL/25/2016 annexed to this determination granted by the National Electric Power Regulatory Authority (NEPRA) to "Pakistan Atomic Energy Commission" for its "340.00 MW Chashma Nuclear Power Plant Unit-3 (CHASNUPP-4/C-4) located at Chashma, Tehsil Piplan, District Mianwali, in the province of Punjab" pursuant to Section 15 of the Regulation of Generation, Transmission and Distribution of Electric Power Act (XL of 1997).

2. Please quote above mentioned Generation Licence No. for future correspondence.

Enclosure: Generation Licence
[(GL/25/2016)]



19.05.16
(Syed Safer Hussain)

Copy to:

1. Chief Executive Officer, NTDC, 414-WAPDA House, Lahore
2. Director General, Environment Protection Department, Government of Punjab, National Hockey Stadium, Ferozpur Road, Lahore.
3. Chief Executive Officer, CPPA-G, 6th Floor, Shaheed-e-Millat Secretariat, Jinnah Avenue, Blue Area, Islamabad
4. Chairman, Pakistan Nuclear Regulatory Authority (PNRA), PNRA HQ, P.O Box No. 1912, Islamabad

National Electric Power Regulatory Authority
(NEPRA)

Determination of the Authority
in the Matter of Application of Pakistan Atomic Energy Commission
for the Consideration of Grant of Generation Licence for Nuclear
Power Plant/Project at Chashma (Unit No. 4/C-4)

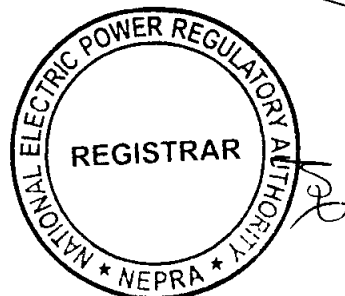
May 13, 2016
Case No. LAG-325

(A). Background

(i). The demand for energy in the country is rising at a rapid pace. In order to meet the future demand, the Government of Pakistan (GoP) has chalked out a plan to add more generation capacity using different indigenous resources including the nuclear.

(ii). In consideration of the above, GoP is working on an ambitious plan for setting up Nuclear Generation Facilities/Nuclear Power Plants at various locations across the country. In this regard, on March 30, 2009 the Executive Committee of the National Economic Council (ECNEC) approved a PC-I for setting up two more Nuclear Projects/Nuclear Power Plants at Chashma, Tehsile Piplan, District Mianwali, in the province of Punjab.

(iii). The above mentioned PC-I envisaged Pakistan Atomic Energy Commission (PAEC) as the Sponsoring, Executing and Operation and Maintenance Agency for the proposed Nuclear Power Plants/Projects of Unit No. 4 (C-4) and Unit No. 4 (C-4).

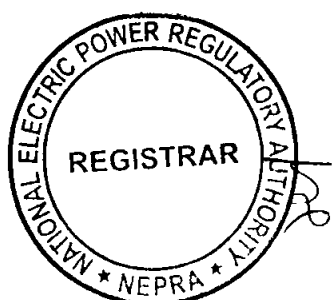


(B). Filing of Generation Licence Application

(i). In accordance with Section-15 of Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 (the NEPRA Act), PAEC submitted an application on January 19, 2016 requesting for the grant of Generation Licence for Chashma Nuclear Power Plant Unit No. 4 (C-4/CHASNUPP-4).

(ii). The Registrar examined the submitted application and found the same compliant with the NEPRA Licensing (Application and Modification Procedure) Regulations, 1999 ("the Regulations") and submitted the same for the consideration of the Authority. The Authority considered the matter in its Regulatory Meeting (RM-16-74), held on February 02, 2016 and found the form and content of the application in substantial compliance with Regulation-3 of the Regulations. Accordingly, the Authority admitted the application for consideration of the grant of Generation Licence as stipulated in Regulation-7 of the Regulations. The Authority approved the advertisement [containing (a). the prospectus; (b). a notice to the general public about the admission of the application of PAEC], inviting the general public for submitting their comments in the matter as stipulated in Regulation-8 of the Regulations. The Authority also approved the list of the persons for providing their comments or otherwise to assist the Authority in the consideration of the above mentioned application of PAEC. Accordingly, the advertisement was published in one Urdu and one English National Newspaper on March 11, 2016.

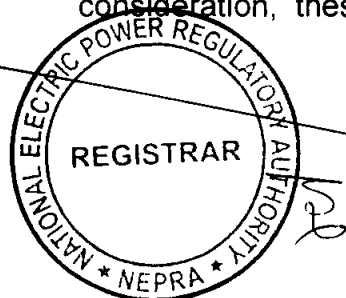
(iii). Apart from the above, separate letters were also sent to Government Ministries, their Attached Departments, Representative Organizations and Individual Experts etc. on March 14, 2016. The said stakeholders were directed for submitting their views/comments for the assistance of the Authority.



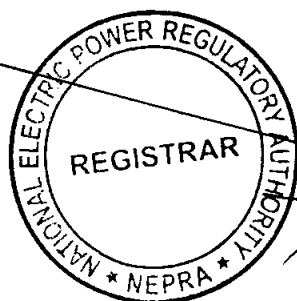
(C). Comments of Stakeholders

(i). In reply to the above, the Authority received comments from five (05) stakeholders. These included The Federation of Pakistan Chambers of Commerce and Industry (TFoPCoC&I), Pakistan Nuclear Regulatory Authority (PNRA), anonymous writer(s) presumably from the employees of C-3 and C-4, Ministry of Petroleum & Natural Resources (MoP&NR) and National Power Control Center (NPCC) of National Transmission and Desptach Company Limited (NTDC). The salient points of the comments offered by the said stakeholders are summarized in the following paragraphs: -

- (a). TFoPCoC&I stated that for economic growth, cheap and uninterrupted electricity is required. In view of the energy crisis and its adverse impact on economic growth, there is an immediate need to install power plants like C-3 and C-4. Therefore, TFoPCoC&I fully supports the grant of Generation Licence to C-3 & C-4 expeditiously to achieve commercial operation within the specified timelines;
- (b). PNRA commented that the preliminary design and safety features of C-3 and C-4 were reviewed and found generally acceptable. The commissioning activities are in progress under the regulatory oversight. Therefore, PNRA has no objection for the grant of Generation Licence for C-3;
- (c). The anonymous letter stated that the nation requires Nuclear Power Plants because these provide highly economical, reliable (in terms of capacity factor) and environment-friendly source of electrical power, if operated in a safe and educated manner. However, if the key-factors of safe operations are not given due consideration, these plants have potential to cause disastrous



accidents. PAEC has made no compromise on safety while selecting the design of its Nuclear Power Plants however, it has ignored some key aspects related to its man-power. PAEC has recruited the most talented scientists, and engineers of the country and providing them the best education, training, compensation packages and living facilities, so that they have the right skills as well as the desired peace of mind to operate its nuclear power plants. It is evident from the history that PAEC successfully achieved safe operation of the facilities by following the right approach. However, PAEC in the case of C-3 and C-4 has completely ignored the basic facility relating to the accommodation of employees and their families at site. C-3 and C-4 are located in remote area and for such projects residential colonies are constructed for the employees. This enables the employees to perform their duties with a peace of mind. PAEC constructed such colonies for its earlier projects of Chashma Nuclear Unit No. 1 & 2 respectively (i.e. C-1 and C-2) however, the same has completely been ignored for the projects of C-3 and C-4. Currently, only the top leadership has been provided accommodation in the leftover houses of C-1 and C-2 colonies whereas engineers/scientists have only been given single-room hostel accommodations for their families. Others have been provided bachelor accommodation in hostels on shared basis. This result in highly unsatisfied life pattern and psychological problems for employees of C-3 and C-4 resultantly, most of the engineers appearing for "Reactor Operator Licence Exam" before PNRA failed due to this reason. As the expected commissioning of C-3 is near, it may be granted Generation Licence but condition may be imposed to solve the problems of accommodation. However, for C-4 there is sufficient time before its operation therefore, the grant of Generation Licence may be postponed

