REPUBLIC OF THE PHILIPPINES
NATIONAL POWER CORPORATION
(Pambansang Korporasyon sa Elektrisidad)

BID DOCUMENTS

Name of Project	:	**UPGRADING OF ANNUNCIATOR, CONTROL AND PROTECTION SYSTEM OF UNIT 1 AT AGUS 4 HEP PLANT**
Project Location	:	**AGUS 4 HEP PLANT, BALO-I, LANAO DEL NORTE**
PR No.	:	**MG-A5M23-003**
Contents	:	

Design and Development Department

SECTION I

INVITATION TO BID

National Power Corporation
INVITATION TO BID
PUBLIC BIDDING – BCS 2023-0030

1. The NATIONAL POWER CORPORATION (NPC), through its approved Corporate Budget of CY 2023 intends to apply the sum of **(Please see schedule below)** being the Approved Budget for the Contract (ABC) to payments under the contract. Bids received in excess of the ABC shall be automatically rejected at Bid opening.

PR Nos./PB Ref No. & Description	Similar Contracts	Pre-bid Conference	Bid Submission / Opening	ABC/ Amt. of Bid Docs
HO-TFM22-091 / PB220705-HG00236 (PB2) Supply, Delivery, Installation, Test and Commissioning of 1 x 600kW Standby Power (Open Type) Diesel Generator Set and Associated Electrical Equipment for NPC Head Office	Supply, Delivery, Installation, Test and Commissioning or Construction of Power Facilities, Installation, Test and Commissioning of "Unit Diesel Generator" with generator capacity of at least 300kW Rated capacity	06 February 2023 9:30 A.M	20 February 2023 9:30 A.M	₱ 12,108,600.00 / ₱ 25,000.00
MG-A5M23-003 / PB230220-HG00019 Upgrading of Annunciator, Control and Protection System of Unit 1 at Agus 4 HEP Plant	Supply, Delivery, Installation, Testing and Commissioning of Distributed Control System (DCS) or any components of DCS for Hydro Electric Power Plant	06 February 2023 9:30 A.M	20 February 2023 9:30 A.M	₱ 35,000,000.00 / ₱ 25,000.00
Venue: Kañao Function Room, NPC Bldg. Diliman, Quezon City				

2. The NPC now invites bids for Items listed above. Delivery of the Goods is required **(see table below)** specified in the Technical Specifications. Bidders should have completed, within **(see table below)** from the date of submission and receipt of bids, a contract similar to the Project. The description of an eligible bidder is contained in the Bidding Documents, particularly, in Section II. (Instruction to Bidders).

PR No/s. / PB Ref No/s.	Delivery Period / Contract Duration	Relevant Period of SLCC reckoned from the date of submission & receipt of bids
HO-TFM22-091	One Hundred Eighty (180) Calendar Days	Fifteen (15) Years
MG-A5M23-003	One Hundred Eighty (180) Calendar Days	Fifteen (15) Years

3. Bidding will be conducted through open competitive bidding procedures using a non-discretionary "*pass/fail*" criterion as specified in the 2016 revised Implementing Rules and Regulations (IRR) of Republic Act (RA) No. 9184.

   Bidding is restricted to Filipino citizens/sole proprietorships, partnerships, or organizations with at least sixty percent (60%) interest or outstanding capital stock belonging to citizens of the Philippines, and to citizens or organizations of a country the laws or regulations of which grant similar rights or privileges to Filipino citizens, pursuant to RA 5183.

4. Prospective Bidders may obtain further information from National Power Corporation, Bids and Contracts Services Division and inspect the Bidding Documents at the address given below during office hours (8:00AM to 5:00PM), Monday to Friday.

5. A complete set of Bidding Documents may be acquired by interested Bidders from the given address and website(s) and upon payment of the applicable fee for the Bidding Documents, pursuant to the latest Guidelines issued by the GPPB. *Bidding fee may be refunded in accordance with the guidelines based on the grounds provided under Section 41 of R.A. 9184 and its Revised IRR.*

6. The National Power Corporation will hold Pre-Bid Conference **(see table above)** and/or through video conferencing or webcasting which shall be open to prospective bidders.

   Only registered bidder/s shall be allowed to participate for the conduct of virtual pre-bid conference. **Unregistered bidders** may attend the Pre-Bid Conference at the Kañao Room, NPC subject to the following:

   a. Only a maximum of two (2) representatives from each bidder / company shall be allowed to participate during the virtual pre-bid conference.
   b. A "No Face mask / No Entry" policy shall be implemented in the NPC premises. Face mask shall be 3-ply surgical or KN95 mask type.
   c. The requirements herein stated including the medium of submission shall be subject to GPPB Resolution No. 09-2020 dated 07 May 2020
   d. The Guidelines on the Implementation of Early Procurement Activities (EPA) shall be subject to GPPB Circular No. 06-2019 dated 17 July 2019

7. Bids must be duly received by the BAC Secretariat through (i) manual submission at the office address indicated below; (ii) online or electronic submission before the specified time stated in the table above for opening of bids. Late bids shall not be accepted.

8. All Bids must be accompanied by a bid security in any of the acceptable forms and in the amount stated in **ITB** Clause 14.

9. Bid opening shall be on Kañao Function Room, NPC Head Office, Diliman, Quezon City and/or via online platform to be announced by NPC. Bids will be opened in the presence of the bidders' representatives who choose to attend the activity.

10. The National Power Corporation reserves the right to reject any and all bids, declare a failure of bidding, or not award the contract at any time prior to contract award in accordance with Sections 35.6 and 41 of the 2016 revised IRR of R.A. No. 9184, without thereby incurring any liability to the affected bidder or bidders.

11. For further information, please refer to:

Bids and Contracts Services Division,
Logistics Department

BIR Road cor. Quezon Avenue
Diliman, Quezon City
Tel Nos.: 8924-5211 and 8921-3541 local 5564/5211
Fax No.: 8922-1622
Email: bcsd@napocor.gov.ph /

12. You may visit the following websites:

For downloading of Bidding Documents: https://www.napocor.gov.ph/bcsd/bids.php

RENE B. BARRUELA
Vice President, Corporate Affairs Group and
Chairman, Bids and Awards Committee

SECTION II

INSTRUCTIONS TO BIDDERS

SECTION II – INSTRUCTIONS TO BIDDERS

TABLE OF CONTENTS

SECTION II – INSTRUCTIONS TO BIDDERS

1. Scope of Bid

The **National Power Corporation (NPC** or **NAPOCOR)** wishes to receive Bids for the **UPGRADING OF ANNUNCIATOR, CONTROL AND PROTECTION SYSTEM OF UNIT NO. 1 AT AGUS 4 HEP PLANT,** with identification number **PR NO. MG-A5M23-003.**

The Procurement Project (referred to herein as "Project") is composed of one (1) lot and will be awarded to one (1) Bidder in one complete contract, the details of which are described in Section VII (Technical Specifications).

2. Funding Information

2.1. The GOP through the source of funding as indicated below for CY 2022 in the amount of **₱ 35,000,000.00.**

2.2. The source of funding is the Corporate Operating Budget of the National Power Corporation.

3. Bidding Requirements

The Bidding for the Project shall be governed by all the provisions of RA No. 9184 and its 2016 revised IRR, including its Generic Procurement Manuals and associated policies, rules and regulations as the primary source thereof, while the herein clauses shall serve as the secondary source thereof.

Any amendments made to the IRR and other GPPB issuances shall be applicable only to the ongoing posting, advertisement, or **IB** by the BAC through the issuance of a supplemental or bid bulletin.

The Bidder, by the act of submitting its Bid, shall be deemed to have verified and accepted the general requirements of this Project, including other factors that may affect the cost, duration and execution or implementation of the contract, project, or work and examine all instructions, forms, terms, and project requirements in the Bidding Documents.

4. Corrupt, Fraudulent, Collusive, and Coercive Practices

The Procuring Entity, as well as the Bidders and Suppliers, shall observe the highest standard of ethics during the procurement and execution of the contract. They or through an agent shall not engage in corrupt, fraudulent, collusive, coercive, and obstructive practices defined under Annex "I" of the 2016 revised IRR of RA No. 9184 or other integrity violations in competing for the Project.

5. Eligible Bidders

5.1. Only Bids of Bidders found to be legally, technically, and financially capable will be evaluated.

5.2. Foreign ownership exceeding those allowed under the rules may participate when citizens, corporations, or associations of a country, included in the list issued by the GPPB, the laws or regulations of which grant reciprocal rights or privileges to citizens, corporations, or associations of the Philippines.

The foreign bidder claiming eligibility by reason of their country's extension of reciprocal rights to Filipinos shall submit a certification from the relevant government office of their country stating that Filipinos are allowed to participate in their government procurement activities for the same item/product. The said certification shall be validated during the post-qualification of bidders.

5.3. Pursuant to Section 23.4.1.3 of the 2016 revised IRR of RA No.9184, the Bidder shall have an SLCC that is at least one (1) contract similar to the Project the value of which, adjusted to current prices using the PSA's CPI, must be at least equivalent to at least fifty percent (50%) of the ABC.

5.4. The Bidders shall comply with the eligibility criteria under Section 23.4.1 of the 2016 IRR of RA No. 9184.

6. Origin of Goods

There is no restriction on the origin of goods other than those prohibited by a decision of the UN Security Council taken under Chapter VII of the Charter of the UN, subject to Domestic Preference requirements under **ITB** Clause 18.

7. Subcontracts

7.1. The Bidder may subcontract portions of the Project to the extent allowed by the Procuring Entity as stated herein, but in no case more than twenty percent (20%) of the Project.

The portions of Project and the maximum percentage allowed to be subcontracted are indicated in the **BDS**, which shall not exceed twenty percent (20%) of the contracted Goods.

7.2. The Supplier may identify its subcontractor during the contract implementation stage. Subcontractors identified during the bidding may be changed during the implementation of this Contract. Subcontractors must submit the documentary requirements under Section 23.1 of the 2016 revised IRR of RA No. 9184 and comply with the eligibility criteria specified in **ITB** Clause 5 to the implementing or end-user unit.

7.3. Subcontracting of any portion of the Project does not relieve the Supplier of any liability or obligation under the Contract. The Supplier will be responsible for the acts, defaults, and negligence of any subcontractor, its agents, servants, or workmen as fully as if these were the Supplier's own acts, defaults, or negligence, or those of its agents, servants, or workmen.

8. Pre-Bid Conference

The Procuring Entity will hold a pre-bid conference for this Project on the specified date and time and either at its physical address and/or through videoconferencing/webcasting as indicated in paragraph 6 of the **IB.**

9. Clarification and Amendment of Bidding Documents

Prospective bidders may request for clarification on and/or interpretation of any part of the Bidding Documents. Such requests must be in writing and received by the Procuring Entity, either at its given address or through electronic mail indicated in the **IB**, at least ten (10) calendar days before the deadline set for the submission and receipt of Bids.

10. Documents comprising the Bid: Eligibility and Technical Components

10.1. The first envelope shall contain the eligibility and technical documents of the Bid as specified in Section VIII (NPCSF-GOODS-01 - Checklist of Technical and Financial Documents).

10.2. The Bidder's SLCC as indicated in **ITB** Clause 5.3 should have been completed within Fifteen (15) Years prior to the deadline for the submission and receipt of bids.

10.3. If the eligibility requirements or statements, the bids, and all other documents for submission to the BAC are in foreign language other than English, it must be accompanied by a translation in English, which shall be authenticated by the appropriate Philippine foreign service establishment, post, or the equivalent office having jurisdiction over the foreign bidder's affairs in the Philippines. Similar to the required authentication above, for Contracting Parties to the Apostille Convention, only the translated documents shall be authenticated through an apostille pursuant to GPPB Resolution No. 13-2019 dated 23 May 2019. The English translation shall govern, for purposes of interpretation of the bid.

10.4. The Statement of the bidder's Single Largest Completed Contract (SLCC) (NPCSF-GOODS-03) and List of all Ongoing Government & Private Contracts Including Contracts Awarded but not yet Started (NPCSF-GOODS-02) shall comply with the documentary requirements specified in the **BDS.**

11. Documents comprising the Bid: Financial Component

11.1. The second bid envelope shall contain the financial documents for the Bid as specified in Section VIII (NPCSF-GOODS-01 - Checklist of Technical and Financial Documents).

11.2. If the Bidder claims preference as a Domestic Bidder or Domestic Entity, a certification issued by DTI shall be provided by the Bidder in accordance with Section 43.1.3 of the 2016 revised IRR of RA No. 9184.

11.3. Any bid exceeding the ABC indicated in paragraph 1 of the **IB** shall not be accepted.

11.4. For Foreign-funded Procurement, a ceiling may be applied to bid prices provided the conditions are met under Section 31.2 of the 2016 revised IRR of RA No. 9184.

12. Bid Prices

12.1. Prices indicated on the Price Schedule shall be entered separately in the following manner:

a. For Goods offered from within the Procuring Entity's country:
   i. The price of the Goods quoted EXW (ex-works, ex-factory, ex-warehouse, ex-showroom, or off-the-shelf, as applicable);

   ii. The cost of all customs duties and sales and other taxes already paid or payable;

   iii. The cost of transportation, insurance, and other costs incidental to delivery of the Goods to their final destination; and

   iv. The price of other (incidental) services, if any, listed in the **BDS.**

b. For Goods offered from abroad:

   i. Unless otherwise stated in the **BDS**, the price of the Goods shall be quoted delivered duty paid (DDP) with the place of destination in the Philippines as specified in the **BDS**. In quoting the price, the Bidder shall be free to use transportation through carriers registered in any eligible country. Similarly, the Bidder may obtain insurance services from any eligible source country.

   ii. The price of other (incidental) services, if any, as listed in the **BDS.**

13. Bid and Payment Currencies

13.1. For Goods that the Bidder will supply from outside the Philippines, the bid prices may be quoted in the local currency or tradeable currency accepted by the BSP at the discretion of the Bidder. However, for purposes of bid evaluation, Bids denominated in foreign currencies, shall be converted to Philippine currency based on the exchange rate as published in the BSP reference rate bulletin on the day of the bid opening.

13.2. Payment of the contract price shall be made in Philippine Pesos.

14. Bid Security

14.1. The Bidder shall submit a Bid Securing Declaration or any form of Bid Security in the amount indicated in the **BDS**, which shall be not less than the percentage of the ABC in accordance with the schedule in the **BDS**.

14.2. The Bid and bid security shall be valid for **One Hundred Twenty (120) calendar** days from the date of opening of bids. Any Bid not accompanied by an acceptable bid security shall be rejected by the Procuring Entity as non-responsive.

15. Sealing and Marking of Bids

Each Bidder shall submit one copy of the first and second components of its Bid.

The Procuring Entity may request additional hard copies and/or electronic copies of the Bid. However, failure of the Bidders to comply with the said request shall not be a ground for disqualification.

If the Procuring Entity allows the submission of bids through online submission or any other electronic means, the Bidder shall submit an electronic copy of its Bid, which must be digitally signed. An electronic copy that cannot be opened or is corrupted shall be considered non-responsive and, thus, automatically disqualified.

16. Deadline for Submission of Bids

16.1. The Bidders shall submit on the specified date and time and either at its physical address or through online submission as indicated in paragraph 7 of the **IB.**

17. Opening and Preliminary Examination of Bids

17.1. The BAC shall open the Bids in public at the time, on the date, and at the place specified in paragraph 9 of the **IB.** The Bidders' representatives who are present shall sign a register evidencing their attendance. In case videoconferencing, webcasting or other similar technologies will be used, attendance of participants shall likewise be recorded by the BAC Secretariat.

In case the Bids cannot be opened as scheduled due to justifiable reasons, the rescheduling requirements under Section 29 of the 2016 revised IRR of RA No. 9184 shall prevail.

17.2. The preliminary examination of bids shall be governed by Section 30 of the 2016 revised IRR of RA No. 9184.

18. Domestic Preference

18.1. The Procuring Entity will grant a margin of preference for the purpose of comparison of Bids in accordance with Section 43.1.2 of the 2016 revised IRR of RA No. 9184.

19. Detailed Evaluation and Comparison of Bids

19.1. The Procuring Entity's BAC shall immediately conduct a detailed evaluation of all Bids rated "*passed*," using non-discretionary pass/fail criteria. The BAC shall consider the conditions in the evaluation of Bids under Section 32.2 of the 2016 revised IRR of RA No. 9184.

19.2. If the Project allows partial bids, bidders may submit a proposal on any of the lots or items, and evaluation will be undertaken on a per lot or item basis, as the case maybe. In this case, the Bid Security as required by **ITB** Clause 14 shall be submitted for each lot or item separately.

19.3. The descriptions of the lots or items shall be indicated in **Section VII (Technical Specifications)**, although the ABCs of these lots or items are indicated in the **BDS** for purposes of the NFCC computation pursuant to Section 23.4.2.6 of the 2016 revised IRR of RA No. 9184. The NFCC must be sufficient for the total of the ABCs for all the lots or items participated in by the prospective Bidder.

19.4. The Project shall be awarded to one (1) Bidder in one complete contract.

19.5. Except for bidders submitting a committed Line of Credit from a Universal or Commercial Bank in lieu of its NFCC computation, all Bids must include the NFCC computation pursuant to Section 23.4.1.4 of the 2016 revised IRR of RA

No. 9184, which must be sufficient for the total of the ABCs for all the lots or items participated in by the prospective Bidder. For bidders submitting the committed Line of Credit, it must be at least equal to ten percent (10%) of the ABCs for all the lots or items participated in by the prospective Bidder.

20. Post-Qualification

20.1. Within a non-extendible period of five (5) calendar days from receipt by the Bidder of the notice from the BAC that it submitted the Lowest Calculated Bid, the Bidder shall submit its latest income and business tax returns filed and paid through the BIR Electronic Filing and Payment System (eFPS) and other appropriate licenses and permits required by law and stated in the **BDS**.

21. Signing of the Contract

21.1. The documents required in Section 37.2 of the 2016 revised IRR of RA No. 9184 shall form part of the Contract. Additional Contract documents are indicated in the **BDS**.

SECTION III

BID DATA SHEET

SECTION III - BID DATA SHEET

ITB Clause	
5.3	For this purpose, similar contracts shall refer to supply, delivery, installation, testing and commisioning of Distributed Control System (DCS) or any components of DCS for Hydro Electric Power Plant. The Single Largest Completed Contract (SLCC) as declared by the bidder shall be verified and validated to ascertain such completed contract. Hence, bidders must ensure access to sites of such projects/equipment to NPC representatives for verification and validation purposes during post-qualification process. It shall be a ground for disqualification, if verification and validation cannot be conducted for reasons attributable to the Bidder.
7.1	Subcontracting may be allowed on transport, local/non-skilled labor under the supervision of the Bidder. The Bidder shall not be relieved from any liability or obligation that may arise from the performance of the Subcontractor.
10.4	The list of on-going contracts (Form No. NPCSF-GOODS-02) shall be supported by the following documents for each on-going contract to be submitted during **Post-Qualification:** 1. Contract/Purchase Order and/or Notice of Award 2. Certification coming from the project owner/client that the performance is satisfactory as of the bidding date The bidder shall declare in this form all his on-going government and private contracts including contracts where the bidder (either as individual or as a Joint Venture) is a partner in a Joint Venture agreement other than his current joint venture where he is a partner. Non declaration will be a ground for disqualification of bid.
	The Statement of the bidder's Single Largest Completed Contract (SLCC) similar to the contract to be bid (Form No. NPCSF-GOODS-03) shall be supported by the following documents to be submitted during **Bid Opening:** 1. Contract/Purchase Order 2. Certificate of Acceptance; or Certificate of Completion; or Official Receipt (O.R); or Sales Invoice
	Any single bidder/s who already procured/secured the bidding documents but want to avail the Joint Venture Agreement (JVA) shall inform the BAC in writing prior to the bid opening for records and documentation purposes.

10.5	Bidders shall also submit the following requirements in their first envelope, Eligibility and Technical Component of their bid: 1. Data and Information to be submitted with the Proposal as specified in Clause TS-9.0(a) of Section VI - Technical Specifications; 2. Complete eligibility documents of the proposed sub-contractor, if any
12	The price of the Goods shall be quoted DDP Project Site or the applicable International Commercial Terms (INCOTERMS) for this Project.
14.1	The bid security shall be in the form of a Bid Securing Declaration, or any of the following forms and amounts: a) The amount of not less two percent (2%) of ABC, if bid security is in cash, cashier's/manager's check, bank draft/guarantee or irrevocable letter of credit; or b) The amount of not less than five percent (5%) of ABC, if bid security is in Surety Bond.
19.3	The Goods are grouped together in one (1) lot and will be awarded to one (1) Bidder in one complete contract. Partial bid is not allowed. The Goods are grouped in a single lot and the lot shall not be divided into sub-lots for the purpose of bidding, evaluation, and contract award. The Bidders bid offer must be within the ABC of the lot. Bid offers that exceed the ABC of the lot or with incomplete price, shall be rejected.
19.5	If the Bidder opted to submit a Committed Line of Credit (CLC), the bidder must submit a granted credit line valid/effective at the date of bidding.
20.1	Additional documents to be submitted during Post-Qualification: a. Contract/Purchase Order and/or Notice of Award for the contracts stated in the List of all Ongoing Government & Private Contracts Including Contracts Awarded but not yet Started (NPCSF-GOODS-02); b. Certification coming from the project owner/client that the performance is satisfactory as of the bidding date for all ongoing contracts stated in Form NPCSF-GOODS-02; c. Documents to be submitted during post-qualification process as specified in TS-9.0(b) of Section VI-Technical Specifications Manufacturer's brochures, manuals and other supporting documents of equipment, materials, hardware and tools proposed by the bidders must comply with the technical specifications of such equipment, materials, hardware and tools. It shall be a ground for disqualification if the submitted brochures, manuals and other supporting documents are determined not

	complying with the specifications during technical evaluation and post-qualification process. Equipment, materials, hardware and tools proposed by the winning bidder to be supplied, which were evaluated to be complying with the technical specifications, shall not be replaced and must be the same items to be delivered/installed/used during the contract implementation. Any proposed changes/replacement of said items may be allowed on meritorious reasons subject to validation and prior approval by NPC.
20.2	The licenses and permits relevant to the Project and the corresponding law requiring it as specified in the Technical Specifications, if any.
21.2	Notice to Proceed.

SECTION IV

GENERAL CONDITIONS OF CONTRACT

SECTION IV – GENERAL CONDITIONS OF CONTRACT

1. Scope of Contract

This Contract shall include all such items, although not specifically mentioned, that can be reasonably inferred as being required for its completion as if such items were expressly mentioned herein. All the provisions of RA No. 9184 and its 2016 revised IRR, including the Generic Procurement Manual, and associated issuances, constitute the primary source for the terms and conditions of the Contract, and thus, applicable in contract implementation. Herein clauses shall serve as the secondary source for the terms and conditions of the Contract.

This is without prejudice to Sections 74.1 and 74.2 of the 2016 revised IRR of RA No. 9184 allowing the GPPB to amend the IRR, which shall be applied to all procurement activities, the advertisement, posting, or invitation of which were issued after the effectivity of the said amendment.

Additional requirements for the completion of this Contract shall be provided in the **Special Conditions of Contract (SCC).**

2. Advance Payment and Terms of Payment

2.1. Advance payment of the contract amount is provided under Annex "D" of the revised 2016 IRR of RA No. 9184.

2.2. The Procuring Entity is allowed to determine the terms of payment on the partial or staggered delivery of the Goods procured, provided such partial payment shall correspond to the value of the goods delivered and accepted in accordance with prevailing accounting and auditing rules and regulations. The terms of payment are indicated in the **SCC**.

3. Performance Security

3.1. Within ten (10) calendar days from receipt of the Notice of Award by the Bidder from the Procuring Entity but in no case later than the signing of the Contract by both parties, the successful Bidder shall furnish the performance security in any of the forms prescribed in Section 39 of the 2016 revised IRR of RA No. 9184.

3.2. The performance bond to be posted by the Contractor must also comply with additional requirements specified in the **SCC.**

4. Inspection and Tests

The Procuring Entity or its representative shall have the right to inspect and/or to test the Goods to confirm their conformity to the Project specifications at no extra cost to the Procuring Entity in accordance with the Generic Procurement Manual. In addition to tests in the **SCC**, **Section VII (Technical Specifications)** shall specify what inspections and/or tests the Procuring Entity requires, and where they are to be conducted. The Procuring Entity shall notify the Supplier in writing, in a timely manner, of the identity of any representatives retained for these purposes.

All reasonable facilities and assistance for the inspection and testing of Goods, including access to drawings and production data, shall be provided by the Supplier to the authorized inspectors at no charge to the Procuring Entity.

5. Warranty

5.1 In order to assure that manufacturing defects shall be corrected by the Supplier, a warranty shall be required from the Supplier as provided under Section 62.1 of the 2016 revised IRR of RA No. 9184.

5.2 The Procuring Entity shall promptly notify the Supplier in writing of any claims arising under this warranty. Upon receipt of such notice, the Supplier shall, repair or replace the defective Goods or parts thereof without cost to the Procuring Entity, pursuant to the Generic Procurement Manual.

6. Liability of the Supplier

The Supplier's liability under this Contract shall be as provided by the laws of the Republic of the Philippines.

If the Supplier is a joint venture, all partners to the joint venture shall be jointly and severally liable to the Procuring Entity.

SECTION V

SPECIAL CONDITIONS OF CONTRACT

SECTION IV – SPECIAL CONDITIONS OF CONTRACT

GCC Clause	
1	**Delivery and Documents –** The delivery terms applicable to the Contract is DDP delivered to the project site specified in the technical specifications, in accordance with INCOTERMS. Risk and title will pass from the Supplier to the Procuring Entity upon receipt and final acceptance of the Goods at their final destination. Delivery of the Goods shall be made by the Supplier in accordance with the terms specified in Section VI – Technical Specifications. The details of shipping and/or other documents to be furnished by the Supplier are as follows: *For Goods supplied from within the Philippines* Upon delivery of the Goods to the Project Site, the Supplier shall notify the Procuring Entity and present the following documents to the Procuring Entity: (i) Original and four copies of the Supplier's invoice showing Goods' description, quantity, unit price, and total amount; (ii) Original and four copies of Supplier's factory test/inspection report; (iii) Original and four copies of the certificate of origin (for imported Goods); (iv) Delivery receipt detailing number and description of items received signed by the Procuring Entity's representative at the Project Site; (v) Certificate of Completion/Inspection Report signed by the Procuring Entity's representative at the Project Site; (vi) Original and four copies of the Inspection Receiving Report signed by the Procuring Entity's representative at the Project Site; (vii) Original and four copies of the Manufacturer's and/or Supplier's warranty certificate; and (viii) Documents specified in the Technical Specifications, if any. *For Goods supplied from abroad:* Upon shipment, the Supplier shall notify the Procuring Entity and the insurance company by e-mail the full details of the shipment, including Contract Number, description of the Goods, quantity, vessel, bill of lading number and date, port of loading, date of shipment, port of discharge etc. Upon delivery to the Project Site, the Supplier shall notify the Procuring Entity and present the following documents as applicable with the documentary requirements of any letter of credit issued taking precedence: (i) Original and four copies of the Supplier's invoice showing Goods' description, quantity, unit price, and total amount;

	(ii) Original and four copies of the negotiable, clean shipped on board bill of lading marked "freight pre-paid" and five copies of the non-negotiable bill of lading ; (iii) Original and four copies of Supplier's factory test/inspection report; (iv) Delivery receipt detailing number and description of items received signed by the Procuring Entity's representative at the Project Site; (v) Certificate of Completion/Inspection Report signed by the Procuring Entity's representative at the Project Site; (vi) Original and four copies of the Inspection Receiving Report signed by the Procuring Entity's representative at the Project Site; (vii) Original and four copies of the certificate of origin (for imported Goods); and (viii) Original and four copies of the Manufacturer's and/or Supplier's warranty certificate including all other documents specified in the Technical Specifications, if any. For purposes of this Clause the Procuring Entity's Representative at the Project Site is VP - Mindanao Generations. **Incidental Services –** The Supplier is required to provide all of the following services, including additional services, if any, specified in Section VI. Schedule of Requirements: a. performance or supervision of on-site assembly and/or start-up of the supplied Goods; b. furnishing of tools required for assembly and/or maintenance of the supplied Goods; c. furnishing of a detailed operations and maintenance manual for each appropriate unit of the supplied Goods; d. performance or supervision or maintenance and/or repair of the supplied Goods, for a period of time agreed by the parties, provided that this service shall not relieve the Supplier of any warranty obligations under this Contract; and e. training of the Procuring Entity's personnel, at the Supplier's plant and/or on-site, in assembly, start-up, operation, maintenance, and/or repair of the supplied Goods. f. Additional requirements specified in Section VI – Technical Specifications, if any. The Contract price for the Goods shall include the prices charged by the Supplier for incidental services and shall not exceed the prevailing rates charged to other parties by the Supplier for similar services.

Spare Parts –

The Supplier is required to provide all of the following materials, notifications, and information pertaining to spare parts manufactured or distributed by the Supplier:

1. such spare parts as the Procuring Entity may elect to purchase from the Supplier, provided that this election shall not relieve the Supplier of any warranty obligations under this Contract; and

2. in the event of termination of production of the spare parts:

    i. advance notification to the Procuring Entity of the pending termination, in sufficient time to permit the Procuring Entity to procure needed requirements; and

    ii. following such termination, furnishing at no cost to the Procuring Entity, the blueprints, drawings, and specifications of the spare parts, if requested

The spare parts and other components required are listed in **Section VI (Technical Specifications)** and **Section VII (Schedule of Requirements/Bid Price Schedule)** and the costs thereof are included in the contract price.

The Supplier shall carry sufficient inventories to assure ex-stock supply of consumable spare parts or components for the Goods for the period specified in the Technical Specifications.

Spare parts or components shall be supplied as promptly as possible, but in any case, within three (3) months of placing the order.

Packaging –

The Supplier shall provide such packaging of the Goods as is required to prevent their damage or deterioration during transit to their final destination, as indicated in this Contract. The packaging shall be sufficient to withstand, without limitation, rough handling during transit and exposure to extreme temperatures, salt and precipitation during transit, and open storage. Packaging case size and weights shall take into consideration, where appropriate, the remoteness of the Goods' final destination and the absence of heavy handling facilities at all points in transit.

The packaging, marking, and documentation within and outside the packages shall comply strictly with such special requirements as shall be expressly provided for in the Contract, including additional requirements, if any, specified below, and in any subsequent instructions ordered by the Procuring Entity.

The outer packaging must be clearly marked on at least four (4) sides as follows:

Name of the Procuring Entity
Name of the Supplier
Contract Description
Final Destination
Gross weight

	Any special lifting instructions Any special handling instructions Any relevant HAZCHEM classifications A packaging list identifying the contents and quantities of the package is to be placed on an accessible point of the outer packaging if practical. If not practical the packaging list is to be placed inside the outer packaging but outside the secondary packaging. **Transportation –** Where the Supplier is required under Contract to deliver the Goods CIF, CIP, or DDP, transport of the Goods to the port of destination or such other named place of destination in the Philippines, as shall be specified in this Contract, shall be arranged and paid for by the Supplier, and the cost thereof shall be included in the Contract Price. Where the Supplier is required under this Contract to transport the Goods to a specified place of destination within the Philippines, defined as the Project Site, transport to such place of destination in the Philippines, including insurance and storage, as shall be specified in this Contract, shall be arranged by the Supplier, and related costs shall be included in the contract price. Where the Supplier is required under Contract to deliver the Goods CIF, CIP or DDP, Goods are to be transported on carriers of Philippine registry. In the event that no carrier of Philippine registry is available, Goods may be shipped by a carrier which is not of Philippine registry provided that the Supplier obtains and presents to the Procuring Entity certification to this effect from the nearest Philippine consulate to the port of dispatch. In the event that carriers of Philippine registry are available but their schedule delays the Supplier in its performance of this Contract the period from when the Goods were first ready for shipment and the actual date of shipment the period of delay will be considered force majeure. The Procuring Entity accepts no liability for the damage of Goods during transit other than those prescribed by INCOTERMS for DDP deliveries. In the case of Goods supplied from within the Philippines or supplied by domestic Suppliers risk and title will not be deemed to have passed to the Procuring Entity until their receipt and final acceptance at the final destination. **Intellectual Property Rights –** The Supplier shall indemnify the Procuring Entity against all third-party claims of infringement of patent, trademark, or industrial design rights arising from use of the Goods or any part thereof.
2.2	Advance payment not to exceed fifteen percent (15%) of the contract amount shall be allowed and paid within sixty (60) calendar days from effectivity of the contract and upon the submission to and acceptance by the Procuring Entity of an irrevocable letter of credit or bank guarantee issued by a Universal or Commercial Bank. The irrevocable letter of credit or bank guarantee must be for an equivalent amount, shall remain valid until the goods are delivered, and accompanied by a claim for advance payment.

All progress payments shall first be charged against the advance payment until the latter has been fully exhausted.

The terms of payment shall be as follows:

1) For Supply and Delivery Contracts:

(a) On Contract Effectivity: Advance payment of Fifteen percent (15%) of the total Contract Price shall be paid within sixty (60) days from effectivity of the Contract and upon submission of a claim and an irrevocable letter of credit or bank guarantee issued by a Universal or Commercial Bank for the equivalent amount valid until the Goods are delivered and in the form provided in Section VIII- Bidding Forms.

(b) On Delivery: Eighty percent (80%) of the Contract Price of the ***delivered Goods*** shall be considered for payment, less the total amount of advance payment, if any and other deductions. If the amount is sufficient to fully recoup the advance payment, the remainder after deductions shall be paid to the Supplier within sixty (60) days after the date of receipt of the Goods and upon submission of the documents (i) through (vi) specified in the SCC provision on Delivery and Documents. Otherwise, the total delivery payment shall be charged against the advance payment and the remaining advance payment will be fully recouped from the succeeding claims.

(c) On Acceptance: The remaining twenty percent (20%) of the Contract Price of the ***delivered Goods*** shall be paid to the Supplier within sixty (60) days after the date of submission of the acceptance and inspection certificate for the respective delivery issued by the Procuring Entity's authorized representative. In the event that no acceptance certificate is issued by the Procuring Entity's authorized representative within forty five (45) days after successful test and commissioning, if required, the Supplier shall have the right to claim payment of the remaining twenty percent (20%) subject to the Procuring Entity's own verification of the reason(s) for the failure to issue documents (vii) and (viii) as described in the SCC provision on Delivery and Documents.

2) For Supply, Delivery, Installation, Test and Commissioning Contracts:

(a) On Contract Effectivity: Advance payment of Fifteen percent (15%) of the total Contract Price shall be paid within sixty (60) days from effectivity of the Contract and upon submission of a claim and an irrevocable letter of credit or bank guarantee issued by a Universal or Commercial Bank for the equivalent amount valid until the Goods are delivered and in the form provided in Section VIII- Bidding Forms.