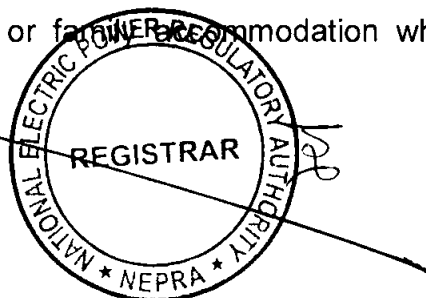


unless sufficient progress has been made pertaining to the accommodation of the engineers;

- (d). MoP&NR remarked that PAEC intends to install Thermal Power Plants based on slightly enriched Uranium as fuel for which no Gas is required. Therefore, the Ministry does not have any objection to the grant of Generation Licence to PAEC for C-4; and
- (e). NPCC submitted that Nuclear Power Plant are very sensitive from operational point of view. The existing transmission line network is sufficient for dispersal of power from C-1 and C-2 only. There would be congestion in the area after the commissioning of C-3 and C-4 and evacuation of electric power from C-3 and C-4 will be difficult without additional transmission lines. Therefore, it will be imperative to enhance the transmission network capacity by addition of new circuits in the area for the safe, reliable and economical operation of C-3 and C-4.

(ii). The above comments of the stakeholders were examined and the Authority observed that though all the stakeholders have supported the grant of Generation Licence to PAEC however, some observations were also raised by the anonymous stakeholder (i.e. presumably the employees of C-3/C-4) and NPCC. In view of the said, the Authority considered it appropriate seeking perspective of PAEC. Further, the Authority also considered it appropriate views of NTDC on the availability of dispersal arrangement from C-4.

(iii). In its rejoinder, PAEC submitted that it is aware of the issue of accommodation being faced by its employees of the projects of C-3/C-4. In this regard, PAEC is utilizing Rs. 3100 million exclusively for the construction of residences including hostels, family suites and houses for the employees. C-3/C-4 currently employees about 1200 personnel and all C-3/C-4 employees who have applied been provided bachelor or family accommodation whichever is available at site on merit



basis. Construction of around 1200 new houses is under way expected to be completed in the next two to three years which will solve the problems of accommodation.

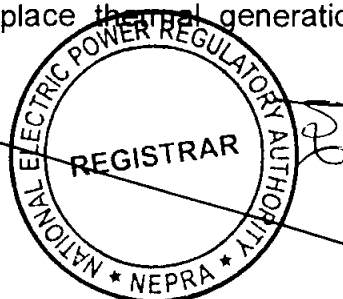
(iv). NTDC clarified that electric power to be generated from C-3 and C-4 will be evacuated through 220 KV D/C Chashma-Bannu Transmission Line. The said line is has already been completed and is running on no load. The Authority considered the above submissions of PAEC and NTDC and found the same plausible. Accordingly, the Authority considered it appropriate to process the application of PAEC for the consideration of the grant of Generation Licence for C-4 as stipulated in the Regulations and NEPRA Licensing (Generation) Rules, 2000 (the Rules).

(D). Grant of Generation Licence

(i). Electricity is a fundamental element for the economic growth of any country. The electricity consumption per capita has a strong correlation to the Social Development Indices (Human Development Index-HDI, life expectancy at birth, infant mortality rate, and maternal mortality) and Economic Indices (such as GDP per capita etc.).

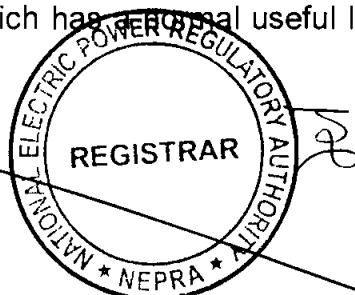
(ii). Increasing electricity consumption per capita can directly stimulate faster economic growth and indirectly achieve enhanced social development. In short, the Economic Growth of any country is directly linked with the availability of safe, secure, reliable and cheaper supply of electricity. In view of the said, the Authority is of the considered opinion that for sustainable development, all types of electric power generation resources including Coal (Imported/Indigenous), Nuclear, Hydel, Wind, Solar and other Renewable Energy (RE) resources must be tapped and developed on priority basis both in Public and Private Sectors.

(iii). The initiative of installation of new Nuclear Power Plants in the electrical power system is considered important as their induction in the system always results in better overall energy mix. The Nuclear Power Plant are always used as base load power plant and displace thermal generation particularly those based on imported



furnace oil, resulting in precious foreign exchange saving. Further, for a Nuclear Power Plant, the fuel cost is very small as compared to that of a conventional thermal power plant. In view of the low fuel cost, the induction of Nuclear Power Plant always results in stabilizing the generation cost of electricity. The operations of the Nuclear Power Plant are independent of any seasonal effects as in the case of Hydro Power Plants and any daily variations in the case of solar and wind power plants. Thus Nuclear Power Plants can provide much needed firm generating capacity in low hydro generation periods. C-4 is being set up in the vicinity of the existing Nuclear Power Plant of C-1 and C-2 where most of the basic infrastructures for the setting up of a Nuclear Power Plant already exist. Therefore, the installation of C-4 at its proposed location of District Mianwali will result in economies of scale thus reducing further the overall cost of electricity from it. Therefore, the project of C-4 will be extremely beneficial as its tariff will be significantly lower than other upcoming projects. The project will help in enhancing energy security of the country not only by diversifying the energy mix of the country but will also reduce dependence on imported fuels. In consideration of the above, the Authority considers that the efforts of PAEC for setting up another Nuclear Power Plant in the country will help in meeting with the growing energy needs of the country at very reasonable and affordable cost.

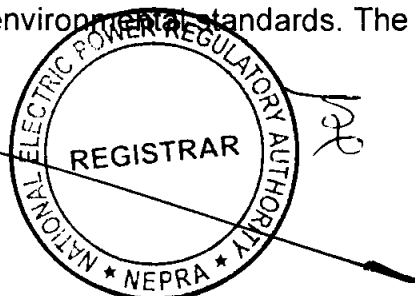
(iv). The Term of a Generation Licence is fixed according to the Rules. According to Rule 5 of the Rules, except where an applicant for a Generation Licence consents to a shorter term, the term of the Generation Licence is to be commensurate with the maximum expected useful life of the units comprised in a generation facility. According to the information provided by PAEC, C-4 will be achieving the Commercial Operation by June 30, 2017 and will have a useful life of about forty (40) years from its commissioning/Commercial Operation Date (COD). PAEC has claimed that the plant will also used further, for period of another twenty (20) years after the completion of the forty (40) years of initial life however, major rehabilitation will be required for this. PAEC has proposed that the term of the Generation Licence may be fixed to forty (40) years. The Authority considers that apart from the reactor part of the Nuclear Power Plant, the balance of the Nuclear Power Plant resembles with a conventional Steam Turbine Thermal Power Plant which has a normal useful life of at least thirty (30) years. In this



regard, the Authority has observed that the PC-I of the project has also assumed the useful life of the C-4 as thirty (30) years and all the Financial/Economic Analysis has been based on this life. In consideration of the said, the Authority sets the term of the Generation Licence to thirty (30) years. However, PAEC will have the option to get the term of the Generation Licence re-fixed/extended subsequently as stipulated in the Article-4.2 of the Generation Licence.

(v). Regarding the Tariff of Generation Facility (i.e. C-4) that it will charge from the Power Purchaser, PAEC has confirmed that it will be filing a Tariff Petition with the Authority in terms of NEPRA (Tariff Standards and Procedure) Rules, 1998 for the determination of the same. The Authority directs PAEC to charge the Power Purchaser only such Tariff which has been determined, approved or specified by it. The Authority is satisfied that the NTDC has endorsed the site and parameters of the project. Further, NTDC has also confirmed that the Interconnection and Transmission facilities for dispersal of power from C-4 are in advance stage of construction and will be available for transportation of electric power to National Grid, once it starts production.

(vi). The safety and environmental aspects for the Nuclear Power Plant are of real concerns for all the stakeholders. PAEC has confirmed the Authority that C-4 is being installed in accordance with the National and International Regulations/Standards/Criteria for Nuclear Power Plants including site selection, design, construction and commissioning. As explained at Para C(b) above, PNRA has given its nod for C-4 confirming that the preliminary design and safety features are acceptable. About the environmental aspects, PAEC has clarified that several technical and administrative procedure have been prepared as per National/International standards that ensure that all the radioactive effluents in the form of gases, liquids and solids will be kept well within the permissible limits as prescribed by the National/International regulatory bodies. The Authority considers that in view of the stringent regulations of the PNRA and the requirements of the Environment Protection Department, Govt. of the Punjab (which has also issued No Objection Certificate for the construction of C-4), the said agencies provide adequate guidelines for the maintenance of nuclear safety and environmental standards. The Authority directs PAEC to follow the

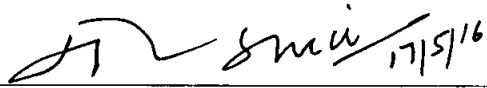


instructions, guidelines, relevant rules and regulations of the said agencies in letter and spirit. Further, the Authority also directs PAEC to submit a report on a bi-annual basis, confirming that operation of C-4 is compliant with required environmental standards as prescribed by the relevant authority.


(vii). In view of the above, the Authority hereby decides to approve the grant of Generation Licence to PAEC for C-4 on the terms and conditions set out in the Generation Licence annexed to this determination. The grant of Generation Licence will be subject to the provisions contained in the NEPRA Act, relevant rules, regulations framed there under and the other applicable documents.

Authority

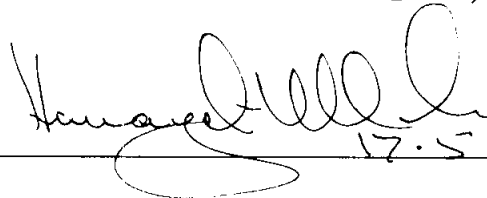
Maj. (R) Haroon Rashid
(Member)



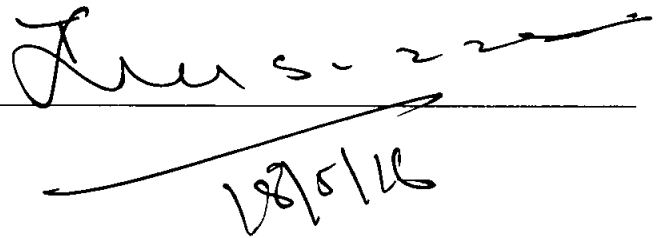
Syed Masood-ul-Hassan Naqvi
(Member)

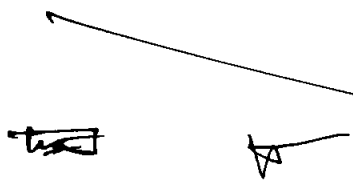


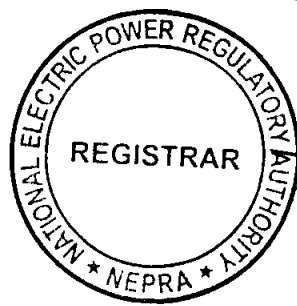
Himayat Ullah Khan
(Member)/(Vice Chairman)

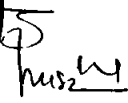


Brig. (R) Tariq Saddozai
(Chairman)








19.05.16

**National Electric Power Regulatory Authority
(NEPRA)
Islamabad – Pakistan**

GENERATION LICENCE

No. GL/25/2016

In exercise of the Powers conferred upon the National Electric Power Regulatory Authority (NEPRA) under Section-15 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997, the Authority hereby grants a Generation Licence to:

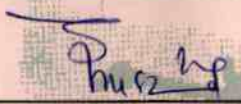
PAKISTAN ATOMIC ENERGY COMMISSION-PAEC

for its Chashma Nuclear Power Plant Unit-4 (CHASNUPP-4/C-4), located at Chashma, Tehsil Piplan, District Mianwali, in the Province of Punjab

(Installed Capacity: 340.00 MW Gross)

to engage in generation business subject to and in accordance with the Articles of this Licence.

Given under my hand this 19th day of May Two Thousand & Sixteen and expires on 29th day of June Two Thousand & Forty Seven.


Registrar 19.05.16

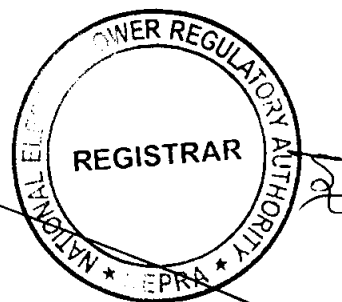




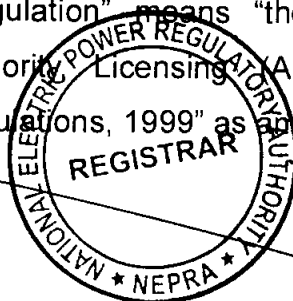
Article-1
Definitions

1.1 In this Licence

- (a). "Act" means "the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997";
- (b). "Applicable Documents" have the same meaning as defined in the Rules;
- (c). "Authority" means "the National Electric Power Regulatory Authority constituted under Section-3 of the Act";
- (d). "Bus Bar" means a system of conductors in the generation facility of the Licensee on which the electric power of all the generators is collected for supplying to the Power Purchaser;
- (e). "Commercial Operations Date (COD)" means the day immediately following the date on which the generation facility of the Licensee is commissioned;
- (f). "CPPA-G" means "Central Power Purchasing Agency (Guarantee) Limited" or any other entity created for the like purpose;
- (g). "Distribution Code" means the distribution code prepared by distribution company and approved by the Authority, as it may be revised from time to time with necessary approval of the Authority;



- (h). "Grid Code" means the grid code prepared by NTDC and approved by the Authority, as it may be revised from time to time by NTDC with necessary approval of the Authority;
- (i). "IEC" means International Electrotechnical Commission or any other entity created for the like purpose and its successors or permitted assigns;
- (j). "IEEE" means the Institute of Electrical and Electronics Engineers and its successors or permitted assigns;
- (k). "Law" means the Act, relevant rules and regulations made there under and all the Applicable Documents;
- (l). "Licensee" means "Pakistan Atomic Energy Commission-PAEC" and its successors or permitted assigns;
- (m). "NTDC" means National Transmission and Despatch Company Limited and its successors or permitted assigns;
- (n). "Power Purchase Agreement" means the power purchase agreement, entered or to be entered into by and between the Power Purchaser and the Licensee, for the purchase and sale of electric energy generated by the generation facility, as may be amended by the parties thereto from time to time;
- (o). "Power Purchaser" means the CPPA-G purchasing electric power on behalf of XW-DISCOs from the Licensee, pursuant to Power Purchase Agreement for procurement of electricity;
- (p). "Regulation" means "the National Electric Power Regulatory Authority Licensing (Application & Modification Procedure) Regulations, 1999" as amended or replaced from time to time;



- (q). "Rules" mean "the National Electric Power Regulatory Authority Licensing (Generation) Rules, 2000";
- (r). "XW DISCO" means "an Ex-WAPDA distribution company engaged in the distribution of electric power".