(b) On Delivery: Eighty percent (80%) of the price of the **delivered Goods,** excluding price for installation, test and commissioning shall be considered for payment, less the total amount of advance payment, if any and other deductions. If the amount is sufficient to fully recoup the advance payment, the remainder after deductions shall be paid to the Supplier within sixty (60) days after the date of receipt of the Goods and upon submission of the documents (i) through (vi) specified in the

SCC provision on Delivery and Documents. Otherwise, the total delivery payment shall be charged against the advance payment and the remaining advance payment will be fully recouped from the succeeding claims.

(c) On Acceptance: The remaining twenty percent (20%) of the price of the **delivered Goods** plus price for installation, test and commissioning shall be paid to the Supplier within sixty (60) days after the date of submission of the acceptance and inspection certificate for the respective delivery issued by the Procuring Entity's authorized representative. In the event that no acceptance certificate is issued by the Procuring Entity's authorized representative within forty five (45) days after successful test and commissioning, the Supplier shall have the right to claim payment subject to the Procuring Entity's own verification of the reason(s) for the failure to issue documents (vii) and (viii) as described in the SCC provision on Delivery and Documents.

3) For Supply, Delivery, Installation, Test and Commissioning Contracts where Installation, Test and Commissioning prices are included in the supply price:

(a) On Contract Effectivity: Advance payment of Fifteen percent (15%) of the total Contract Price shall be paid within sixty (60) days from effectivity of the Contract and upon submission of a claim and an irrevocable letter of credit or bank guarantee issued by a Universal or Commercial Bank for the equivalent amount valid until the Goods are delivered and in the form provided in Section VIII- Bidding Forms.

(b) On Delivery: Sixty percent (60%) of the price of the **delivered Goods** shall be considered for payment, less the total amount of advance payment, if any and other deductions. If the amount is sufficient to fully recoup the advance payment, the remainder after deductions shall be paid to the Supplier within sixty (60) days after the date of receipt of the Goods and upon submission of the documents (i) through (vi) specified in the SCC provision on Delivery and Documents. Otherwise, the total delivery payment shall be charged against the advance payment and the remaining advance payment will be fully recouped from the succeeding claims.

(c) On Acceptance: The remaining forty percent (40%) of the price of the **delivered Goods** shall be paid to the Supplier within sixty (60) days after the date of submission of the acceptance and inspection certificate for the respective delivery issued by the Procuring Entity's authorized representative. In the event that no acceptance certificate is issued by the Procuring Entity's authorized representative within forty five (45) days after successful test and commissioning, the Supplier shall have the right to claim payment subject to the Procuring Entity's own verification of the reason(s) for the failure to issue documents (vii) and (viii) as described in the SCC provision on Delivery and Documents

3.2	1. The following must be indicated in the performance bond to be posted by the Contractor: i. Company Name ii. Correct amount of the Bond iii. Contract/Purchase Order Reference Number iv. Purpose of the Bond: "To guarantee the faithful performance of the Principal's obligation to undertake *(Contract/Purchase Order Description)* in accordance with the terms and conditions of *(Contract No. & Schedule/Purchase Order No.)* entered into by the parties." 2. The bond shall remain valid and effective until the duration of the contract *(should be specific date reckoned from the contract effectivity)* plus sixty (60) days after NPC's acceptance of the last delivery/final acceptance of the project. 3. In case of surety bond, any extension of the contract duration or delivery period granted to the CONTRACTOR shall be considered as given, and any modification of the contract shall be considered as authorized, as if with the expressed consent of the surety, provided that such extension or modifications falls within the effective period of the said surety bond. However, in the event that the extension of the contract duration or delivery schedule would be beyond the effective period of the surety bond first posted, it shall be the sole obligation of the CONTRACTOR to post an acceptable Performance Security within ten (10) calendar days after the contract duration/delivery period extension has been granted by NPC. 4. Other required conditions in addition to the standard policy terms issued by the Bonding Company: i. The bond is a penal bond, callable on demand and the entire amount thereof shall be forfeited in favor of the Obligee upon default of the Principal without the need to prove or to show grounds or reasons for demand for the sum specified therein; ii. The amount claimed by the Obligee under this bond shall be paid in full and shall never be subject to any adjustment by the Surety; iii. In case of claim, the Surety shall pay such claim within sixty (60) days from receipt by the Surety of the Obligee's notice of claim/demand letter notwithstanding any objection thereto by the Principal.
4	The inspections and tests that will be conducted are specified in the Technical Specifications.

SECTION VI

PART I

TECHNICAL SPECIFICATIONS

SECTION VI – TECHNICAL SPECIFICATIONS

PART I – TECHNICAL SPECIFICATIONS

TABLE OF CONTENTS

SECTION VI – TECHNICAL SPECIFICATIONS

PART I – TECHNICAL SPECIFICATIONS

TS-1.0 GENERAL

This specification covers the features and technical requirements for the ***Upgrading of Annunciator, Control and Protection System of Unit No. 1 at Agus 4 HEP Plant.***

The control, monitoring and protection system and power supply to be provided shall include equipment which are new, unused and have passed the manufacturer's quality control for ensured reliable and safe operation of Unit no. 1 at Agus 4 HEP Plant. These shall fit to its intended use and shall comply with all applicable regulations, quality, and standards. The design of these systems/equipment shall take into consideration the specifications of all existing undamaged associated system/equipment of Unit no. 1 at Agus 4 HEP Plant.

The system to be supplied shall provide reliable and timely process data, status monitoring and operation, alarm handling, historical data storage and retrieval, open communication, flexibility and protection of people, equipment and environment capable to meet the requirements as detailed in this specification. The Supplier must supply all minor items (such as auxiliary relays, terminal blocks, accessories, etc.) which are necessary although not expressly described in the Technical Specifications, in order to guarantee the trouble-free operation and ease in the maintenance of the supplied equipment (or parts of equipment supplied) with particular reference to the provisions to be taken into consideration in order to avoid dangerous or wrong operations.

The Supplier shall accept full responsibility for the full conformance to specifications, documentation, reports, corrosion protection, shop testing, preparation for shipment, warranty provisions and compliance with the applicable codes and standards and the requirements of this Specification.

TS-2.0 SCOPE OF WORKS

The works to be done shall include all equipment including software necessary for secure and reliable operation of the plant. The system shall consider provisions for the upgrading of the control and monitoring of the other units in the plant.

The Supplier shall perform all the works required in accordance with this technical specification. It should be noted that the contract also includes all and every work and service although not specifically mentioned but are required to fully complete the works ready for operation as well as the

dismantling and hauling works of all equipment to be replaced to the designated location.

It shall cover the furnishing of all equipment, materials, tools, labor and other necessary incidentals required for the Upgrading of Annunciator, Control and Protection System of Unit no. 1 at Agus 4 HEP Plant which shall generally consist of but not limited to all equipment, materials and services enumerated herein:

1. Conduct site inspection to verify and assess the extent of the related and incidental works needed to implement the project competently and efficiently;

2. Supply, design, installation, test and commissioning of the new control, monitoring, protection and synchronization system in replacement to the existing control, monitoring, protection and synchronization system of Unit no. 1 at Agus 4 HEP Plant in accordance with the technical specifications, and technical data sheets including the associated equipment and appurtenances The new state of the art microprocessor-based design Control and Protection System shall be for the following:

   a) Unit 1 Main AC Generator
   b) Unit 1 Main Power Transformer

3. Supply, delivery, installation, test and commissioning of the new Distributed Control System (DCS) in replacement to the existing Distributed Control System (DCS) of Unit 1 including the associated equipment and appurtenances. The scope shall consist of but not limited to the following:

   a) Field Control Unit;
   b) Marshalling Panel;
   c) Local Control Panel;
   d) Protection Panel;
   e) Human Machine Interface (HMI) Station;
   f) Engineering Workstation (EWS);
   g) Sequence of Event (SOE) Manager and Analyzer (Automatic Start-up and Shutdown);
   h) Surveillance or Monitoring Station;
   i) Time Synchronization Unit;
   j) Network Architecture; and,
   k) Miscellaneous Control and Monitoring Equipment

4. Supply, installation, test and commissioning of the panels completely. These panels must be completely assembled before delivery to Agus 4 HEP Plant;

5. Supply, delivery, design, installation, test and commissioning of new Uninterruptible Power Supply (UPS), wires, lugs, connectors, intended for the upgrading of control, monitoring and protection system of Unit 1, complete with all the required appurtenances. Power supply shall be

taken from the existing 220 V, 1Φ, 60 Hz panelboard in the control room of Agus 4 HEP Plant;

6. Formulate/program the logic circuit and the Human Machine Interface (HMI) Station software;

7. Pre-testing and commissioning of the whole system;

8. Conduct of toolbox meeting and safety orientation;

9. Checking of all delivered materials;

10. Supply, delivery, laying and termination of cables. Process includes but not limited to termination of the new cables to the panel and the panel to panel wires, shutting down of the unit of which shall be in the shortest period of time possible, disconnection of existing wires from all existing panels and termination of these wires on the new panel. Installation shall be complete with all the requirements firmly and safely connected and interconnected with operating switches, interlocks, signalization, alarms and metering instruments to the extent required to put the power plant in satisfactory operating conditions.

11. Conduct of training of NPC personnel regarding the hardware/software operation and maintenance of the supplied equipment including system configuration, setting and parameterization;

12. Overall testing and commissioning of the whole system; and

13. All other works which are not specified on the technical specifications that are necessary for the complete and reliable operation of the system for the project shall be hereby provided by the Supplier.

In addition, the following shall be provided by the Supplier:

1. Removal/dismantling and hauling of all equipment and materials to be replaced to designated NPC plant stockyard/warehouse area;

2. Supply and delivery of spare parts and consumables as per manufacturer's recommendations to ensure reliable operation of the equipment for at least five (5) years;

3. Supply and delivery of standard and special tools and appliances required for start-up testing, commissioning, operation and maintenance of the equipment;

4. Provision of services of highly qualified and competent engineers for the direct supervision during the test and commissioning of all supplied equipment;

5. Submission of drawings and documents i.e. Equipment Manufacturer's drawings, Operation and Maintenance Manuals, Calculation, etc.; and,

6. Provision of technical assistance and services during one (1) year warranty period such as periodic assessment of the operating condition. This include all maintenance services to be rendered upon request in the event of any abnormality occurred within the warranty period.

It shall include all and every work and service although not specifically detailed herein but are required to fully complete and make ready the safe and reliable operation of the system.

The Supplier shall have the complete system responsibility for the proper design and functioning of the system from installation until system acceptance. The equipment to be furnished shall be complete, with all parts in excellent working conditions, of new and high-grade materials and produced with first class satisfactory manner in accordance with generally accepted modern engineering practice.

All the system engineering software and online system, materials and parts including all the various equipment and devices necessary for instrumentation and control requirements which are not specifically mentioned herein but are necessary for the proper construction, assembly, and operation of the equipment shall be furnished at no additional cost to NPC.

Any damage on existing structures/ facilities incurred during transport, unloading/ mounting, installation, laying of cables, test and commissioning including shall be the responsibility of the Supplier.

TS-3.0 DELIVERY PERIOD AND LOCATION

The delivery period shall be **ONE HUNDRED EIGHTY (180) CALENDAR DAYS** reckoned from receipt of Notice to Proceed.

The equipment to be supplied shall be delivered to **Agus 4 HEP Plant, Balo-i, Lanao del Norte.**

The Supplier shall be responsible for taking reference to its accessibility, means of transportation and all other factors that could hamper the smooth execution of the contract.

Any and/or all expenses arising through the lack of knowledge of the supplier regarding the existing conditions of the delivery site shall be the responsibility of the Supplier and no additional payment thereof shall be made by NPC.

TS-4.0 CODES AND STANDARDS

The equipment and materials to be furnished shall be designed, manufactured and tested in accordance with, but not limited to, the latest issues of the following codes and standards, including all addenda, in effect at time of purchase order unless otherwise stated in this specification:

1.	American National Standards Institute	ANSI
2.	Institute of Electrical & Electronic Engineers	IEEE
3.	American Society for Testing and Materials	ASTM
4.	National Electrical Manufacturers Association	NEMA
5.	Underwriters Laboratories, Inc.	UL
6.	International Electro-Technical Commission	IEC
7.	International Standards Organization	ISO
8.	Japanese Industrial Standards	JIS
9.	Japanese Electrical Standards	JES
10.	National Electric Code	NEC
11.	Philippine Electrical Code	PEC
12.	National Electrical Safety Code	NESC
13.	Philippine Electronics Code	PEC

These codes and standards set forth the minimum requirements which may be exceeded by the Supplier, if, in the Supplier's judgment and with NPC's acceptance, superior or more economical designs or materials are available for successful and continuous operation of the Supplier's equipment as required by this specification.

In addition to this codes and standards mentioned, the Supplier shall comply with all National and local laws, codes, regulations, statutes and ordinances.

Equipment or materials meeting other internationally accepted standards, which ensure an equal or higher quality than the standards mentioned, will also be accepted.

In the event of any apparent conflict among standards, codes or this specification, the Supplier shall refer the conflict to NPC for written resolution before start of fabrication. Final decision regarding the acceptance of proposed standards is the prerogative of NPC.

No deviation from the accepted standards shall be made subsequent to the Contract without the written approval of NPC.

Standards listed in individual technical specification are used mainly for NPC's references. Other internationally known standards, however, shall also apply, provided such standards are equivalent in all respect to the standard prescribed and to the specific requirements described in the individual equipment specification. Supplier shall submit copies of such standards for NPC's review and approval.

TS-5.0 DESIGN REQUIREMENTS

The design requirements shall have but not limited the following:

a) Distributed Control System;
b) Field Control Unit;
c) Marshalling Panel;
d) Local Control Panel;
e) Protection Panel;

f) Human Machine Interface (HMI) Station;
g) Engineering Workstation (EWS);
h) Sequence of Event (SOE) Manager and Analyzer (Automatic Start-up and Shutdown);
i) Surveillance or Monitoring System;
j) Time Synchronization Unit;
k) Network Architecture; and,
l) Miscellaneous Control and Monitoring Equipment

The Supplier shall be responsible for preparation of programs and turning over to NPC a complete operational system. The Supplier's programming and configuration responsibilities shall include but are not limited to the following functions: all plant control system logic modulating control functions, equipment safety, protection and interlocks, man-machine interface functions, operator training for programming functions and overall system configuration and testing. The Supplier 's programming functions shall be performed at the Supplier's facilities. The logic strategy and configuration for each functional controller, and the logic sequences between functional controllers, shall be prepared and installed in the DCS by the Supplier.

The Supplier shall provide all hardware and cabling necessary to provide redundant, fail-safe communications between the subsystems of the DCS.

The construction of the different parts of supply must be as standard as possible in order to reduce to a minimum the spare parts and to make the maintenance and operation easy. All similar parts must be interchangeable.

TS-5.1 DISTRIBUTED CONTROL SYSTEM

TS-5.1.1 General

This part specifies the detailed requirements for the design, manufacture, factory wiring, programming, transport, delivery, installation, testing and commissioning of the Distributed Control System (DCS) which will be the monitoring and control system of Unit 1 Main AC Generator and Unit 1 Main Power Transformer. The control system shall be able to monitor, supervise and control the unit and desired station auxiliaries, instrumentations, associated valves and gates under automatic start-stop control mode of the unit. It shall be interfaced and communicated with the control switchboard for the selected control mode of the unit.

All materials and parts which are shown on the topology and not specifically mentioned herein but are necessary for the proper erection, assembly and operation of the equipment shall be furnished at no additional cost to NPC.

The Supplier shall have the complete system responsibility for the proper design and functioning of the system from fabrication until system acceptance. All the system engineering software and on-line system shall be supplied whether specifically details. It is not NPC's intent to specify all the technical requirements nor to set forth those requirements adequately

covered by applicable codes and standards. Adherence to all applicable codes and standards is required. The Supplier shall furnish high quality equipment meeting the requirements of this specification and industry standards.

The system shall provide reliable and timely information data and control functions required for efficient operation of the plant. The required system shall have the operational speed, computing power, adequate input/output storage capacity and self-diagnostic/analysis capability to meet the requirements as detailed in this specification.

TS-5.1.2 Design Requirements

The Distributed Control System shall perform at least the following:

a) Starting Sequence Control;
b) Stopping Sequence Control;
c) Turbine/Generator Protection;
d) Temperature Monitoring;
e) Alarm System;
f) Water Level Monitoring and Turbine Discharge Monitoring (if available);
g) Dam and Power Intake Control (if available);
h) Auxiliary Control and Station Service Control;
i) Switchyard Control;
j) Data Logging;
k) Event and Fault Recording;
l) Synchronizing;
m) Interlocking; and,
n) Database Management

The entire plant is monitored and controlled via DCS through Human Machine Interface (HMI) Station. For manual control mode of the plant, a control panel shall be provided capable of starting sequence control and stopping sequence control, loading and unloading as required. Further, in certain case, hardwired controls are provided to ensure plant safety and/or operability in the event of DCS failure.

The system shall be designed to allow the operator to make online changes to any analog or digital input point in the system, i.e. addition of new points or deletion of an existing point including data base and application programs.

The system shall be designed to monitor and diagnose its own performance, alert and indicate to the operator of any equipment and/or sub-systems failures. Some of the checks to be made and trigger an alarm are peripheral failure, I/O failure, peripheral memory error, main memory error and CPU failure to complete program, scan overruns, controller errors, loss of communication, etc.

Failure of any component in the system shall not cause loss of control of more than one component in the system and must not cause a total system failure.

TS-5.1.3 System Architecture Requirements

The Supplier may offer similar or equivalent system architecture subject to NPC's review and approval.

The DCS shall provide the means of controlling the plant from the station control level and field control unit levels.