1.2 Words and expressions used but not defined herein bear the meaning given thereto in the Act or Rules and regulations issued under the Act.

Article-2 **Applicability of Law**

This Licence is issued subject to the provisions of the Law, as amended from time to time.

Article-3 **Generation Facilities**

3.1 The location, size (capacity in MW), technology, interconnection arrangements, technical limits, technical and functional specifications and other details specific to the generation facility of the Licensee are set out in Schedule-I of this Licence.

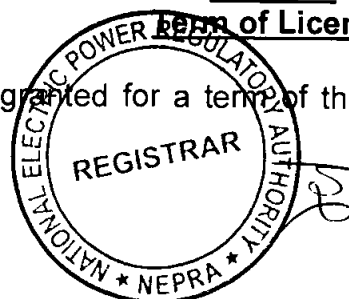
3.2 The net capacity of the generation facility of the Licensee is set out in Schedule-II hereto.

3.3 The Licensee shall provide the final arrangement, technical and financial specifications and other specific details pertaining to its generation facility before its COD.

Article-4

Term of Licence

4.1 The Licence is granted for a term of thirty (30) years from the COD of the generation facility.



4.2 Unless suspended or revoked earlier, the Licensee may apply for renewal of the Licence within ninety (90) days prior to the expiry of the term of the Licence, as stipulated in the Regulations.

Article-5
Licence fee

After the grant of the Generation Licence, the Licensee shall pay to the Authority the Licence fee, in the amount and manner and at the time set out in the National Electric Power Regulatory Authority (Fees) Rules, 2002.

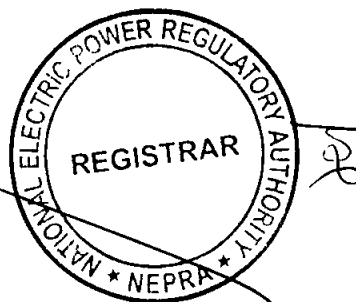
Article-6
Tariff

The Licensee shall charge only such tariff which has been determined, approved or specified by the Authority.

Article-7
Competitive Trading Arrangement

7.1 The Licensee shall participate in such manner as may be directed by the Authority from time to time for development of a Competitive Trading Arrangement. The Licensee shall in good faith work towards implementation and operation of the aforesaid Competitive Trading Arrangement in the manner and time period specified by the Authority. Provided that any such participation shall be subject to any contract entered into between the Licensee and another party with the approval of the Authority.

7.2 Any variation or modification in the above-mentioned contracts for allowing the parties thereto to participate wholly or partially in the Competitive Trading Arrangement shall be subject to mutual agreement of the parties thereto and such terms and conditions as may be approved by the Authority.



Article-8
Maintenance of Records

For the purpose of sub-rule (1) of Rule-19 of the Rules, copies of records and data shall be retained in standard and electronic form and all such records and data shall, subject to just claims of confidentiality, be accessible by authorized officers of the Authority.

Article-9
Compliance with Performance Standards

The Licensee shall comply with the relevant provisions of the National Electric Power Regulatory Authority Performance Standards (Generation) Rules 2009 as amended from time to time.

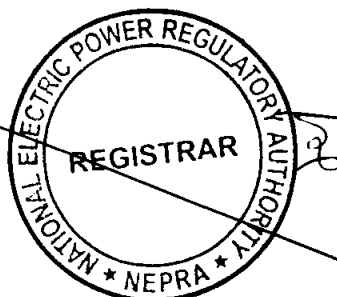
Article-10
Compliance with Environmental Standards

10.1 The Licensee at all times shall comply with the environmental standards as may be prescribed by the relevant competent authority as amended from time to time.

10.2 The Licensee shall provide a certificate on a bi-annual basis, confirming that the operation of its generation facility is in line with environmental standards as prescribed by the relevant competent authority.

Article-11
Power off take Point and Voltage

The Licensee shall deliver power to the Power Purchaser at the outgoing bus bar of its grid station. The up-gradation (step up) of generation voltage up to the required interconnection voltage level will be the responsibility of the Licensee.



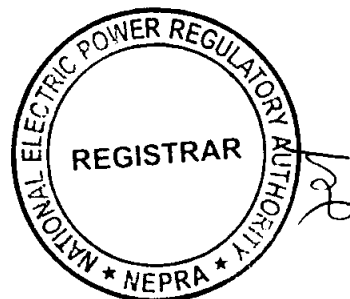
Article-12
Provision of Information

12.1 The obligation of the Licensee to provide information to the Authority shall be in accordance with Section-44 of the Act.

12.2 The Licensee shall be subject to such penalties as may be specified in the relevant rules made by the Authority for failure to furnish such information as may be required from time to time by the Authority and which is or ought to be or has been in the control or possession of the Licensee.

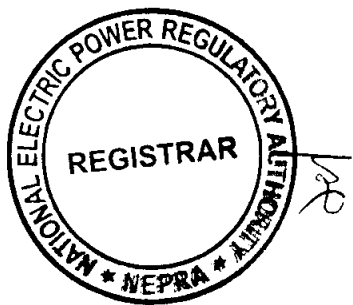
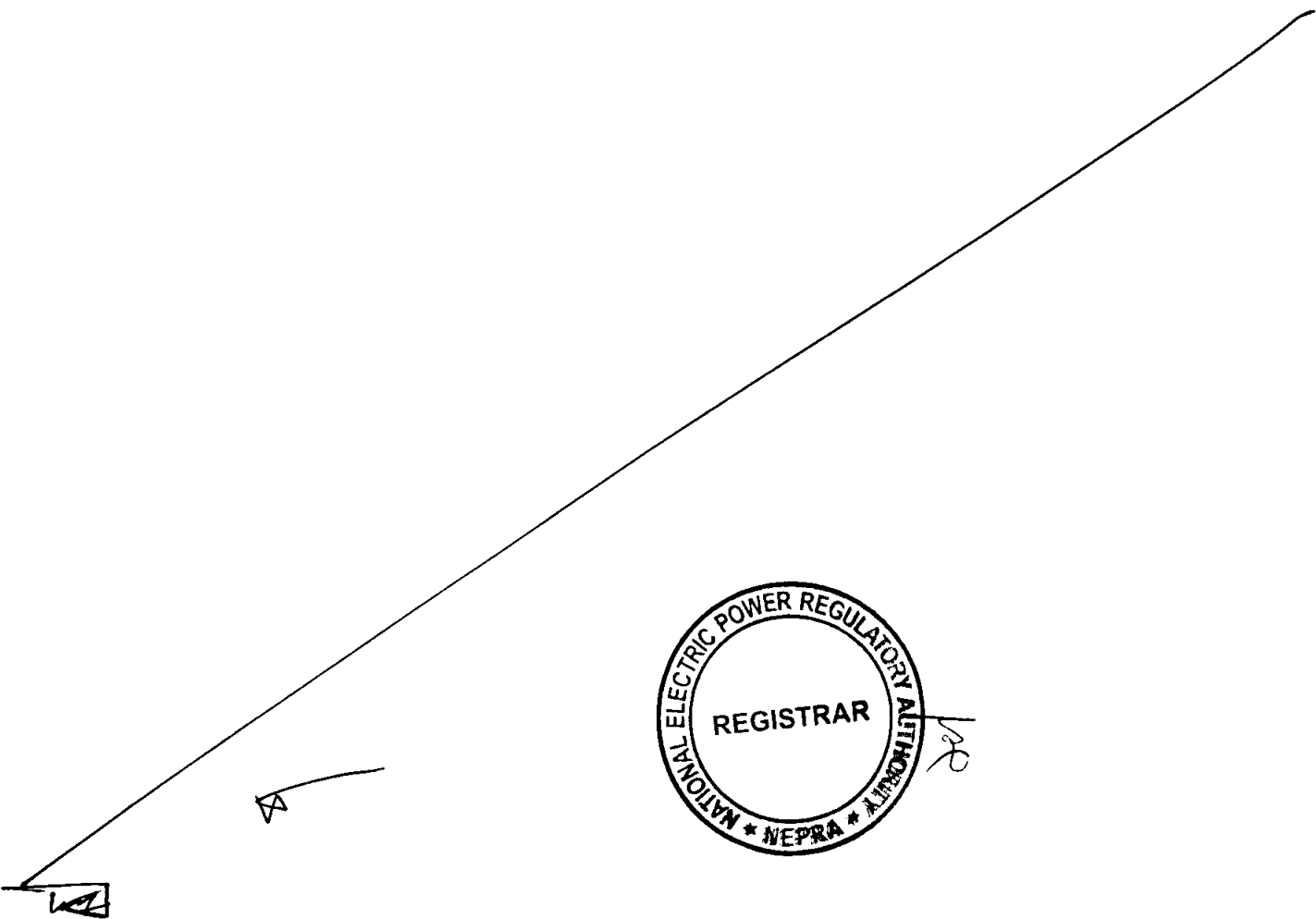
Article-13
Design & Manufacturing Standards

All the components of the generation facility shall be designed, manufactured and tested according to the latest IEC, IEEE or any other equivalent standards. All plant and equipment shall be unused and brand new.

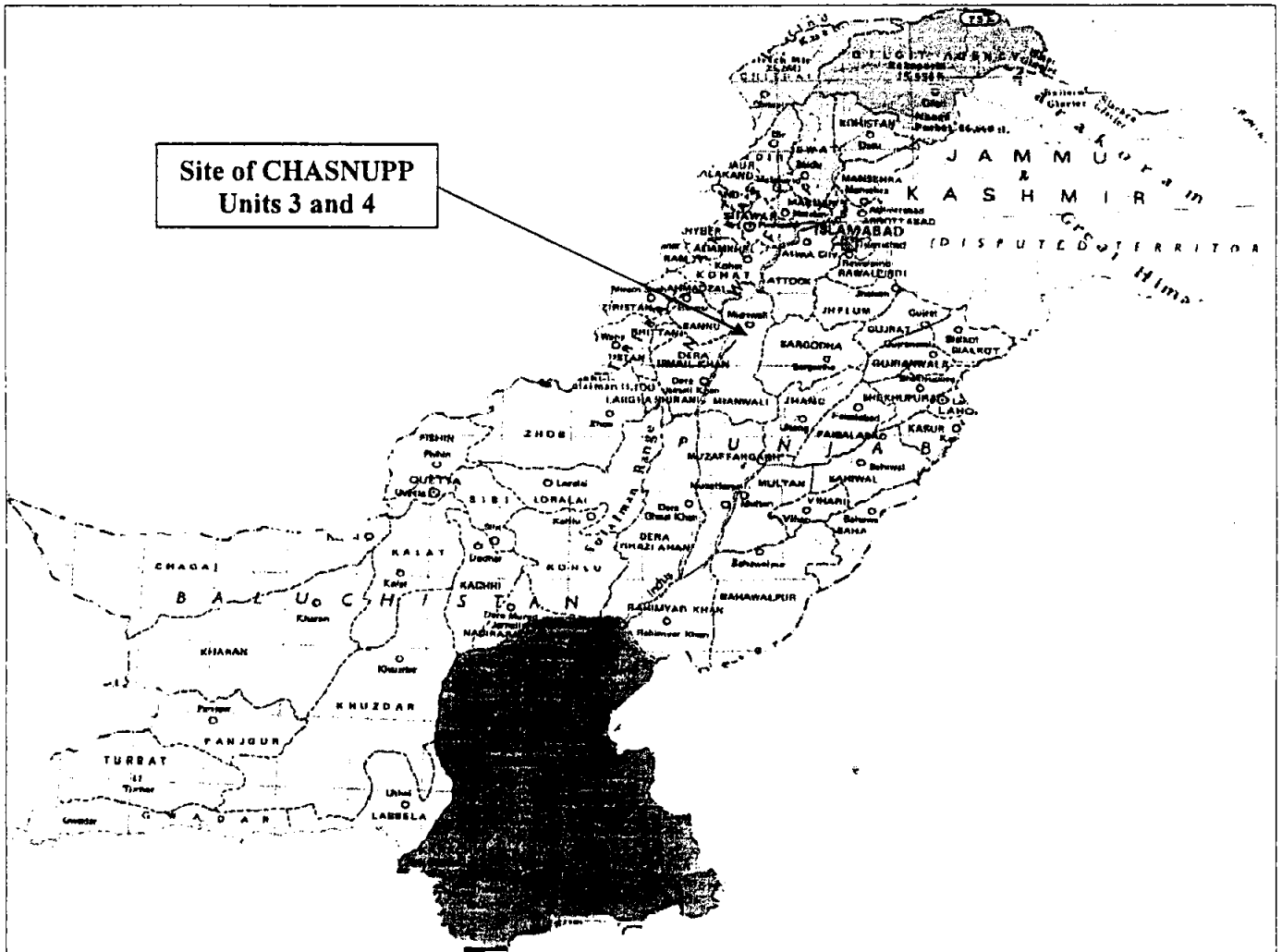


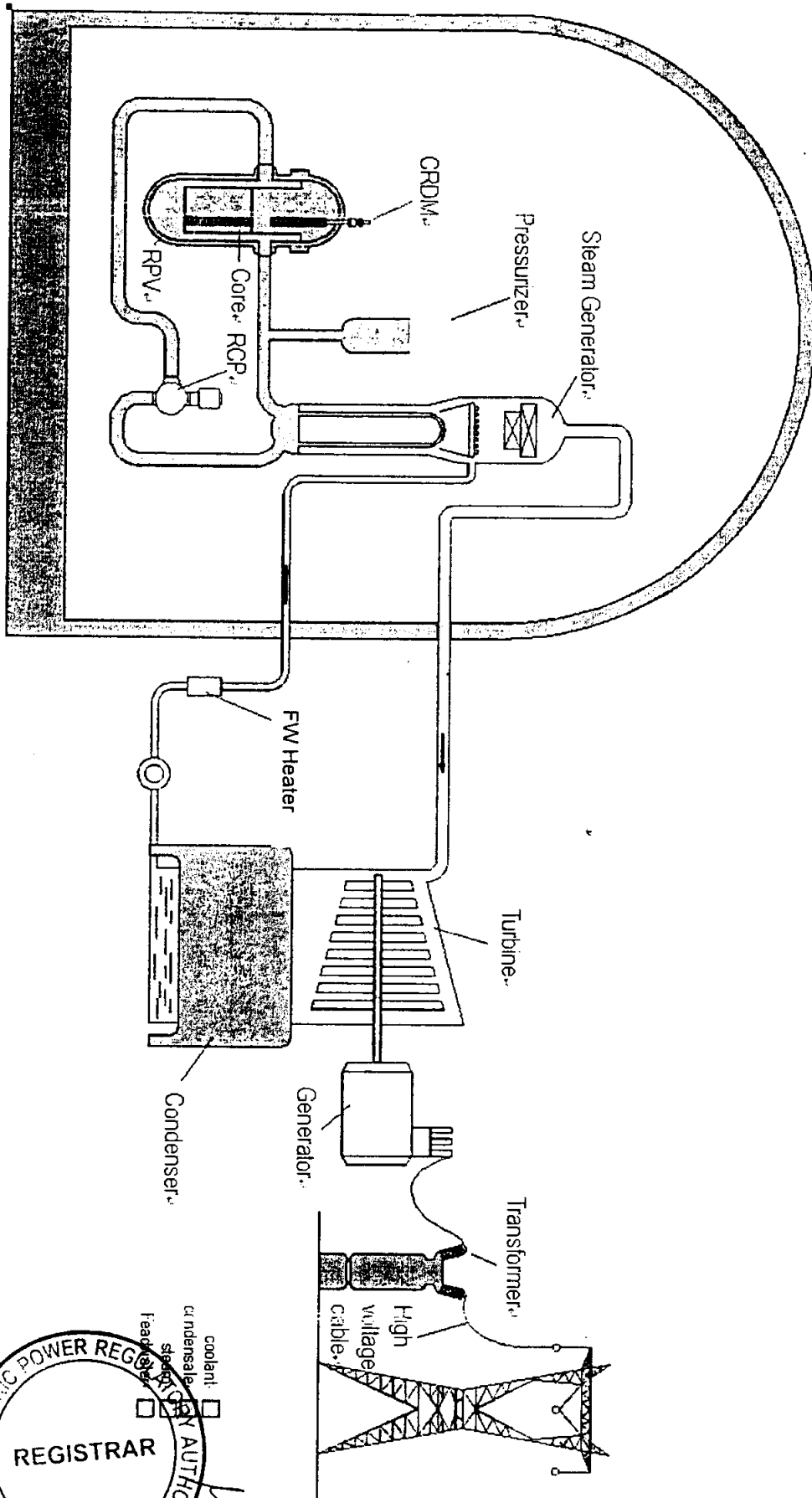
SCHEDULE-I

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



Generation Licence
Pakistan Atomic Energy Commission