Any control action initiated via the DCS from any of the above control points shall include interlocking and security checks.

The system shall have the capability for analog/digital interoperability and seamless integration with different types/models of communication equipment. The system shall be easily expandable.

TS-5.1.4 Station Control Level

The system computer consoles shall work in redundant. Any action shall be performed from these computers. Functions shall be available from these computers such as monitor the measurement (temperature, power, water level, vibration, etc.), monitor and control the system (start/stop the unit, switchyard operation, gate operation, etc.), curve and trend display, daily and monthly report etc. The system devoted to plant level shall be implemented on standard multi-task computers in order to achieve in parallel, the main functions of event and fault reporting/recording, operation of the plant, data historization and overall system configuration and maintenance. The entire plant is controlled and supervised from the Plant Control Level at the Control Room.

The Station Control Level in general, shall include:

a) A Centralized Control Unit (CCU) which shall be included in the System Cabinet, for performing control and interlocking functions. It shall be equipped with redundant station computer. The redundancy shall be based on a pair and spare configuration: that is, both will operate simultaneously and in case one fails, the other will continue the operation independently.

b) A Marshalling Panel where the field wires are captured and terminated to the terminal blocks. The terminal blocks are then cross wired to the terminal boards which are then connected to the I/O modules using system cables.

c) A Local Control Panel which can locally and manually control the unit. This panel can be separated or be integrated to other panel includes meters, synchronizer, synchro scope, switches for breakers,

synchronization switches, switch for excitation ON/OFF, switches for INCREASE/ DECREASE generator voltage.

d) A Protection Panel which is a separate panel for digital generator protection relay, digital Transformer Protection Relay and redundant lock-out relays

e) A Human Machine Interface (HMI) Station including its accessories, which will serve as an operator interface for the Station Control Level from where the plant can be monitored, controlled and engineered. The HMI shall consist of the following:

1. An Engineering Workstation (EWS) which shall be used as an engineering tool, configurator and maintenance of the DCS. Logics, control drawings and graphic pages are created in its database necessary for the operation, monitoring and control functions. This station shall allow to create or make modifications on any of the DCS database including power plant topology and all other maintenance operations and control functions. Therefore, for any changes and/or modifications in the DCS structure, the operator will be able to perform by himself the customization engineering without the help of the DCS manufacturer.

2. An Operator Workstation (OWS) which provides intuitive, easy-to-understand operating and monitoring environments. It shall have diverse display patterns offering flexibility for various phases of operations and improved operating efficiency. Furthermore, it shall be an aid for implementation of easy-to-understand graphic windows based on ergonomics and knowledge engineering.

3. A Sequence of Event (SOE) Manager and Analyzer which shall capture the sequence of events with time reference of millisecond. It shall record events for at least 30 days before it will be superseded.

4. A Surveillance or Monitoring Station which will display the status of essential parameters, alarms and tripping for surveillance or monitoring on a 65-inch monitor.

5. At least three (3) units – LED screen-based operator stations. Each operator station shall be furnished with spill proof keyboard and industrial optical mouse. Membrane keyboards are unacceptable. Each LED monitor shall be independent of each other, so that failure of any DCS component will not result in the interruption.

6. A Printer Management that allows the system manager to use their HMI for configuring the printers that will be used by the DCS.

The desktop type HMI consists of a PC with Microsoft Windows and DCS software installed. The operation and monitoring function of the desktop HMI enables simple operation and monitoring by optical mouse and using the dedicated keyboard.

TS-5.1.5 Field Control Unit Level

The sub-system devoted to acquisition function, control function at the local control point shall be splitted into autonomous Field Control Unit (FCU), each FCU ensuring the management of one generating unit.

The FCU are where the logics and control functions are executed. Digital I/O must be included which can cater the low voltage system (AC and DC), medium voltage switchgear, switchyard, transformers, governor system, cooling system, turbine valve hydraulic system, turbine parameters, generator parameters, spillway and power intake.

The FCU to be supplied for Unit 1 shall be able to have direct connections with all the other subsystems, including the other FCU units to be installed in the future, via the optical LAN. Its functions shall include but not limited to the following:

a) Wired input/output interfacing with substation items and protective relays;
b) Communication interfacing with relays;
c) Control and supervision of the complete generator- exciter/turbine-governor set; and
d) Local automatic sequences.

Each FCU shall be housed in a control cubicle containing all equipment necessary for control and supervision of the complete generator – turbine set as follows:

a) Power supply module;
b) CPU module;
c) Optical Interface module;
d) IED interface module;
e) General I/O;
f) Digital I/O cards;
g) Analog I/O cards;
h) Essential pushbuttons;
i) Necessary auxiliary relays; and,
j) Terminal strips;

In addition, necessary RS232 serial interface shall be provided for connecting a portable PC to the FCU, to enable local control and monitoring at the local unit level in case the upper level of control has a failure or for downloading the unit module configuration files or for having an access to the maintenance dialogue with the equipment.

The unit FCU is responsible for sequence control, alarms, the emergency trip system, temperature supervision and data transfer to computer system in central control station. It is composed of main component and sub-components for safety, sequencing and generator switchgear control.

These FCUs shall provide high adoption capabilities for establishing direct communication links with the various equipment installed in the corresponding unit, especially with digital protection relays. Each FCU shall interface through digital I/O and analog inputs with all devices of the unit.

These FCUs shall operate independent of each other and those of the station control level. Outage of subsystem shall affect and/or disable only the pertinent unit or section being controlled and supervised.

The FCU manages the data communication with the main computer system and executes in at least four (4) different software modules following functions:

a) Safety Module
b) Sequencing Module
c) Common Unit Control Module
d) Generator Switchgear Control Module

The FCU communicates with the computer system in the Station Control Level, sending data from the unit to the computer and receiving orders and set points from the computer. The data, which are transmitted from the unit, are displayed on the screens in the Station Control Level and/or logged in reports.

TS-5.1.6 Time Synchronization Unit

For the time synchronization function, a highly quality substation master clock functioning on a GPS signal shall be provided complete with the required accessories. The synchronization shall be distributed to the CCUs and HMIs through a separate optical LAN in star configuration.

TS-5.1.7 Network Architecture

This composed of communication/network devices which can handle a speed of 1 Gbps.

High Reliability

Network shall have dual redundant buses and consists of independent subnets, bus 1 and bus 2. The control communication shall be performed by using bus 1. However, when a problem occurs in bus 1, the path shall switch immediately and automatically so that the control communication to be performed by using bus 2.

Real Time Response

The network shall implement a dedicated protocol for performing high-quality communication which is a protocol that is suitable for real-time communication. Transmission scheduling function shall prevent transmission delays and packet loss by stopping packets from being accumulated. Real-

time response shall be achieved by prioritizing among the different communication types.

Security

The network shall take security into account. It shall perform authentication by using a shared secret key that is updated periodically to prevent cyber-attacks such as data eavesdropping, falsification, and spoofing.

TS-5.1.8 Functional Requirements

Control and Supervision

The Distributed Control System (DCS) shall be designed to perform but not limited to the following functions described below:

a) Control system self-monitoring and diagnostic;
b) Monitor and control the power plant equipment and associated protective relays as well as to supervise all the necessary automatic functions;
c) display and acknowledgement alarm;
d) configuration control and maintenance;
e) generation and editing of database;
f) printing and display reports; and,
g) other pertinent functions as may be recommended.

The standard functions are described extensively and that the description of the wanted task should be enough for a competent company to perform the task in the best engineering sense.

Plant Control Level Control Point

In standard condition, the control of the power plant shall be performed directly in the Central Control Room. This main control mode is termed "Plant Control Mode". This system shall contain all functions which constitute the near control of the whole power plant. The visualization of the process and the control of the activities is achieved by visual display units including appropriate graphic functions. The printer shall complement the screen representation. The selection of the various functions will be executed by optical mouse or function keyboard.

The DCS system architecture shall permit direct data exchange between the subsystem devoted to acquisition and control functions and the subsystem which allows "Plant Control Mode" operations.

The DCS shall provide the means of ensuring that authorized personnel only have access to all the control functions via the DCS control console.

The operating system (O/S) for the CPU and system shall be real-time, multi-user and multi-tasking operating system and shall be based on a universal operating system.

By means of a state representation, it shall be possible from this level to recognize software and hardware faults anywhere in the station control system.

The main computer shall have an implemented system with 30% reserve when expanded to maximum future requirements. The verifiable calculations of reserve units shall be submitted accompanied with supporting documents.

Local Unit Control Point

Facilities shall be provided which enables the individual power plant equipment to be controlled by an operator from the switchgear unit control cubicle. These facilities are primarily required during commissioning or routine maintenance operations but may be used as a means of operating the power plant equipment should the higher-level means of control fail.

All control actions emitted from this local unit control point shall be subject to any interlocking requirements with select/execute actions required from the operator.

Indication of the power plant equipment status shall be provided at the Plant Control Point together with any relevant alarms.

The design of the Local Unit Control shall be such that the dependability, performance and operational flexibility for the local unit management will be attained at the highest level.

Control Point Management

The choice between the "Remote Control Mode" and the "Plant Control Mode" shall be initiated by the operator from the DCS control console in the Central Control Room.

For each item of the power station, various control modes are strictly exclusive. Nevertheless, the control mode of each item could be different from the control mode of any other item: the DCS shall provide configuration capability to ensure the safety of the power plant operation in such a multimode.

Alarm Handling

The DCS shall provide alarms on the HMI Station from the various major systems such as the Turbine/Generator and other balance of plant systems. After loop checks, record of all alarms shall be available in hard copy from the printer. This will include alarm description, time of occurrence and time event returned to normal status. The system shall be configured and designed such that the servers of HMI screens will not be "locked up" during printer operation or sudden burst of alarms.

Alarm color shall change for acknowledged/unacknowledged alarms. The system shall be capable of automatic alarm cutouts to prevent nuisance alarms or screen cluttering when associated equipment is not in service.

When a process alarm occurs, the operator shall be alerted by an audible tone. The audible alarm shall also be accompanied by a flashing indicator on the LED screen.

Logs, Trends, Calculations

The System shall be furnished with periodic and summary logs with an on-demand printout of actual computed or corrected readings of variables, as well as the status of certain major plant equipment. The system shall provide with special logs for "on-demand" printout of selected group points.

The system shall be furnished with an on-demand printout of operational log for post trip review by printing readings of 400 (150 per unit and 100 common) plant variables and operator's actions for periods of at least 15 minutes before and five minutes after initiation (20 minutes total).

The system shall furnish with screen depicting equipment operation status and runtime as determined by contact closure inputs.

The system shall automatically generate a shift log print-out consisting of 400 hourly averages, maximums, minimums and totalized flows of Plant process related data. The balance of plant data to consist of 150 hourly averages per unit and 100 common. The turbine parameters to be logged shall consist of the quantity of "reads" transmitted by the respective serial interfaces. The system shall provide a daily log print-out including daily averages, maximums, minimums, and totals for all trended variables.

The system shall provide for each turbine generator trip log print-out. These logs shall consist of 100 snapshots variables to be automatically collected every 15 seconds, and at five minutes before through five minutes after a turbine trip.

Logs and calculations required for the system include the types listed below and each shall be addressable.

a) Equipment total time of operation (run time);
b) Individual Component efficiencies, such as Generator efficiency, Turbine efficiency, etc.;
c) Plant gross and net heat rate;
d) Power used (auxiliary);
e) DCS Downtime.

The values shall be included in the hourly, shift, daily, weekly and monthly data log reports but shall not be credited against the 400-tag value stated above.

In performing flow calculations, the system shall be capable of selecting among various differential pressure input transmitters, each covering a portion of the flow range, for optimum accuracy. The Supplier shall be responsible for developing and programming these calculations.

Equipment operating time shall only accumulate when the equipment is determined to be functioning.

Capability for 50 trend logs shall be provided. Each shall contain a list of values for up to 12 points. Data collection intervals shall range from one collection per minute to one collection per 24 hours. The total collection period for a trend log shall vary, based on plant reporting needs, with a maximum collection period of 120 days. Automatic printing shall take place at the end of the data collection period, the end of a shift or day, or upon operator's demand.

LED Display

This section defines the minimum information that shall be available on the various HMI console LED displays. All displays shall be accessible from any of the consoles in the same communication link system. Color displays shall be furnished. Keyboards of the consoles shall be identical.

At least the following major types of graphics are to be provided:

a) Index (Menu) Display;
b) Facility Overview Display;
c) Loop Display;
d) Alarm Summary Display;
e) System Diagnostic Display;
f) Historical Trend Display;
g) Control Face Plate Display; and,
h) Trend Display.

All graphic variables shall be dynamic to reflect operating status, alarms; bad quality and loss of communication.

The average custom graphic display shall have a combination of 75 dynamic text, shapes and analog values. The plant operator shall be able to monitor and control the unit by using these LED graphic displays. The graphic shall be laid out in a clear, concise, format with operator control in mind. Graphics shall be linked to each other such that startup/shutdown of a plant can be performed in a smooth manner.

TS-5.1.9 Spare Parts and Special Tools

The Supplier shall furnish spare parts for five (5) years operation. Cost thereof shall be included in the cost of the system.

The Supplier shall also provide a list of recommended spare parts identifying each one and the specific sub-assembly to which it applies. The Supplier shall indicate the expected life of the parts requiring replacement and the minimum recommended inventory of the spare parts for installation, start-up, continuous operation and maintenance. The Supplier shall state whether the recommended spare parts is a stock item or a special item and shall furnish name and location of the nearest supplier, and approximate lead time required for delivery.

All special tools necessary for the installation, start-up, operation, maintenance and adjustment of the equipment and accessories shall be furnished by the Supplier. The Supplier shall provide a list of special tools furnished, identifying the function of each tool and the specific items for which it is used. The Supplier shall also indicate whether the tools is required for installation, start-up, operation, maintenance or adjustment.

The Supplier shall submit a complete priced parts listing for the equipment which shall cross-reference all supplier or Sub-vendor assigned part numbers back to the original manufacturer's part number. The Supplier shall make a notation of quantities of these items recommended and/or required by NPC for continuous operation during normal overhaul cycle. The recommended Spare Parts List shall include items requiring replacement.

The parts list shall include cross sectional or assembly-type drawings, part number, materials, and estimated delivery lead times. The part number shall identify each part for interchangeability purposes. The part listing and recommended spare parts lists shall be provided to NPC promptly upon Supplier's receipt of approved drawings.

TS-5.1.10 Shop Test

Type Test

The manufacturer of the Distributed Control System shall perform a comprehensive type test and provide Type Test Certificate in compliance with international standards on the prototype of the associated or peripheral equipment to be used in the system to confirm the adequacy of their design and their operational stability. The test shall include all the necessary tests stipulated by IEC Standard and other standard test done by the manufacturer such as the following:

a) Power frequency voltage withstand test;
b) Impulse voltage withstand test;
c) High frequency interference;
d) Surge withstand capability;
e) Thermal withstand capability;
f) Temperature dependency;
g) Temperature rise test;
h) Power consumption test;
i) Operation and function test;

j) Others.

Certified test certificates from official independent laboratories may be accepted in lieu of the performance of the type tests. Type test certificates shall be submitted for approval at the same time as the main design details of the equipment or system are submitted.

Routine and Quality Conformance Test

Routine and quality conformance tests and other tests necessary shall be performed in accordance with IEC Standard.

The Supplier shall make all preparation for tests and provide the test apparatus and personnel and shall notify NPC the date of the test **FORTY-FIVE (45) calendar days** in advance.

Prior to shipment to the jobsite, but upon completion of system fabrication, software implementation and documentation reflecting the current system, the Supplier shall perform a factory acceptance test to the satisfaction of NPC. Successful completion of such test is a prerequisite for shipment of system. Prior to the demonstration test, the design of the System shall incorporate the latest changes applicable to the NPC's equipment. The tests shall include all reasonable exercises which the combination of equipment and software can be expected to perform. The complete system shall be present and assembled for this test.

NPC's acceptance shall be based upon the results of the Supplier's demonstration of the system to NPC's complete satisfaction that for each of the tasks, the system is in complete compliance with specifications/design input and the system is ready for field loop tests. All punch list items shall be incorporated and/or reconciled. Should NPC reject the system, the DCS system shall not be permitted to be shipped from the factory or moved to storage.

Close Loop Simulation

Closed Loop simulation shall be conducted which will allow NPC to verify the logic configuration meets design intent and is adequately functioning.

Test Reports

One (1) electronic copy (DVD format) and **FIVE (5) COPIES** of test reports of all standard tests performed subsequent to the date of award and all routine tests shall be certified by the inspector and submitted to NPC within **FIFTEEN (15) CALENDAR DAYS** after test.