for Chashma Nuclear Power Plant Unit-4
(CHASNUPP-4/C-4)
Located at Chashma, Tehsil Piplan
District Mianwali,
in the Province of Punjab

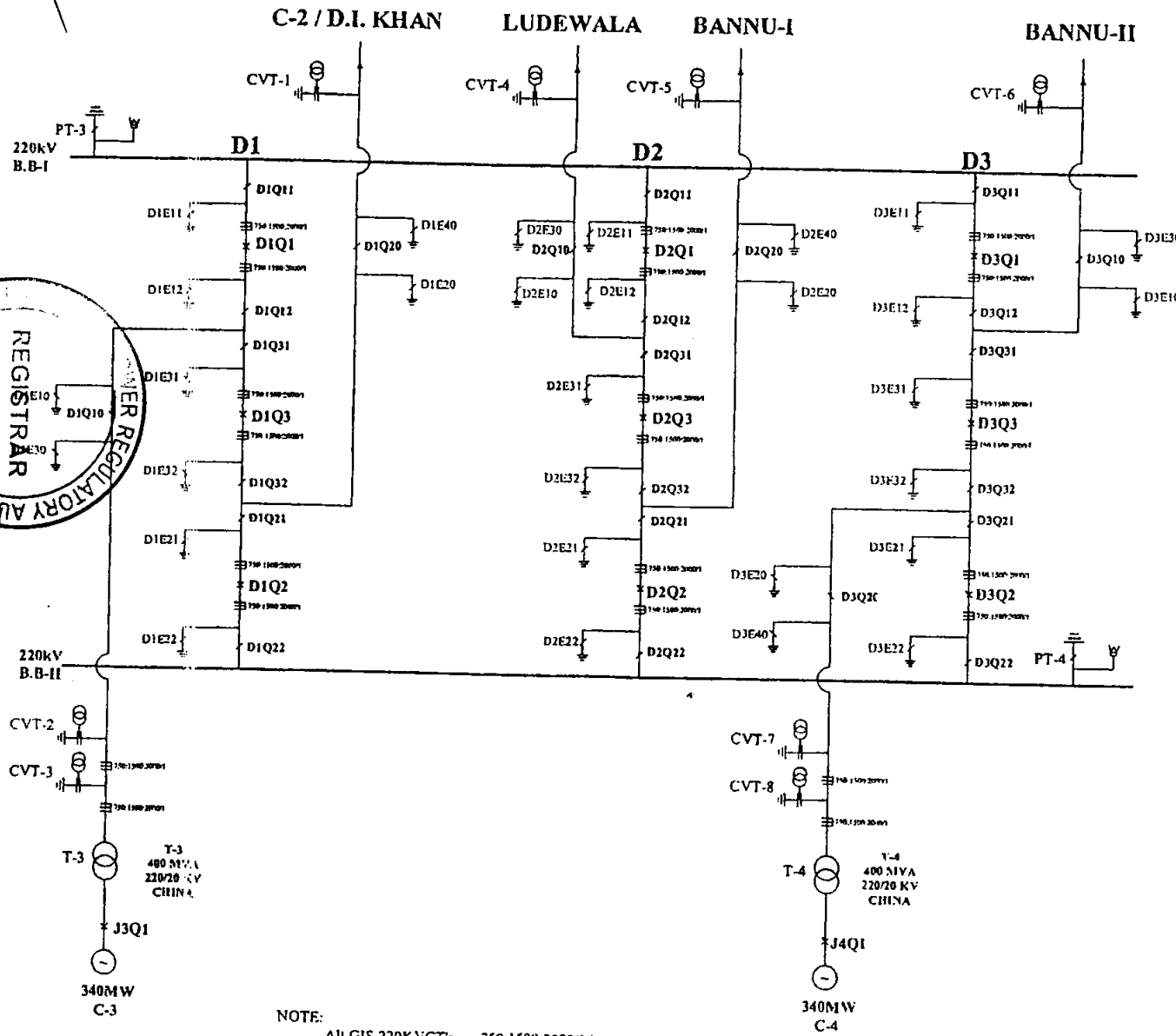




coolant
 condensate
 steam
 feed water

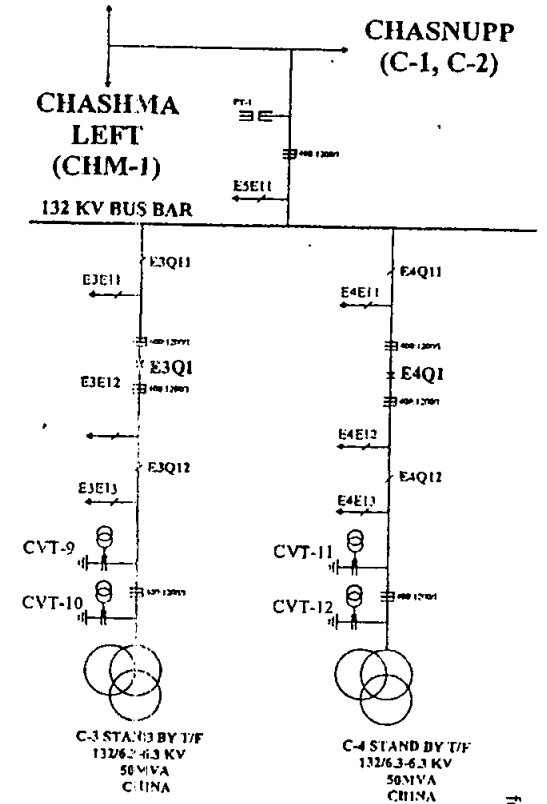
REGISTRAR
 NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
 NEPRA

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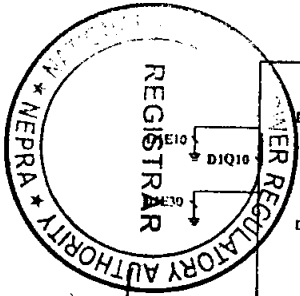


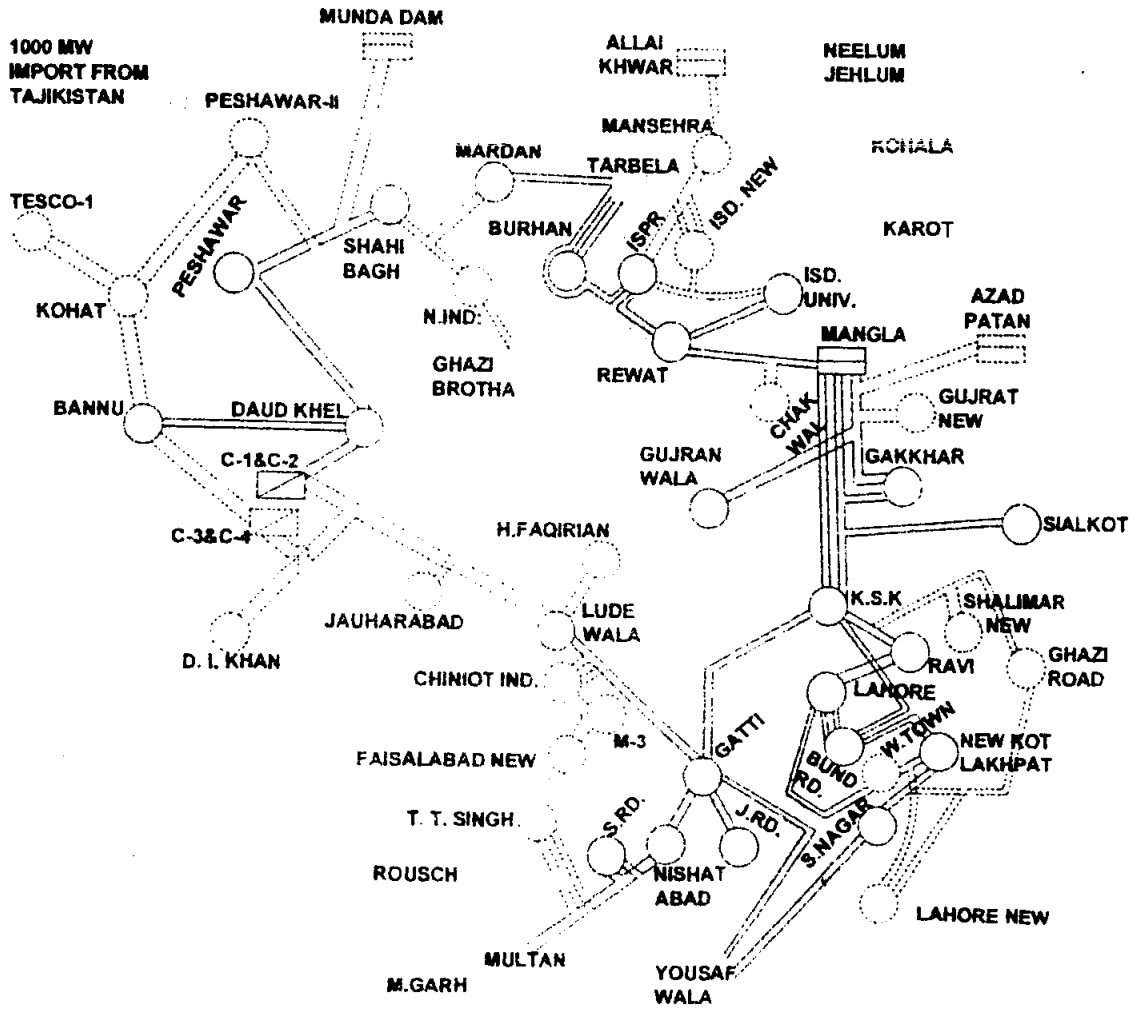
NOTE:
 All GIS 220KVCT's are 750:1500:2000/1A
 All GIS 132KVCT's are 400:1200/1A

WAN BACHIRAN
(WBC-6)

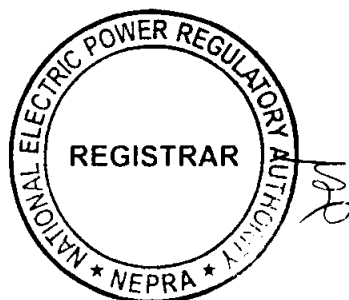


Generation Licence
 Pakistan Atomic Energy Commission
 for Chashma Nuclear Power Plant Unit-4
 (CHASNUPP-4/C-4)
 Located at Chashma, Tehsil Piprian
 District Mianwali,
 in the Province of Punjab





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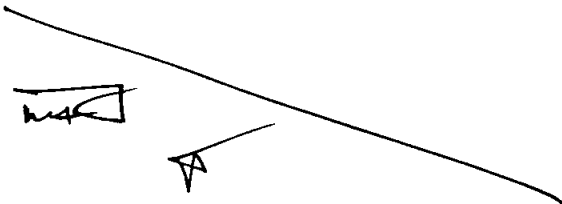
Interconnection Facilities/ Transmission Arrangements for Dispersal of Power from the Generation Facility

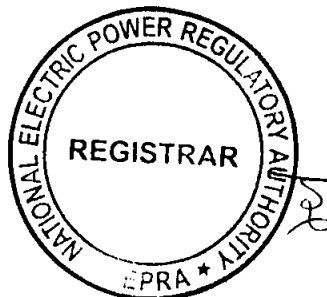
The electric power from the nuclear based generation facility/power plant (i.e. Chashma Nuclear Power Plant Unit-4/CHASNUPP-4/C-4) of the Licensee/Pakistan Atomic Energy Commission will be dispersed to the National Grid.

(2). The Interconnection Facilities (IF)/Transmission Arrangements (TA) for supplying to National Grid from the above mentioned generation facility shall be at 220 KV level. The IF/TA for supplying to National Grid will be consisting of the following:-

- (a). A 220 KV Double Circuit (D/C) transmission line (twin bundled Rail conductor, approx. 125 Km long from switch yard of CHASNUPP-3 & 4 to Bannu grid station;
- (b). A 220 KV Single Circuit (S/C) transmission line (twin bundled Rail conductor, approximately 110 KM) from the switchyard of CHASNUPP-3 & 4 to Ludewala grid station;
- (c). A 220 KV Single Circuit (S/C) transmission line (twin bundled Rail conductor, approx. 3Km from the switchyard of CHASNUPP-3 & 4 to adjacent switch yard/grid station of CHASNUPP-1 & 2.

(3). Any change in the above mentioned IF/TA for dispersal of electric power as agreed by the Licensee and the Power Purchaser shall be communicated to the Authority in due course of time.