TS-5.1.11 Data and Documentation Requirements

The following documents shall be submitted after award of contract for NPC's review and approval prior to procurement and installation of the supplied equipment and materials:

a) Complete shipping and assembly drawings showing the Supplier's identification, plans, elevation and section views, mounting dimensions and details, weights and cable entrance openings;
b) Complete system architecture for the DCS identifying its components;
c) Complete description of the functions and technical specifications of each of the following principal components of the DCS;
   1. Central Control Unit,
   2. Station Control Unit
      - Operation Human Machine Interface (HMI) Station;
      - Plant and Switchyard Sequence of Event (SOE) Manager;
      - Engineering Workstation (EWS) computer;
      - Function Keyboard and Optical Mouse;
      - Printer Management.
   3. Local Area Network (LAN)
d) Detailed system architecture arrangement drawings showing the layout inside the control room, complete with the required furniture for the DCS;
e) Complete description of the following:
   1. Environmental Data;
   2. Failure behavior;
   3. Plant and Switchyard protections;
   4. Plant and Switchyard Interlocking;
   5. Generator and Transformer parallel operation scheme;
   6. Modules:
      - Input/output,
      - Analogue/digital,
      - De-coupling,
      - Programmable translator.
   7. Communication;
   8. System software;
   9. Protection remote setting and disturbance analysis software;
   10. Catalogue and operating characteristic detail for all equipment;
   11. Functional requirements, including control (manual & automatic), display, alarm, etc.;
   12. Power supply system and arrangement,
   13. Earthing details.
f) Detailed bill of materials and parts list for the DCS;
g) Details of DCS connections with various equipment;
h) Detailed logic and schematic diagrams, wiring diagrams including connection points for all external connections;
i) General assembly and erection/installation drawings and procedures;
j) List of drawings and schedule of submittals;
k) Detailed schematic diagram and cabling layout;
l) Routine Test reports;
m) Detailed test procedures of the equipment and field test reports;
n) Instruction, maintenance and operation manuals;
o) List of codes used;
p) Final Technical Data Sheets conforming to the specification;

q) As-built drawings as finally approved.

TS-5.2 PROTECTION RELAY SYSTEM

TS-5.2.1 Protective Relays

All protective relays shall be of utility-grade numerical or microprocessor based. The necessary test devices shall be incorporated within the relays.

The relay cases shall be of the semi-flush, rectangular, back-connected, dust-tight, switchboard type. The cases shall be provided with removable covers with windows and with means for sealing against tampering. The relays shall conform to the applicable requirements of IEEE C37.90 or equivalent IEC Standard. "Relays and Relay Systems Associated with Electric Power Apparatus." Each protective relay shall be practically free from errors caused by normal variations in frequency, wave form, and power factor and from ambient temperature effects between 5°C and 50°C. All current coils shall be able to withstand 35 times the normal coil rating for 0.5 s and all potential coils shall be able to withstand 10% excess normal voltage continuously without damage to the coils or equipment.

Each relay shall be provided with at least one circuit-closing contact suitable for 110-V DC ungrounded service. Where more than one electrically independent relay contact circuit is required, and it is not feasible to provide more than one such circuit, or if the 2 circuits are available but are not electrically independent, suitable auxiliary relays shall be furnished to provide the required additional circuits. The relay contacts shall be of high-quality, non-oxidizing material. Time-delay features depending upon oil dashpots or other devices which are appreciably affected by temperature will not be accepted. Each relay shall be provided with an operation indicator and external target reset device. Relay shall be complete with all operating auxiliaries, including auxiliary transformers as required to adjust currents and potentials for amplitude and phase angle for proper operation of all relays supplied.

External auxiliary equipment furnished as part of the relays shall be mounted in compact assemblies for back-of-panel mounting. The protective relays and auxiliaries shall be suitable for operation with the instrument transformer ratios and connections shown on the one-line diagram. Relay contacts indicated normally open or normally closed refer to the contact position when the relay coil is de-energized. The Supplier shall furnish, as part of the drawings, computations showing the complete settings to be made in the field of each protective relay.

TS-5.2.1.1 Generator Protection Function

The Generator Protection Relays shall consist of but not limited to the following:

a) Generator Differential Relay (87G)

Generator differential relay shall be high speed, variable percentage differential type, 3-phase. Relays shall have slope characteristics of approximately 10% which shall increase rapidly above approximately twice normal current. The relays shall be unaffected by DC transients associated with a symmetrical short-circuit currents.

b) Generator- Transformer Differential Relay (87GT)

Generator- Transformer Differential Relay shall function as back-up protections of both the generator and transformer from the effects of internal faults.

c) Generator Overcurrent Relay with Voltage Control (51V)

Generator Overcurrent relays with voltage control shall be single-phase induction type with inverse time characteristics.

d) Generator AC Overvoltage/Undervoltage Relay (59G/27G)

Generator AC overvoltage relay shall be single-phase, frequency-compensated, induction type with very short time characteristics and with instantaneous trip units for high overvoltage.

e) Generator Stator/Rotor Ground Fault Relay (64S/64R)

Generator stator ground fault overcurrent relays shall be single-phase induction type.

f) Negative Phase Sequence Relay (46)

Generator negative phase sequence relay operating characteristics shall closely match the I^2t thermal curve of the protected generator.

g) Generator Temperature Overcurrent Relay (49G)

The relay shall operate with current transformers and standard 100-ohm resistance temperature detectors embedded in the generator stator windings.

h) Loss of Excitation Relay (40G)

Generator loss of field relay shall provide 3-phase protection for the generator and/or the power system for loss of generator excitation and shall be of the directional distance type suitable for use with open delta connected potential transformers.

i) Voltage Balanced Relay (60G)

The voltage balance relays shall detect blown fuse in the potential transformer circuit.

j) Reverse Power Relay (32)

The relay shall provide protection of the generator against motoring. The relay shall have an adjustable current setting.

k) Over/Under Frequency Relay (81)

The relay trips the generator to an off-line mode to protect the generator against damage because on the rate of change of frequency such as overheating, vibration, etc.

TS-5.2.1.2 Transformer Protection Relay Function

The Transformer Protection Relays shall consist of but not limited to the following:

a) Differential Relay (87T)

The transformer differential relays shall be of the percentage differential type with three restraint circuits. The relay shall be suitable for protection of 3-phase, generator step-up transformer as shown on the Drawings and shall provide positive protection against tripping or magnetizing inrush current. Any special accessories required for testing or setting the relay shall be furnished with the relays. Auxiliary current transformers or current balancing autotransformers shall be furnished, if required, for proper operation of the relays.

b) Over fluxing Relay (59F)

The transformer overvoltage relay shall be a single-phase, frequency-compensated, induction type with very short time characteristics and with instantaneous trip units for high overvoltage.

c) Neutral Ground Relay (51NT)

Power transformer neutral ground relay shall be single-phase inverse time, overcurrent induction type, with instantaneous element.

d) Instantaneous and Time Overcurrent Relay (50/51T)

The transformer overcurrent relays shall be non-directional, induction type, with instantaneous attachment.

e) Instantaneous and Time Ground Overcurrent Relay (50/51N)

The transformer ground over current relay shall be a residual ground overcurrent non-directional, induction type, with instantaneous attachment.

TS-5.2.2 Synchronizing Equipment

Synchronizing equipment shall be furnished complete with all necessary auxiliaries. It shall operate with single phase, 60 Hz, potential source and available plant DC control power supply.

Manual Synchronizing

Manual synchronizing shall be by means of the synchronizing instruments furnished with the control switchboard, closing of the generator breakers by their manual control switch with the synchronizing switch in the manual position.

Automatic Synchronizing

Automatic synchronizing of the generator shall be by initiating the operation of the synchronizing equipment from the unit start switches with the breaker synchronizing switch in the "Auto" position.

a) Automatic Synchronizing Equipment (15A)

Automatic synchronizing equipment shall be solid state type consisting of an automatic synchronizer, voltage acceptor, voltage matcher, and speed matcher, and synchro acceptor. Synchronizing equipment should be an added function of the Generator Protection Relay.

TS-5.2.3 Data and Documentation Requirements

The following documents shall be submitted after award of contract for NPC's review and approval prior to procurement and installation of the supplied equipment and materials:

a) List of drawings and schedule of submittal
b) Final Technical Data Sheets of the equipment conforming to the specifications
c) Outline drawings of protection relay system and associated accessories showing all critical dimensions and weights, including the following:
    1. Mounting dimensions and details and transport dimensions
    2. Plans, elevation and sectional views
    3. Details of mounting and anchoring to existing/available floor space area
    4. Control and power cable entrance opening
    5. Details of main terminals and grounding connections

d) Schematic diagrams for control and protection including interlocking scheme:

Note: Control circuit diagrams indicating the interfacing with the DCS for the above items shall also be provided, if substation supervisory control and monitoring functions is through the DCS.

e) Instruction, maintenance and operation manuals.
f) The final design short circuit strength and arc-flash calculations including basic equations and reference to the literature
g) Routine test reports
h) Field test to be performed and field test reports
i) As built drawings as finally approved

TS-5.3 POWER SUPPLY

TS-5.3.1 Uninterruptible Power Supply

TS-5.3.1.1 General

This section specifies the technical and associated requirements for the design, manufacture, installation and testing of static uninterruptible power supply (UPS) for use in hydroelectric power generating station.

TS-5.3.1.2 Technical Requirements

TS-5.3.1.2.1 Design Requirements

The data, rating, and requirements listed below shall be the basis of the Supplier's guarantee of performance.

The UPS system should provide a 100% protection for all its load. In all respects, equipment shall incorporate the highest quality of modern engineering design and workmanship with 20 years expected design life.

The Supplier shall supply an industrial design UPS. The system will supply power to an uninterruptible AC panel carrying loads such as the plant distributed control system, emergency lighting, critical electric drive/actuators and programmable controllers.

All components shall be of an industrial standard with a level of quality and reliability that satisfies the requirements of a secure AC source of power to vital equipment performing a controlling, monitoring and safeguarding function in continuously operating process units and utility installations.

All components shall be capable of withstanding the thermal and dynamic stresses resulting from internal and external short circuits and circuit switching operations etc. Damage arising from component failure should be confined to the component concerned.

Protection against direct contact (normally live parts) must be ensures by enclosures having IP50 degree of protection external and IP 20 internal. Protection against indirect contact (parts made live by earth faults) must be afforded by earthed equipotential bonding and automatic disconnect of supply.

TS-5.3.1.2.2 Modes of Operation

The UPS module shall be designed to operate as a double conversion, on-line reverse transfer system in the following modes:

a) Normal

The inverter shall continuously supply power to the critical load. The rectifier/battery charger shall derive power from the normal AC source and supply DC power to the inverter, while simultaneously float charging the battery.

b) Emergency

Upon failure of the normal AC power source, the critical load shall be supplied by the inverter, which, without any switching, shall obtain its power from the battery.

c) Recharge

Upon restoration of the normal power source (prior to complete battery discharge), the rectifier/battery charger shall power the inverter and simultaneously recharge the battery.

d) By-Pass Mode

The static by-pass transfer switch shall be used to transfer the load to the by-pass without interruption to the critical power load. This shall be accomplished by turning the inverter off. Automatic re-transfer or forward transfer of the load shall be accomplished by turning the inverter on.

e) Maintenance By-Pass/Test Mode

A manual make-before-break internal maintenance bypass switch shall be provided to isolate the UPS inverter output and static by-pass transfer switch for maintenance. This shall allow the UPS to be tested or repaired without affecting load operation.

TS-5.3.1.2.3 Rectifier/Battery Charger

The microprocessor-based thyristor rectifier/battery charger shall be compatible with its associated battery and inverter (both charger and inverter shall be microprocessor). The capacity shall be enough to carry the full load

requirements of the inverter and recharge the battery simultaneously at a current rated 10% of battery nominal capacity for Lead acid battery and 20% of battery nominal capacity for Nickel Cadmium battery.

The rectifier/charger shall provide high quality DC power to charge the batteries and power the inverter and shall have the following characteristics:

a) Modular Assembly

The rectifier/battery charger assembly shall be constructed of modular design to facilitate rapid maintenance.

b) Input Power Factor

The rectifier/battery charger shall have 0.85 minimum power factor

c) Input Harmonic Current Suppression

The rectifier/battery charger shall produce a sinusoidal input AC current on each phase with low harmonic content, limiting THD on the UPS input below 33%.

d) Input Current Limiting

The rectifier shall be provided with current limiting means and shall be capable of delivering the current limit continuously without damage. The UPS shall be equipped with a system designed to limit the battery recharge current required by a particular battery.

e) Charging Levels

The battery charging circuitry shall be capable of being set for automatic battery recharge operation, float service, manual battery charge service and equalizing or commissioning operation.

f) Temperature Compensated Charging

The battery charger shall be equipped with a temperature probe to enable temperature compensated charging and adjust the battery float voltage to compensate for the ambient temperature using a negative temperature coefficient of 3mV per cell degree Celsius at a nominal temperature of 25°C.

g) Capacity

The rectifier/charger shall have an enough capacity to support a fully loaded inverter and fully recharge the battery to 95% of its full capacity within 6-8 hours.

h) Voltage Variation

The rectifier/charger shall maintain a rated output voltage within ± 1% from no load to full load, with AC input variations of ±10% of nominal.

i) Operation

The rectifier/charger shall be suitable for an ungrounded (DC output) operation. It shall be capable of operation while disconnected from the battery.

TS-5.3.1.2.4 Inverter

The UPS output shall be derived from a Pulse Width Modulated (PWM) inverter design. It shall be capable of providing the specified precise output power characteristics specified in the technical data sheet while operating over the battery voltage range.

The inverter assembly shall be constructed as a modular assembly to facilitate rapid maintenance.

Frequency shall be synchronized with the frequency of the incoming power under normal conditions and shall be stabilized to within ± 0.5 Hz during interruptions of incoming power.

Inverter output shall be frequency and phase synchronized to the power station's AC system. Interlocking shall prevent transfer from the inverter output to bypass supply manually, without the two being in synchronism. Indication of synchronism shall be provided on the UPS control panel.

The inverter shall be protected by fuse. Reserve static switch thyristors shall be protected with high speed fuse to protect it from damage by short circuits or excessive overloads.

TS-5.3.1.2.5 Static By-Pass Switch

A static switching type transfer switch shall be included. The switch shall be completely solid-state circuit, rated for continuous 100% duty and shall be capable of sensing a system malfunction and automatically transferring load to the system bypass line in ¼ cycle or less on a make before break basis, use of contactor is not allowed. The switch shall have a time delay to prevent immediate switching back to the inverter after automatic transfer to the bypass source.

The static bypass transfer switch shall automatically cause the bypass source to assume the critical load without interruption after logic senses one of the following:

a) Inverter overload exceeds unit's capability
b) Battery autonomy period expired, and bypass current is available

c) Inverter failure

If the bypass source is beyond the conditions stated below, the UPS shall make and interrupted transfer (around 20 m sec.)

a) By-pass voltage greater ± 10%, - 10% from the UPS rated output voltage
b) By-pass voltage greater ± 2%, from the UPS rated output frequency

The static by-pass transfer switch shall automatically forward transfer power from the bypass to the rectifier/inverter, without interruption, after the UPS inverter is turned "ON", after an instantaneous overload-induced reverse transfer has occurred and the load current returns the UPS nominal rating or less. Retransfer back to inverter output shall be automatic when conditions are normal, and output of the inverter is in synchronism with bypass source.

The static by-pass transfer switch shall have the following overload characteristics after which the time a thermal protection device shall engage to protect the static by-pass.

A manual bypass make-before break switch shall be provided to take the inverter and/or static switch out of service for repairs or inspection without disturbance to the load. The switch shall permit operation from either the bypass source or the inverter. The system shall include asynchronous signal to the inverter. /

a) 100% of UPS output rating for 10 milliseconds
b) 150% of UPS output rating for 1 minute

A manual by-pass bypass make-before break switch shall be provided to take the inverter and/or the static switch out of service for repairs or inspection without disturbance to the load. The switch shall permit operation from either the bypass source or the inverter. The system shall include a synchronizing signal to the inverter. Manual transfer switch shall transfer from bypass to normal with synchronizing signal, to test the inverter for such synchronism, before the uninterruptible AC bus is connected to the inverter. A bypass switch shall be provided.

TS-5.3.1.2.6 Microprocessor Controlled Logic

The full UPS operation shall be provided using microprocessor-controlled logic. All operation and parameters shall be firmware controlled, thus eliminating the need for manual adjustments or potentiometers. The logic shall include a self-test and diagnostic circuitry such that a fault can be isolated down to the printed circuit assembly or plug-in power assembly level. Every printed circuit module or plug-in in power module can be monitored.

Diagnostics and configurations of the UPS shall be possible via a PC through the local communication port on the UPS or remotely thru DCS having the computerized control system.

TS-5.3.1.2.7 Standard Communication Panel

The UPS shall include as a standard feature an easy to use communication panel. Include shall be a backlit, color graphic animated LCD display, LED's and audible indicators for UPS normal operation, UPS fault, UPS on battery or reserve and UPS warning. The UPS communication panel shall include rectifier "ON"/ "OFF" and inverter "ON"/ "OFF" pushbuttons that will permit the operator to safely command the UPS on or off without risk of load loss.

TS-5.3.1.2.8 System Controls and Indicators

Front Panel LCD Display

The UPS control panel shall provide a display for indication of UPS status, metering, battery status, alarm event log and advanced operation features. The display shall provide access to the following:

a) An animated, mimic diagram indicating UPS power flow
b) Measurements, status indications and events
c) Personalization menu protected by a password, used to make specific settings

The visual display shall display the following system parameters based on true RMS metering:

a) Measurements

1. Input voltage (phase to phase)
2. Input current phase
3. Input frequency
4. Bypass voltage
5. Bypass input frequency
6. UPS output voltage (phase to neutral)
7. UPS output current per phase
8. UPS output frequency
9. UPS output % of current per phase
10. UPS output kVA
11. UPS output kW
12. DC voltage
13. Battery current
14. Battery back-up time
15. Battery temperature

b) Status Indication and Events

1. Load on battery (discharging)
2. Load on UPS
3. Load on automatic bypass
4. Low-battery voltage warning
5. General alarm
6. Battery fault
7. Battery autonomy time during operation on battery power

8. Internal fan failure
9. Bypass source outside tolerances
10. Battery temperature
11. Any additional indication which shall provide maintenance assistance

The UPS shall be capable of handling time-stamped historical events. This function shall timestamp and store all important status changes anomalies and faults and this information available for automatic or user-requested consultation. It shall interpret the events and indicate remedial measures if possible.

LCD Status Indications

The UPS control panel shall provide LED's or any equivalent indicating means whichever is more appropriate that would signal the following status conditions:

Green Led	UPS normal operation
Orange Led	Minor fault
Red Led	Major fault, load not protected

TS-5.3.1.2.9 On/Off Switch

The UPS shall have an ON and OFF pushbutton which can be used to start and stop the charger and inverter. It shall be possible to remotely activate the OFF function via an isolated dry contact to create an emergency power off function resulting in:

a) Inverter shutdown
b) Opening of the automatic bypass
c) Opening of the battery circuit breaker
d) Opening of the isolated dry contact on the programmable relay card

TS-5.3.1.2.10 Audible Alarm Set

The UPS shall have an audible alarm that can be stopped using the user interface both local and remotely. Provisions shall be made such that if a new alarm is sensed after the original alarm has been acknowledged, it shall reactivate the audible alarm for a new fault/disturbance occurrence.

TS-5.3.1.2.11 Emergency Power Off

The UPS shall be equipped with a local emergency power off button and dry contact input that can be used to command UPS shutdown remotely. Activation of this command shall lead to the following actions:

a) Inverter shutdown
b) Opening of the static bypass and the battery circuit breaker

c) Opening of an isolated dry contact on the programmable relay board

TS-5.3.1.2.12 Dry Contact

The UPS shall be provided with programmable input/output relay board. This board shall contain ten (10) dry contacts, i.e. eight (8) for input and two (2) for output signals. Contacts shall be programmed as:

a) UPS online
b) Load on bypass
c) UPS on battery
d) UPS on battery low
e) General alarm
f) Remote UPS on (input)
g) Remote UPS off (input)

The contacts shall be normally open and shall change to indicate the operating status.

TS-5.3.1.2.13 Mechanical Design Temperature

Enclosure

The UPS shall be housed in a freestanding enclosure with dead front construction. The structure of the UPS shall be sufficiently strong and rigid to withstand handling and installation operations without risk.

The sheet metal elements in the structure shall be protected against corrosion by a suitable treatment, such as zinc electroplating, bi-chromatin, epoxy paint or equivalent. Cabinets shall be pre-treated for corrosion protection.

All modules, etc., shall be inspectable and removable from the front of the cabinet (hinged panels open) without requiring access to the rear of the cabinet. A copper ground bus shall be provided in the cabinet with compression-type connector for connection to copper grounding cable.

Cable Access

The UPS shall be able to accommodate bottom entry cables.

Battery

The UPS module shall use a battery system designed for auxiliary power service in a UPS application.

The battery shall have an impact resistant plastic case and housed in rack out containers inside the UPS module.

The UPS shall be equipped with a device designed to protect the battery against deep discharge depending on discharge conditions with isolation of

the battery by a circuit breaker. A monitoring device shall adjust the battery shutdown voltage as a function of a discharge coefficient to avoid excessive discharge at less than the rated output. A second device shall avoid self-discharge of the battery into the UPS control circuits during an extended shutdown of the UPS.

The battery system shall be provided with a battery self-tests or battery monitoring system which shall be able to perform the following automatic functions:

a) Battery circuit checks every twelve (12) hours
b) Open-circuit battery test once a month
c) Partial discharge tests every three (3) months

This self-test system shall signal faults via LED's on the front panel or a message to remote supervision systems.

TS-5.3.1.2.14 Other Accessories of the UPS

Input Isolation Transformer

An input isolation transformer shall be provided for the UPS to isolate the rectifier input and DC bus for ungrounded DC systems. Its rating shall be equal to the maximum output of the inverter plus the necessary capacity to recharge the battery. The isolation transformer shall be provided in the UPS enclosure.

UPS Distribution Board

The UPS Distribution Board shall be designed to receive power from the UPS and supply power to the computer peripherals, if any for microprocessor-based substation control and to all loads requiring the services of the UPS.

Each output of the distribution board must be fitted with a circuit breaker providing overload and short circuit protection. The Distribution Board itself shall be protected by an input circuit breaker.

The Distribution Board shall be designed such that the output circuits can be added or modified without having to shut down the rest of the installation.

Since interference cannot be avoided in the system, an isolating transformer shall be provided with the Distribution Board to guarantee interference protection of the computer loads.

A mimic panel shall be provided with the distribution center which gives the following digital display and readings:

a) input voltage
b) output voltage
c) output currents

d) power
e) frequency
f) earth leakage current
g) percent load

External Control and Communication Devices

The UPS shall be provided with the following control and communication devices:

a) RS232 Serial Communication Card: The RS-232 serial communication card shall provide registers for all alarms and standard measurements available on the UPS. The port shall be able to adopt with the DCS protocol to be used.

b) RS485 Serial Communication Card: The RS-485 serial communication card shall provide registers for all alarms and standard measurements available on the UPS. The port shall also be able to adopt with the port shall be able to adopt with the DCS protocol to be used.

c) SNMP Interface: The communication port shall accommodate an SNMP (Simple Network Management Protocol) converter to allow acquisition of all UPS status points via SNMP protocol for the purpose of monitoring the UPS via the DCS or direct connection to a PC. The SNMP adapter shall also allow for direct interface with a computer network via a standard RJ-485 Ethernet network connection.

Two Three Circuit Breaker External Maintenance Bypass in Matching Cabinet

The UPS shall be provided with maintenance bypass providing for two (2) or three (3) circuit breakers mounted in a matching cabinet to provide a wraparound bypass configuration for total UPS isolation during maintenance. Maintenance bypass transfers shall be without interruption and kirk-key interlocked to protect the UPS from damage in the event of out of sequence transfers.

Network Based Power Management Software

All software mentioned on any manual and expected to be used for some activities of the UPS i.e. compiler, linker, database, editor, tools etc. shall be supplied as part of the scope of supply of the UPS. All the special connection cables, interface boards or cards necessary for the use of the software shall also be included in the scope of supply.

The UPS software shall use a distributed, TC/IP based architecture and must be SNMP manageable.

Principally this software is divided into an installation related software and an operator dependent software. Any change and handling of the total software will be possible for the operator without previous knowledge of this software.

It should be modular, where each module must be consistent inside itself. A further implementation of modules shall be possible.

The functionality of each software module must be supervised. This supervision has the aim to come to a stable and defined end position in case of a fault on the UPS. Faults on the modules must be followed by a clear, self-explaining fault announcement. In all the programs, an extensive **HELP** utility with all the information contained on the manuals in on-line mode shall be provided.

It must be assured that in case of a new software version all the data, parameter included, remain without limitation on the system. All the function units of the previous version will rest available in their total availability.

All the programs used shall be provided with a defined version number. Every upgraded version shall be compatible with all the previous versions delivered with the original.

Seismic Anchor

To keep the UPS from moving during earthquake, the Supplier shall provide a clamping device which is fixed to the foundation. The bolts for this clamp will be embedded in the concrete foundation so that the UPS, when positioned properly, maybe fixed securely. The UPS can be fixed to or unfastened from these bolts as desired.

Dual Input

A second input terminal block shall be provided to accommodate a separate input source.

Nameplate

Nameplates shall be satin finish white phenolic with black core and beveled edges, 2 mm thick; letter shall be at least 6 mm high. Nameplates shall be attached with corrosion resistant screws to each cabinet front panel for identification.

Wiring and Components

Control wiring shall be 600V, 2.0 mm^2 minimum, 7 strand SIS, copper wire with heat, moisture and flame-resistant cross-linked polyethylene insulation in accordance with ICEA-S-66-524 or equivalent IEC standard. Where flexibility is required, 19 strands wire shall be used. Wire markers shall be used on both ends of all wires.

All wiring shall be protected against contact with sharp edges, neatly bundled and secured with wire ties. Wire shall be continuous; no splicing is permitted.

Terminal lugs shall be compression type with insulated sleeves and shall have ring-type or locking fork-type tongue. Terminal blocks shall be screw type. Terminal blocks for external connections shall be rated 600 volts, 10 amps (minimum).

In the Supplier's internal wiring, no more than two wires shall be connected to one terminal block point. Not more than wire shall be in any terminal lug.

Adequate space shall be provided on both sides of the terminal blocks for connecting wires and for wire markers. To allow for stripping and bending of incoming cables, terminal blocks for external connections shall be located a minimum of 200 mm away from cable entrances.

A minimum of ten (10) percent spare terminal points shall be available in each cabinet. The same type of compression connectors shall be provided for the termination of external AC and DC cables.

TS-5.3.1.3 Test

The Supplier shall carry out at his own expense all tests necessary to ensure the satisfactory design and manufacture of the uninterruptible power supply system in accordance with ANSI or equivalent IEC Standard.

The Supplier shall make all preparations for test and provide the test apparatus and personnel and shall notify NPC the date of the test forty-five (45) days in advance. NPC reserves the right to witness all the routine and quality Conformance tests unless waived in writing.

All materials and/or equipment shall comply with test criteria and NPC's acceptance of the equipment shall not relieve the Supplier of the responsibility for meeting all the requirements of this specification. Although the Supplier performs the required test and the equipment meet the acceptance criteria, he shall not be relieved of the responsibility of providing equipment conforming to all the requirements of this specification.

TS-5.3.1.4 Data and Documentation Requirements

The following documents shall be submitted after award of contract for NPC's review and approval prior to procurement and installation of the supplied equipment and materials:

a) **Outline drawings of UPS and accessories showing all critical dimensions and weights, including the following:**

1. Overall dimensions
2. Mounting dimensions including location and size of anchor bolt holes, including base drilling plan
3. Plans, elevation and sectional views
4. Detail layout of cabinet with racks and modules
5. Control and power cable entrance openings at the cabinet

6. Details of main terminals and grounding connections

b) Complete description of the functions and technical specifications of each of the component of the UPS
c) Type, catalogue designation and description of major components furnished by Supplier
d) Installation details and foundation requirements, loads, fastening details;
e) Detailed material list and part list for the UPS
f) Detailed functional diagram, schematic diagram, panel wiring diagram, terminal block diagram and cabling layout
g) Details of UPS connections with various equipment
h) Protection and alarm monitoring scheme
i) Complete design calculations
j) General assembly and erection/installation drawings and procedures.

Note: ***Control circuit diagrams indicating the interfacing with the DCS for the above items shall also be provided, if substation supervisory control and monitoring functions is through the DCS.***

k) List of drawings and schedule of submittals
l) List of codes used
m) Final Technical Data Sheets conforming to the specification
n) Detailed Contract Schedule Activity for the UPS
o) As-built drawings as finally approved.

TS-5.4 POWER/CONTROL/INSTRUMENTATION CABLES

TS-5.4.1 General

This part specifies the detailed requirements for the manufacture, delivery, installation, test and commissioning of high voltage, medium and low voltage, power, control and instrumentation cables, including all termination, fixing, mounting materials for the entire rehabilitation works.

TS-5.4.2 Technical Requirements

TS-5.4.2.1 General

Cables shall be suitable for operation in systems where continuity of supply is the first consideration. They shall also be satisfactory for operation under the atmospheric and climatic conditions prevailing at the site and under such variations of current, voltage and frequency as may be met under all system operating conditions.

The Supplier shall certify that the cables and accessories offered will be identical in all essential in respect of design, material and workmanship with the cables and accessories for which type approval certificates are offered in support of the Contract. The Supplier shall also ensure that all materials used will be subjected to and shall have satisfactorily withstand such tests as are customary in the manufacture of the types of cable specified.

Cable splices shall not be permitted without the prior written authority of NPC.

TS-5.4.2.2 Auxiliary Power and Control Cables

Insulation

Auxiliary power and control cables shall, unless otherwise specified herein, be insulated for their entire length with a properly prepared, homogenous, heat and moisture resistant grade of cross-linked polyethylene suitable for use at 90 ° C in wet and dry locations and armoured with an overall PVC sheath. In addition, all control cables construction shall incorporate under the armour bedding an overall screening made of flexible copper tapes.

Conductors

All conductors shall be stranded tinned annealed soft copper conductors. Solid conductors will not be accepted. Copper conductors shall meet the requirements of ASTM B3-74 or IEC 60228 C12.

Fillers

Cores shall be laid up to form a circular cable and where fillers are necessary to make a circular compact XLPE insulated cable, they shall be compatible with the conductor insulation and the jacket. Textile and other hygroscopic materials will not be accepted.

Screening

Control cables shall have over the core assembly an overall covering of flexible copper tape screening. This screening shall be helically applied around the cores, overlapped and intercalated as to provide full screening coverage and good flexibility. Braided metal will not be accepted.

Outer Jacket

The outer covering over the armour for all single and multi-core auxiliary power and control cables shall consist of a fire retardant, low acid gas emitting black extruded PVC sheath which shall comply with the requirements of relevant standards.

Ground Conductor

All cables shall contain an un-insulated copper grounding conductor.

Low Level Signal and Instrumentation Cables

Low level Instrumentation and Signal Cables shall have tinned copper conductor insulated with polyethylene or PVC. Cables shall be 300 V class. Conductors shall be uniformly twisted in pairs. The multi-pair cables core assembly shall be filled, covered with separator tape, overall screened, aluminium interlocking armoured over a PVC armour bedding and sheathed overall with neoprene jacket. A drain wire effectively bonded to the overall screen shall be incorporated in the cables shall be suitable for internal and external use in a sub-tropical climate.

Conductors

Each conductor shall consist of a solid wire of commercially pure annealed copper, smoothly drawn and free from all defects, uniformly coated with pure tin and shall have a standard diameter, with a minimum cross section of 0.8 mm^2. The tinned wire shall be clean and shall meet the requirements of the per sulphate test specified in the relevant standard.

Insulation and Standard Insulation Colours

The conductor insulation shall be either extruded polyethylene or extruded PVC.

Polyethylene and PVC insulation shall be of the type in accordance with relevant standards.

The colours for polyethylene insulated conductors and for PVC insulated conductors shall meet the requirements of relevant standards.

Over sheath

The outer protective covering shall consist of an overall neoprene jacket and coloured grey.

The outer covering shall contain an evenly dispersed mixture of an environmentally approved anti-termite protective compound.

Cable Lengths

Cables shall be supplied in drum lengths of not less than 500 m unless shorter lengths are specified or are required to complete a specific order.

Jointing and Termination Accessories

Straight through jointing accessories shall be designed for the accommodation of soldered ferrule conductor joints. Compression type conductor joints will not be accepted.

Mechanical glands for the termination of the cable at the jointing accessory shall meet the requirements of applicable standard and shall be correctly designed for the termination of galvanized steel wire armour. The gland shall adequately secure the armour, provide electrical continuity between the armour and the body of the gland. It shall also provide a watertight seal between the cable over sheath and the cable inner sheath or bedding tapes and prevent the ingress of moisture.

TS-5.4.2.3 Cable Installation

Cable runs shall be continuous from terminal to terminal to the extent permitted by available commercial lengths.

Insulated wire and cables shall be handled with care to avoid kinking and damage to insulation and outer jackets. Cables shall not bend around a radius less than recommended by the manufacturer.

All lugs, terminals, spade or ring terminals and terminal blocks required which are not furnished with the equipment shall be furnished and all connections required to provide a complete installation ready to operate shall be made. Cable identification tags of a permanent type shall be provided and installed on all cables used for power, control, annunciation, instrumentation, communication, and lighting (except branch lighting conductors) for identification of the cables. Splices made in handholes, and boxes shall also be permanently and prominently tagged. Tags shall bear the cable or wire designations. Samples of the proposed tags shall be submitted for approval.

No cable shall be pulled into a duct unless the duct is clean and dry.

Cable wedges, basket-weave grips, and clamps shall be furnished and installed to support vertical or inclined cable runs.

High voltage cables shall be terminated with slip-on type cable terminators suitable for the type of cable furnished. The cable terminators shall provide dielectric stress relief using factory pre-formed components and shall conform to IEEE Standard 48, "Standard Test Procedures for High Voltage Alternating Current Cable Termination."

Metallic tapes of shielded cables shall be grounded at only one end of the cables.

Connections in lighting wires and cables shall be insulated with not less than two half-lapped layers of plastic insulating tape, or with high grade rubber tape over which friction tape shall be applied. Splices shall be soldered. They shall be made mechanically and electrically perfect before solder is applied.

Enough slack shall be allowed in each run to permit contraction and expansion. Where several single-conductor cables or wires comprising, a circuit are trained through a pull box, terminal box, wiring gutter, or tray, they shall be neatly cabled and tied together. Cables shall be laced, using an approved lacing cord, and the method of lacing shall be subject to approval. Exposed wires and cables shall be cleaned of all wire pulling lubricant which may have remained on the cables after pulling through conduits or ducts.

Supports, Racks and Conduits

Cables entering free standing equipment compartments from below shall be supported near the floor by means of approved cable clamps and brackets. Use of electrical galvanized rigid steel conduit, fittings and compatible hardware is not precluded. The Supplier shall submit his own design,

complete with component description for the above conditions, for approval of NPC.

Cables supports and racks together with fixing bolts, nuts and screws shall be of galvanized steel. All steelwork supports shall be designed with a safety factor of not less than four.

Multi-core cables shall be clamped to the racks with smooth finish split packing pieces with bore diameters to suit the cable sizes. The packing pieces shall be of non-magnetic material. Single core power cables shall be erected in separate non-magnetic clamps for approval of NPC. Wooden cleats will not be accepted.

For any cable trays to be provided outdoors, if applicable, covers of approved design and materials shall be included and erected as necessary to protect the cables against the effect of sun, weather, rain, and mechanical damage etc.

The fixing of racks and associated hardware to the building structural steelwork, where approved by NPC, shall be by means of bolted clamps. Weld gun stud fixing shall be allowed only if approved by NPC.