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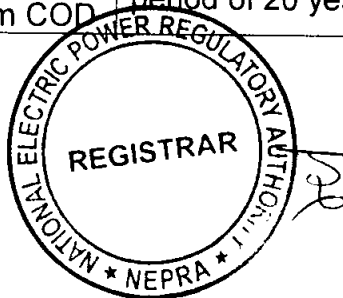
**Detail of
Generation Facility/
Power Plant**

(A). General Information

(i).	Name of Company/ Licensee	Pakistan Atomic Energy Commission (PAEC) for Chashma Nuclear Power Plant Unit-4 (C-4)
(ii).	Registered/Business Office	P.O. Box 3094, Islamabad
(iii).	Location of the Generation Facility/ Power Plant	Chashma, Tehsil Piplan, District Mianwali, in the Province of Punjab
(iv).	Type of Generation Facility/ Power Plant	Thermal Generation Facility/Nuclear Power Plant

(B). Configuration of Generation Facility

(i).	Installed Capacity/Size of the Generation Facility/ Power Plant	340 MW _e
(ii).	Type of Technology	Pressurized light water Nuclear Power Plant
(iii).	Number of Units/Size (MW)	1 x 340 MW _e (Steam Turbine)
(iv).	Unit Make & Model	People's Republic of China (P.R China)
(v).	Moderator	Light water
(vi).	No. of Loops	2
(vii).	COD of the Generation Facility/Power Plant (Anticipated)	June 30, 2017
(viii).	Expected Useful Life of the Generation Facility/ Power Plant from COD	Minimum 40 years (Extendible for another period of 20 years)



(C). Fuel/Raw Material Details

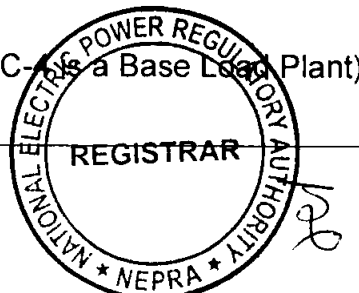
(i).	Primary Fuel	Slightly Enriched Uranium (UO ₂ 2.4% ~ 3%)
(ii).	Start-Up Fuel	Not Applicable (N/A)
(iii).	Fuel Source (Imported/Indigenous)	Imported
(iv).	Fuel Supplier for each of the above	China Nuclear Energy Industry Corporation, P.R. China
(v).	Supply Arrangement	China Nuclear Energy Industry Corporation, P.R. China
(vi).	Fuel Assemblies	121
(vii).	Fuel Storage	Racks are used for dry storage of fresh fuel assemblies
(viii).	Storage Capacity	48 fresh fuel assemblies can be stored in Storage Racks

(D). Cooling System

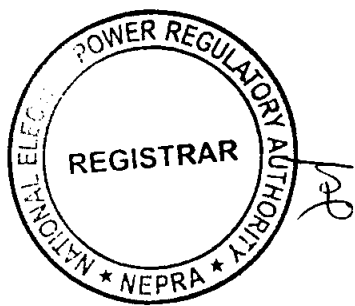
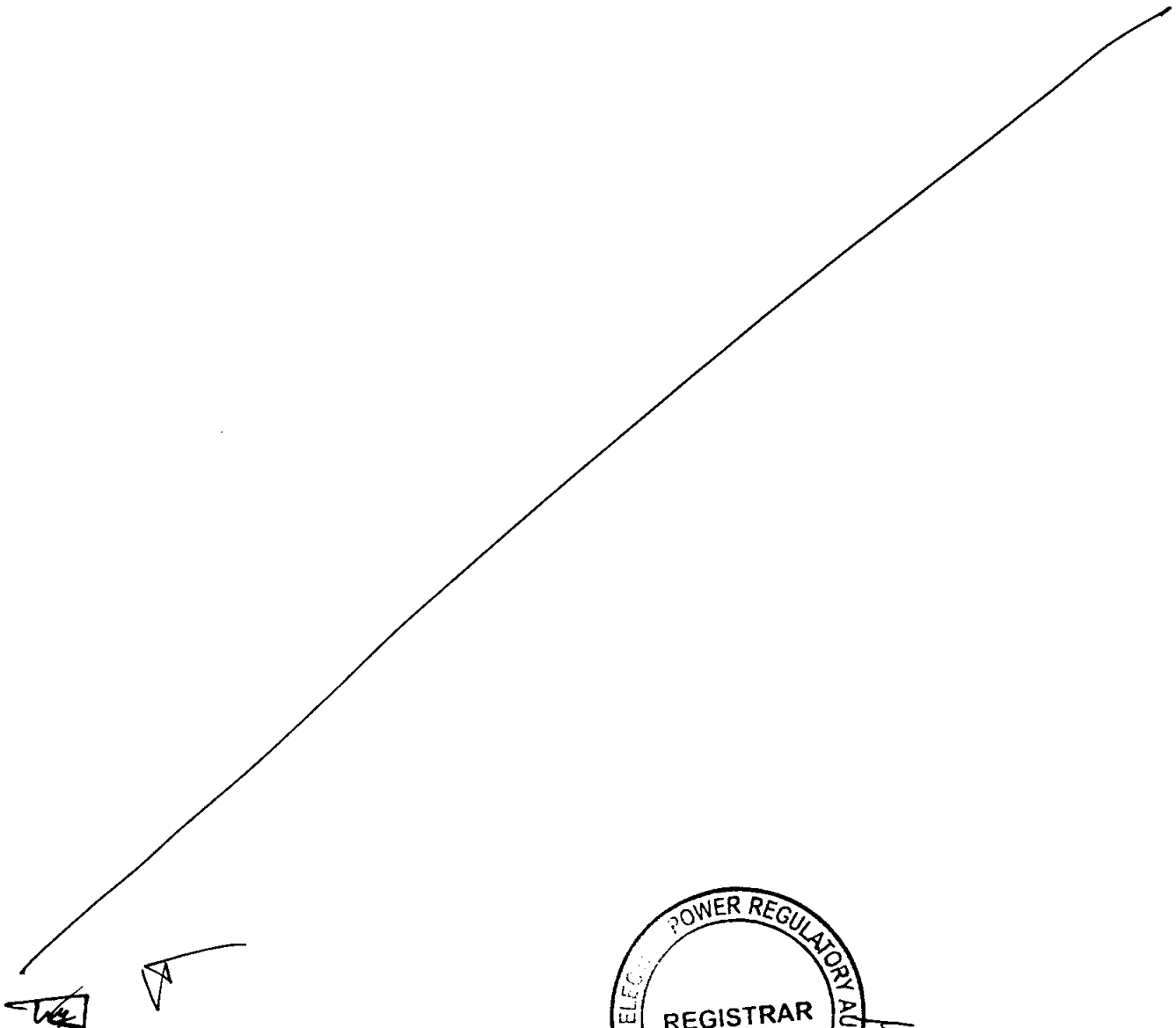
(i).	Cooling Water Source/Cycle	Chashma Jhelum Link Canal/Open Cycle
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(E). Plant Characteristics

(i).	Generation Voltage	20KV ±5%
(ii).	Frequency	49.5 Hz ~ 50.5 Hz
(iii).	Power Factor	0.85 (lagging)
(iv).	Automatic Generation Control (AGC)	No (C-4 is a Base Load Plant)

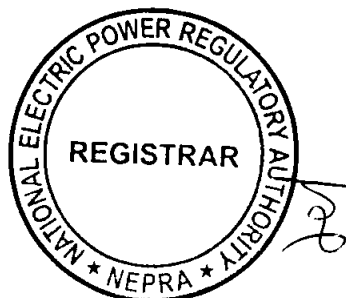


		Turbine Generator Load Range	Cold Start MW _e per minute	Hot Start MW _e per minute
(v).	Ramping Rate	5% ~ 50%	0.6 ~ 1	-
		50% ~ 100%	-	1 ~ 3
(vi).	Time required to Synchronize to Grid and loading the complex to full load.	6 hrs. (Approx.)		



SCHEDULE-II

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



SCHEDULE-II

(1).	Total Gross Installed Capacity of the Generation Facility/Power Plant	340.00 MW
(2).	De-rated Capacity of Generation Facility/Power Plant at Reference Site Conditions	340.00 MW
(3).	Auxiliary Consumption of the Generation Facility/Power Plant	030.00 MW
(4).	Total Installed Net Capacity of Generation Facility/Power Plant at Reference Site Conditions	310.00 MW

Note

All the above figures are indicative as provided by the Licensee. The Net Capacity available to Power Purchaser for dispatch will be determined through procedure(s) contained in the Power Purchase Agreement or any other applicable document(s).