The methods of fixing rack support and conduits to walls or ceiling shall be submitted by the Supplier for approval of NPC.

Erection in Racks

The Supplier shall ensure that cables are not subjected to undue pressure by cleats and clamps.

The spacing of racks in cable runs shall suit the type of cable to be erected and shall be in accordance with relevant standard.

TS-5.4.2.4 Test

Cables shall be tested at the factory in accordance with applicable standards to determine their compliance with the requirements of this specification. Tests shall be conducted on samples and on the entire length of cables in accordance with the applicable standards.

TS-5.4.2.5 Data and Documentation Requirements

The following documents shall be submitted after award of contract for NPC's review and approval prior to procurement and installation of the supplied equipment and materials:

a) Outline drawings of UPS and accessories showing all critical dimensions and weights.
b) Complete description of technical characteristics of each type of cables.
c) Design (Type) Test Reports, if not submitted with the proposal;
d) Cross-section and details of power, control, and instrumentation cables;
e) Cable rating calculations;

f) Make of each cable and cable reel;
g) Installation procedure and splicing methods for high voltage cable;
h) Description of High Voltage cable terminations and sealing ends;
i) Description of cable supporting structures, cable tray, cable rack, cable fixing method, cable connection, cable spacer, cable clamps, bending radius, etc.;
j) Power, control and instrumentation cable routing plan;
k) Cable schedule, including cable numbers, identification, sizes, etc.;
l) List of drawings and schedule of submittal;
m) Final Technical Data Sheets conforming to the specification;
n) Detailed Contract Schedule Activity for the cables;
o) Detailed QA Program based on ISO 9002;
p) Routine Tests Reports;
q) Field Tests to be performed and Field Test Reports.

TS-6.0 ENVIRONMENTAL REQUIREMENTS AND OPERATING CONDITIONS

All equipment shall conform with the environmental requirements and conditions applying to the location where it is to be used. Additional heating by equipment inside buildings must be considered.

All equipment and materials to be furnished shall meet the performance and rating requirements of this specification and all Supplier's guarantees shall be based on operation within the prevailing environmental conditions. This also applies during storage and if susceptible to moisture absorption or fungus attack, the equipment and materials shall be treated with fungicidal varnish and otherwise be adequately tropicalized as far as necessary in accordance with national and international environmental and health and safety regulations.

Special measures shall be taken such as the use of chemically treated insert parts and proper surface preparation and paint application in accordance with this Specification for equipment installed at Site(s) with a corrosive atmosphere, to protect exposed metal parts and other materials susceptible to chemical reaction.

Materials susceptible to deterioration from climatic conditions or subject to the formation of fungus or any other form of parasitic life shall preferably not be used, but if used and cannot be avoided, these must be permanently protected.

For all outdoor equipment, the operation of the equipment must not be influenced by dew, fog, rain, wind, sun radiation, quick changes of temperature, dust, smoke, salts, aggressive gases, and steams. Outdoor installations shall be protected against solar radiation by means of adequate covers, where required, with non-deteriorating material to be provided by the Supplier.

TS-7.0 MISCELLANEOUS

TS-7.1 SUPPLIER'S SUPERVISION

The Supplier shall provide a competent (Engineer) Service Engineer, or technician during installation and perform the complete tests, commissioning and start-up of all equipment.

The Supplier shall send only service engineer, or technician who have adequate working knowledge of the English language.

NPC reserves the right, if services for a longer period are needed, to ask for extension of the Supplier's supervisors until such time that NPC's personnel have been fully trained in the operation, test and maintenance of the equipment supplied by the Supplier, at no cost to NPC.

The service engineer or technicians shall not be considered employee of the NPC for all legal intents and purposes and the Supplier shall be responsible for the payment to said service engineer or technician of all indemnities accruing of any labor accident which may occur in the course of the work and for which the Supplier maybe responsible either under the Philippine Laws or any foreign laws.

TS-7.2 TRAINING OF NPC PERSONNEL

The Supplier shall provide local training courses for NPC's personnel in English.

Training shall be geared towards the technical engineers and maintenance personnel of NPC through the transfer of technical knowledge.

Local training shall be conducted for five (5) NPC personnel for not more than one (1) month. The Supplier shall provide similar training documentation and local meals to NPC personnel. NPC shall provide training room and any available test facilities.

Training selected from among NPC maintenance staff will be qualified electrical and/or electronic personnel. Their experience will be of a broad and general technical nature, including general familiarity with electronic systems and testing facilities.

The cost of performing the training course shall be included in the Contract Price for the equipment.

Training Objectives

The training courses shall be designed to:

a) Enable maintenance staff to perform maintenance of the equipment by teaching principle of operation trouble-shooting methods and procedures leading to the identification and replacement of faulty piece of equipment, modules, units and components, with the objective that NPC's personnel will become capable of carrying out repair and maintenance without outside assistance.

b) Enable maintenance staff to perform routine maintenance of the equipment by way of electrical and mechanical adjustments, lubrication and/or replacement of parts subject to wear or with a limited life.

c) Provide an understanding of the software and a working knowledge of the database for additions, modifications, and deletions and the practical use of diagnostic programs.

Course Content

The training course shall consist of formal courses including classroom training, instruction and explanation during shop tests and/or Factory Acceptance Tests and practical work sessions with the Manufacturer's specialists during the implementation of requirements of the Contract. Training shall be on the same hardware and software supplied under the contract.

Course Documentation

The Supplier shall submit a daily schedule for the entire training period and a syllabus for each course with a listing of course documentation, no later than thirty (30) days prior to the start of training.

Documentation shall be provided covering each course to a level of detail so that the text is self-explanatory and enough as future reference.

Prior to the start of a course, each trainee shall receive at least one (1) set of documentation covering that course. The Supplier shall submit to NPC one (1) set of course documentation per trainee no later than fifteen (15) days prior to start of each course.

TS-8.0 INSPECTION, TESTING AND ACCEPTANCE CRITERIA

TS-8.1 TESTING

TS-8.1.1 General

The Supplier shall perform at his own expense all tests required to ensure adequacy of design, material, workmanship and conformance of the equipment to be supplied to the guaranteed data and other requirements of the specifications and standards.

Certified test reports/results of all tests conducted shall be submitted to NPC for evaluation and acceptance.

TS-8.1.2 Factory Acceptance Test

TS-8.1.2.1.1 Field Test

Field tests and acceptance tests shall be performed by the Supplier and witnessed by NPC representative to determine whether requirements of the specification have been fulfilled. The Supplier shall provide instructions and acceptance criteria for field testing for NPC's review and approval prior to conduct of such tests and commissioning the equipment. No field tests shall be performed unless approved by NPC.

TS-8.1.2.1.2 Test Reports

One (1) electronic (CD format) and five (5) certified copies of the reports of all NPC's specified tests and other manufacturer standard tests shall be furnished to NPC immediately within a maximum of fifteen (15) days following the completion of the tests. For equipment which had the required type test already, the type test certificates shall be submitted by the Supplier together with his proposal.

For the routine tests, acceptance tests and field tests, the test certificates shall include, in addition to the test results, the following information:

a) Test certificate date
b) Equipment data
c) Client's reference number
d) Equipment serial number

Certified test data submitted to NPC shall also include copies of oscillography records made in conjunction with the tests

The Supplier shall provide these records and reports.

TS-8.1.2.2 Waiver of Factory Acceptance Test Witnessing/Inspection

Where Factory Acceptance Tests (FAT) to be witnessed by NPC representative(s) have been required in the Technical Data Sheets of an equipment, costs of these tests witnessing shall be deemed included in the price for the equipment.

If, however, NPC opted not to witness the Factory Acceptance Tests, NPC will issue a Certificate of Waiver of Tests Witnessing/Inspection for the equipment and materials. In such case, the Supplier shall proceed with the Factory Tests in accordance with the requirement of the specification and the manufacturer's test specification as approved by the NPC.

Where Factory Tests are not required to be witnessed by NPC representative(s) as indicated in the Technical Data Sheets of the equipment, a Certificate of Waiver of Tests Witnessing/ Inspection will be issued also by NPC. In this case, no claim whatsoever can be made by NPC on the Supplier as a result of waiving the Factory Acceptance Tests.

TS-8.2 INSPECTION

Upon arrival of equipment/component and/or materials at site, NPC and the Supplier or their authorized representatives, shall jointly verify the delivered equipment/component and/or materials following the steps below:

a. Inspection and verification of the packing list;
b. Visual inspection of the condition of the packing and its surfaces; and
c. Partial opening of the crates and plastic sheet protection to verify the content and its physical condition and to check the pilferage or damage during shipment and storage.

A record shall be prepared carefully noting all eventual shortages, defects or damages, signed by the Supplier and concurred by NPC. All shortages and damages noted shall be immediately replaced by the Supplier at his own cost. Supplier shall also ensure the timely delivery of such replacement without affecting the agreed overall contract implementation schedule.

TS-8.3 ACCEPTANCE

Acceptance certificate shall be issued only after all the required inspection and verification are satisfactorily conducted and performed.

If any of the equipment delivered failed to pass inspection and evaluation, NPC may at his own judgment, direct the Supplier to make necessary replacement of equipment/spare parts as may be deemed appropriate.

TS-9.0 DOCUMENTS AND DRAWINGS TO BE SUBMITTED

a. To be submitted with the bid/proposal for evaluation:

   a.1 Completely filled-in Sections 1.0 and 2.0 of the Technical Data Sheets (TDS);

   a.2 Original Copy of the Manufacturer/Distributer Authorization to Bid, directly addressed to the BAC-NPC, indicating therein the PR/Reference number for the following equipment;
   - Distributed Control System (DCS)
   - Generator Protection System
   - Transformer Protection System

   In case of authorized Distributor issuing the authority to bid, it shall be accompanied by a Certificate of Authorized Distributorship from the Manufacturer.

Note: Authorization to bid and Certificate of Distributorship from the Manufacturer shall be current and valid for at least Six (6) months from the date of bid opening as advertised.

b. To be submitted during post qualification:

b.1 Completely filled-in Sections 3.0 to 6.0 of the Technical Data Sheets (TDS);

b.2 Letter of Confirmation from the Manufacturer that a local agent or representative is available to provide "After Sales Service" to the supplied components/parts/accessories during and after the warranty period. Name, address and contact number shall be provided;

b.3 Manufacturer's Brochures/Catalogues/Drawings which contain information/data to support the Supplier's submitted and filled-out Technical Data Sheet;

b.4 Certificate of Site Inspection duly signed by NPC's authorized plant personnel; and

b.5 Certificate from their customer (end-user) duly addressed to the Bidder that the supplied equipment is/are like the items subject for bidding has performed satisfactorily in service. The certification must indicate in the PR/Reference Number and date of issuance.

c. To be submitted before or upon delivery:

c.1 "Certificate of Origin" from the Manufacturer.

c.2 "Warranty Certificate" for one (1) year against factory defects/workmanship.

c.3 Quality Assurance or Quality Inspection Certificate from the Manufacturer.

c.4 User Manual in Three (3) copies.

c.5 Brochure, Catalogue & Technical Specification.

c.6 As-built drawings as finally approved.

c.7 Type Tests Certificate with Test Reports in Five (5) copies.

c.8 Routine and Quality Conformance Certificate with Test Reports in Five (5) copies.

c.9 Certified Test and Inspection Reports duly signed and witnessed by NPC representative; and

c.10 Certificate to show that the item to be delivered is brand new.

NOTE: All documents and drawings in Clause TS-5.0 and TS-9.0 shall be submitted to the Plant Manager – **Manager, Agus 4/5 HEP Complex**, for evaluation and/or approval prior to issuance of Acceptance Certificate.

TS-10.0 GUARANTEE

The Supplier shall guarantee to complete the repair of equipment/device /materials, and/or replacement within sixty (60) calendar days upon notice, of the supplied equipment/device/material at his own expense against defect in design, workmanship and materials for a period of one (1) year after issuance of Acceptance Certificate by NPC. The Supplier shall guarantee that the unit will perform in the manner as set forth in the equipment's manual and the Contract.

The Supplier shall submit a Warranty Certificate (at least 1 year) effective from the date of acceptance by NPC.

After the lapse of the warranty period, if there are no defects found, NPC shall release the warranty security/certificate.

TS-11.0 MEASUREMENT OF PAYMENT

Payment will be made at the contract lot price of the item(s) delivered in the Bid Price Schedule. Payment thereof shall constitute the full compensation for the supply, delivery, installation, test and commissioning of the equipment/components.

SECTION VI – TECHNICAL SPECIFICATIONS

PART II – TECHNICAL DATA SHEETS

TABLE OF CONTENTS

Name of Bidder : _____

Signature of Bidder : _____

SECTION VI – TECHNICAL SPECIFICATIONS

PART II – TECHNICAL DATA SHEETS

SECTION 1.0 – 2.0

Documents to be Submitted during the Bid Opening

1. The following Technical Data Sheets shall be filled-out and to be submitted with the Bid Proposal.

2. The Bidder is required to provide all the information required under the Column "Supplier's Data". Although not given by NPC, the Supplier's Data shall be based on the International Standard.

3. NPC's requirements are indicated below. The Supplier shall indicate their data corresponding to the said NPC requirements to facilitate evaluation of Supplier's compliance to the specifications.

4. Deviation from the requirements indicated in the Technical Data Sheets shall be ground for disqualification.

Name of Bidder : _____

Signature of Bidder : _____

SECTION VI – TECHNICAL SPECIFICATIONS

PART II – TECHNICAL DATA SHEETS

1.0 DISTRIBUTED CONTROL SYSTEM [1]

1.1 System Capacity Description

Description	NPC Requirements	Supplier's Data
a. Manufacturer	By Supplier	
b. Place of Manufacturer	By Supplier	
c. No. of Operating Console (Operator Workstation)	2 Sets	
d. No. of event and record printer (Dot Matrix)	1 Unit	
e. No. of Maintenance and Configuration Console (Engineering Workstation)	1 Set	
f. No. of subsystem devoted to substation unit management	As Required	
g. Total no. of turbine-generator equipment and associated auxiliary devices managed by DCS.	Refer to System Architecture	

[1] Data given are minimum requirements. Supplier may offer DCS System with greater system capability.

Name of Bidder : _____

Signature of Bidder : _____

	Description	NPC Requirements	Supplier's Data
h.	No. of binary inputs per single subsystem devoted to unit management	As Required With 30% spares	
i.	No. of equipment display	In accordance with the number of different equipment in power station	
j.	System Architecture designed to allow modification/configuration of hardware (i.e. additional unit computers and software) [2]	Yes	
k.	System software, including maintenance and configuration editor software	To be Provided	

1.2 Technical Features and Characteristics of Centralized Control Unit (CCU)

a.	Manufacturer	By Supplier	
b.	Place of Manufacturer	By Supplier	
c.	Description/Type	Modular Industrial Computer	
d.	Modularity	CPU + I/O Module	

[2] Modification will not require any changes in the existing hardware and services of the Supplier in case of future expansion

Name of Bidder : _____

Signature of Bidder : _____

	Description	NPC Requirements	Supplier's Data
e.	Hardware	Latest available model on time of award	
f.	Communication Interface		
1.	Local Area Network	Refer to System Architecture	
2.	Communication Protocols	MODBUS, TCP/IP, IEC60870, IEC 61850, IEEE 802.3, CSMA/CD, EtherNet/IP, DNP 3, etc.	

1.3 Technical Features and Characteristics of Human Interface Station (HIS)

a.	Manufacturer	By Supplier	
b.	Place of Manufacturer	By Supplier	
c.	Description/Type	Multi-task Industrial Computer, Workstation and/or Desktop	
d.	Hardware	Latest available model on time of award	

1.4 Technical Features and Characteristics of Engineering Workstation (EWS)

a.	Manufacturer	By Supplier	

Name of Bidder : _____

Signature of Bidder : _____

	Description	NPC Requirements	Supplier's Data
b.	Place of Manufacturer	By Supplier	
c.	Description/Type	Multi-task Industrial Computer, Workstation and/or Desktop	
d.	Hardware	Latest available model on time of award	

1.5 Technical Features and Characteristics of Sequence of Event (SOE) Manager

a.	Manufacturer	By Supplier	
b.	Place of Manufacturer	By Supplier	
c.	Description/Type	Multi-task Industrial Computer, Workstation and/or Desktop	
d.	Hardware	Latest available model on time of award	

1.6 Technical Features of Printer and other Peripheral Equipment [3]

a.	Manufacturer	By Supplier	
b.	Place of Manufacturer	By Supplier	
c.	Event recorder printer	Dot matrix	

[3] The Supplier to provide instruction manuals.

Name of Bidder : _____

Signature of Bidder : _____

1.7 Technical Features and Characteristics of Time Synchronization Unit

Description	NPC Requirements	Supplier's Data
a. Manufacturer	By Supplier	
b. Place of Manufacturer	By Supplier	
c. General Features		
1. Type	Modular System	
2. Description	Industrial Master Clock with SNTP time protocol per IEC 61850 standard	
d. Synchronization		
1. Internal Synchronization	GPS, synchronization TOP, Time code on serial link all time code format necessary within the power station	
2. External Synchronization	GPS, capability for time code on serial link one-time code	

Name of Bidder : _____

Signature of Bidder : _____

2.0 PROTECTION RELAY SYSTEM

2.1 GENERATOR PROTECTION RELAY

2.1.1 Generator Protection Relay Technical Features & Characteristics

Description	NPC Requirements	Supplier's Data
a. Construction	Microprocessor based and/or numerical	
b. Mounting	To be installed inside the panel enclosure	
c. Configuration editor and maintenance software for protection relays to be provided	Yes	
d. Operating frequency	60 Hz	
e. Relays and functions:		
1. Generator-Differential (87)	To be included	
2. Lock-out (86)	To be included	
3. Frequency (81O/81U)	To be included	
4. Over voltage (59)	To be included	
5. Under voltage (27)	To be included	
6. Voltage balance relay (60)	To be included	
7. Stator thermal overload (49)	To be included	
8. AC Time overcurrent (51)	To be included	
9. Instantaneous overcurrent (50)	To be included	
10. Negative phase sequence (46)	To be included	
11. Loss of excitation (40)	To be included	
12. Directional power (32)	To be included	
13. Volts/hertz (24)	To be included	

Name of Bidder : _____

Signature of Bidder : _____

2.2 TRANSFORMER PROTECTION RELAY

2.2.1 Transformer Protection Relay Technical Features & Characteristics

Description	NPC Requirements	Supplier's Data
a. Construction	Microprocessor based and/or numerical [4]	
b. Mounting	To be installed inside the panel enclosure	
c. If individual relays are to be supplied, required no. of protection sets for single transformer (specify one, two, etc.)	One [5]	
d. Configuration editor and maintenance software for protection relays to be provided	Yes	
e. Operating frequency	60 Hz	
f. Provided with the following relays and functions:		
1. Generator-Transformer-Differential (87GT)	To be included	
2. Generator-Transformer Lock-out (86GT)	To be included	
3. Over voltage (59)	To be included	
4. Over-fluxing (59F)	To be included	
5. Restricted earth fault	To be included	
6. Overcurrent (50/51) [6]	To be included	

[4] If a numerical protection is proposed, it shall have an integrated overcurrent (if required), overload and over fluxing (if required) relays as backup for the differential protection function.
[5] The technical data stated are taken from the requirements of both ANSI/IEEE C.37.91 and IEC 255. The Supplier shall fill-up the applicable data requirements stated for the relay to be supplied.
[6] The Supplier to indicate the proposed measuring range i.e. instantaneous and time delay.

Name of Bidder : _____

Signature of Bidder : _____

Description	NPC Requirements	Supplier's Data
7. Neutral overcurrent (51N) [7]	To be included	
8. Restraint percentage	20 %	
9. Current taps for winding (for CT ratio matching)	With vector group and CT ratio compensation	

[7] The Supplier to give full description i.e. methods of stabilizing for inrush current.

Name of Bidder : _____

Signature of Bidder : _____

SECTION VI – TECHNICAL SPECIFICATIONS

PART II – TECHNICAL DATA SHEETS

SECTION 3.0 – 6.0

Documents to be Submitted during the Post Qualification as Reference for the Approval of Manufacturer's Brochures/Drawings

1. The following shall be filled-out and to be submitted during the post qualification.

2. Filled-out data by the Supplier shall only serve as reference for the review and approval of brochures/drawings during implementation stage.

3. The Bidder is required to provide all the information required under the Column "Supplier's Data". Although not given by NPC, the Supplier's Data shall be based on the International Standard.

4. NPC's requirements are indicated below. The Supplier shall indicate their data corresponding to the said NPC requirements to facilitate evaluation of Supplier's compliance to the specifications.

5. Deviation from the requirements indicated in the Technical Data Sheets shall be ground for disqualification.

6. Non-submission of the documents shall be ground for disqualification.

Name of Bidder : _____

Signature of Bidder : _____

SECTION VI – TECHNICAL SPECIFICATIONS

PART II – TECHNICAL DATA SHEETS

3.0 DISTRIBUTED CONTROL SYSTEM [8]

3.1 System Capacity Description

Description	NPC Requirements	Supplier's Data
a. Manufacturer	By Supplier	
b. Place of Manufacturer	By Supplier	
c. No. of Operating Console (Operator Workstation)	2 Sets	
d. No. of event and record printer (Dot Matrix)	1 Unit	
e. No. of maintenance and configuration console (Engineering Workstation)	1 Set	
f. No. of subsystem devoted to substation unit management	As Required	
g. Total no. of turbine-generator equipment and associated auxiliary devices managed by DCS.	Refer to System Architecture	
h. No. of binary inputs per single subsystem devoted to unit management	As Required with 30% spares	

[8] Data given are minimum requirements. The Supplier may offer DCS with greater system capability.

Name of Bidder : _____

Signature of Bidder : _____

	Description	NPC Requirements	Supplier's Data
i.	No. of equipment display	In accordance with the number of different equipment in power station	
j.	System Architecture designed to allow modification/configuration of hardware (i.e. additional unit computers and software) [9]	Yes	
k.	System software, including maintenance and configuration editor software	To be Provided	
3.2	**Technical Features and Characteristics of Centralized Control Unit (CCU)**		
a.	Manufacturer	By Supplier	
b.	Place of Manufacturer	By Supplier	
c.	Description/Type	Modular Industrial Computer	
d.	Modularity	CPU + I/O Module	
e.	Hardware		
1.	Processor	Latest available model on time of award	
2.	Clock frequency	Latest available model on time of award	
3.	RAM for programs	As Required	
4.	RAM capacity for data	As Required	
5.	REFROM capacity	As Required	

[9] Modifications will not require any changes in the existing hardware and services of the Supplier/ Manufacturer in case of future expansion.

Name of Bidder : _____

Signature of Bidder : _____

Description	NPC Requirements	Supplier's Data
6. Key Features	High-performance, High-reliability modular controller	
7. RAS Features	CPU self-diagnostics, I/O diagnostics	
8. Module Configuration	Duplex, Hot-Swappable	
9. Heat Dissipation	Low heat dissipation eliminates the need for a fan	
10. Protection	Manufacturer's Std.	
11. Power Supply Input [10]	220 to 240VAC	
12. Communication Method	Full/Half Duplex (Software Setting)	
13. Network Interface	RS-232C (Serial) and/or RJ45 (TCP-IP)	
14. Communication Protocol	DNP 3.0 and/or DNP3.0, TCP-IP and/or IEC61850, etc.	
f. Software		
1. Key Specifications	Multiple Process Intensive Control, Wide Area Communication	
2. Sequential Control	Relatively High (Logic)	
3. Cyber Security	By Supplier	

[10] The Supplier shall design his equipment based on the hardware's power supply characteristics.

Name of Bidder : _____

Signature of Bidder : _____

Description	NPC Requirements	Supplier's Data
g. Binary inputs		
1. Capacity	By Supplier; with 30% spare inputs	
2. Modularity [11]	By Supplier	
3. Rated Working Voltage	By Supplier	
4. Discrepancy Management	Yes	
5. High flow event acquisition capability	Yes	
h. Low level analog inputs		
1. Capacity	By Supplier; With 30% spare inputs	
2. Modularity [11]	By Supplier	
i. High level analog inputs		
1. Capacity	By Supplier; With 30% spare inputs	
2. Measurement Method	Rapid Sampling and Digital Computation	
j. Binary Outputs		
1. Capacity	By Supplier; With 30% spare inputs	
2. Modularity [11]	By Supplier	
3. Protection	Manufacturer's Std.	

[11] The Supplier may offer other modularity

Name of Bidder : _____

Signature of Bidder : _____

Description	NPC Requirements	Supplier's Data
k. Communication Interface		
1. Local Area Network	Refer to System Architecture	
2. Communication Protocols	MODBUS, TCP/IP, IEC60870, IEC 61850, IEEE 802.3, CSMA/CD, EtherNet/IP, DNP 3, etc.	

3.3 Technical Features and Characteristics of Human Interface Station (HIS)/ Engineering Workstation (EWS)/ Sequence of Event (SOE) Manager

a. Manufacturer	By Supplier	
b. Place of Manufacturer	By Supplier	
c. Description/Type	Multi-task Industrial Computer, Workstation and/or Desktop	
d. Hardware		
1. CPU Processor	Latest available model on time of award	
2. Clock Frequency	At least 2.6 GHz	
3. RAM capacity	At least 8 GB	
4. Hard Disk Capacity	At least 1 TB	
5. Video RAM	At least 2 GB	
6. Monitor		
i. Size	32" LED Color Monitor	
ii. Resolution	1280 x 1024	
iii. Graphical Capability	True Color 32-bit	

Name of Bidder : _____

Signature of Bidder : _____

Description	NPC Requirements	Supplier's Data
e. Software		
1. Operating System	Windows or Equivalent	
2. Database Management	Specialized Relational Database Management Software	
3. Window System	Yes	
4. Communication Stack	OSI-TCP/IP	
f. Peripheral		
1. Communication Interface	TCP/IP SCSI Interface, IEEE 802.3 Interface, RS232 Interface, etc.	
2. Optical Drive	DVD + RW (Latest Speed)	
3. USB Drive Slot	Included	
4. Portable Mouse	Optical sensor type with scroll wheel	
g. Power Supply (with UPS)		
1. Voltage	220VAC, 1-Ø, 60Hz	
2. Redundancy	Yes	
3. Modular	Yes	
4. Hot-Swappable	Yes	
3.4 Technical Features of Printers and other Peripheral Equipment [12]		
a. Manufacturer	By Supplier	
b. Place of Manufacturer	By Supplier	

[12] The Supplier to provide instruction manuals

Name of Bidder : _____

Signature of Bidder : _____

	Description	NPC Requirements	Supplier's Data
c.	Event recorder printer		
1.	Type	Inkjet	
2.	Engine feature	Not less than 20ppm print engine	
3.	Resolution [13]	Not less than 600 dpi	
4.	Paper Size	Up to A3	
3.5	**Technical Features and Characteristics of Time Synchronization Unit**		
a.	Manufacturer	By Supplier	
b.	Place of Manufacturer	By Supplier	
c.	General Features		
1.	Type	Built-in function of the Generator Protection Relay	
2.	Description	Industrial Master Clock with SNTP time protocol per IEC 61850 standard	
d.	Synchronization		
1.	Internal Synchronization	GPS, synchronization TOP, Time code on serial link all time code format necessary within the power station	
2.	External Synchronization	GPS, capability for time code on serial link one-time code	

[13] The Supplier may offer better printer resolution than what is specified.

Name of Bidder : _____

Signature of Bidder : _____

3.6 TRAINING REQUIREMENTS

Description	NPC Requirements	Supplier's Data
a. Manufacturer-supervised Hands-on Technical Training including configuration, setting and parameterization at the Manufacturer's Laboratory facilities (Yes, No)	No	
b. Required number of personnel to attend Hands-on Technical Training	N/A	
c. Operating and Configuration Editor Software Program		
1. All system software and configuration editor software program including licenses shall be supplied and included in the cost of the DCS System	Yes	
2. Set of each type of software including licenses plus instruction manuals shall be furnished.	Yes	
3. The DCS System shall be configured considering the future expansion as shown on the system architecture	Yes	
d. The training requirements for the DCS System shall be as specified in the Technical Requirements.	Local Training	

Name of Bidder : _____

Signature of Bidder : _____

3.7 TEST AND EXPERIENCE REQUIREMENTS

Description	NPC Requirements	Supplier's Data
a. Test Requirements		
1. Design Test and Certified Test Reports of the DCS components required (Yes, No) *	Yes	
2. Certified test design reports of prototype or duplicate production type are acceptable (Yes, No) *	Yes	
3. Test frequency requirements	60 Hz	
4. Factory Acceptance (Routine) Tests to be performed on the DCS (Yes, No)	No	
5. Factory Acceptance (Routine) Tests to be witnessed by NPC representative (Yes, No)	No	
b. Equipment and Manufacturer's Experience		
1. The manufacturer should have been in the business of manufacturing the type of equipment for not less than: **	10 Years	
2. The same type of DCS system architecture for power station being offered should have been in the actual service for not less than: **	5 Years	

Name of Bidder : _____

Signature of Bidder : _____

4.0 PROTECTION RELAY SYSTEM

4.1 GENERATOR PROTECTION RELAY

4.1.1 Cubicle Details of Generator Protective Relay

Description	NPC Requirements	Supplier's Data
a. Cubicle type	Enclosed swinging rack	
b. Panel type (specify mosaic, sheet steel)	Sheet steel	
c. With gasketed doors (Yes, No)	Yes	
d. Degree and protective class applied	Yes, IP50	
e. Cable entrance	Bottom	
f. Access for maintenance and testing (specify front, rear, front & rear)	Front	

4.1.2 Generator Protection Relay Technical Features & Characteristics

a. Construction	Microprocessor based and/or numerical	
b. Mounting	To be installed inside the panel enclosure	
c. Configuration editor and maintenance software for protection relays to be provided	Yes	
d. Operating frequency	60 Hz	
e. Relays and functions:		
1. Generator-Differential (87)	To be included	

Name of Bidder : _____

Signature of Bidder : _____

Description	NPC Requirements	Supplier's Data
2. Lock-out (86)	To be included	
3. Frequency (81O/81U)	To be included	
4. Over voltage (59)	To be included	
5. Under voltage (27)	To be included	
6. Voltage balance relay (60)	To be included	
7. Stator thermal overload (49)	To be included	
8. AC Time overcurrent (51)	To be included	
9. Instantaneous overcurrent (50)	To be included	
10. Negative phase sequence (46)	To be included	
11. Loss of excitation (40)	To be included	
12. Directional power (32)	To be included	
13. Volts/hertz (24)	To be included	

4.2 TRANSFORMER PROTECTION RELAY

4.2.1 Cubicle Details of Transformer Protection Relay

a. Cubicle type	Enclosed swinging rack	
b. Panel type (specify mosaic, sheet steel)	Sheet steel	
c. With gasketed doors (Yes, No)	Yes	

Name of Bidder : _____

Signature of Bidder : _____

	Description	NPC Requirements	Supplier's Data
d.	Degree and protective class applied	Yes, IP50	
e.	Cable entrance	Bottom	
f.	Access for maintenance and testing (specify front, rear, front & rear)	Front	

4.2.2 Transformer Protection Relay Technical Features & Characteristics

a.	Construction	Microprocessor based and/or numerical [14]	
b.	Mounting	To be installed inside the panel enclosure	
c.	If individual relays are to be supplied, required no. of protection sets for single transformer (specify one, two, etc.)	One [15]	
d.	Configuration editor and maintenance software for protection relays to be provided	Yes	
e.	Operating frequency	60 Hz	

[14] If numerical protection system is proposed, it shall have an integrated overcurrent (if required), overload and over fluxing (if required) relays as backup for the differential protection function.

[15] The technical data stated are taken from the requirements of ANSI/IEEE C.37.91 and IEC 255. The Supplier shall fill-up the applicable data requirements stated above for the relay to be supplied.

Name of Bidder : _____

Signature of Bidder : _____

Description	NPC Requirements	Supplier's Data
f. Provided with the following relays and functions:		
1. Generator-Transformer-Differential (87GT)	To be included	
2. Generator-Transformer Lock-out (86GT)	To be included	
3. Over voltage (59)	To be included	
4. Over-fluxing (59F)	To be included	
5. Restricted earth fault	To be included	
6. Overcurrent (50/51) [16]	To be included	
7. Neutral overcurrent (51N) [17]	To be included	
8. Restraint percentage	20 %	
9. Current taps for winding (for CT ratio matching)	With vector group and CT ratio compensation	

4.3 TEST AND EXPERIENCE REQUIREMENTS

4.3.1 Test Requirements

1. Design Test and Certified Test Reports for each of the relay components (Yes, No) *	Yes	

[16] The Supplier to indicate the proposed measuring range i.e. instantaneous and time delay.
[17] The Supplier to give full description i.e. methods of stabilizing for inrush currents.

Name of Bidder : _____

Signature of Bidder : _____

Description	NPC Requirements	Supplier's Data
2. Certified test design reports of prototype or duplicate production type are acceptable (Yes, No) *	Yes	
3. Additional tests are required, if yes, see Item 4.3.2	Yes	
4. Test frequency requirements	60 Hz	
5. Test reports of Supplier instead of manufacturer (acceptable, not acceptable):	Not acceptable	
6. Factory Acceptance (Routine) Tests to be witnessed by NPC representative (Yes, No)	No	

4.3.2 Additional Test

1. If addition tests are required, they shall be the Manufacturer's test standards not within the specified test of either ANSI or IEC standards.	Included	

4.3.3 Equipment and Manufacturer's Experience

1. The manufacturer should have been in the business of manufacturing the type of equipment for not less than: **	5 Years	

Name of Bidder : _____

Signature of Bidder : _____

Description	NPC Requirements	Supplier's Data
2. The same type of equipment being offered should have been in the actual service for not less than: **	2 Years	

5.0 UNINTERRUPTIBLE POWER SUPPLY (UPS)

5.1 BATTERY CHARGER/RECTIFIER

a. Manufacturer	By Supplier	
b. Place of manufacturer	By Supplier	
c. Construction	Microprocessor based controlled	
d. Degree of protective class applied	IP52	
e. Cable entrance (specify top, bottom)	Bottom	
f. Access for maintenance (specify front, rear, front & rear)	Front & rear	
g. Output power continuous rating	3 kVA	
h. Input voltage:		
1. Main 1 source	240VAC	
2. Main 2 source (bypass source)	125 VDC	
i. DC input characteristics:		
1. Input voltage	125 VDC, +10% to -15%	
2. Maximum input voltage	140 VDC	

Name of Bidder : _____

Signature of Bidder : _____

	Description	NPC Requirements	Supplier's Data
	3. Provision for transient voltage surge suppression to be provided (yes, no)	Yes	
j.	AC input characteristics:		
	1. Input frequency	60 Hz, -25% to +15%	
	2. Maximum input current at low line voltage (A)	Manufacturer's data	
	3. Input power factor	≥ 0.85 lagging	
	4. Harmonics distortion of input current wave form	Less than 2.5% at full load	
	5. Magnetizing inrush current	Less than nominal input current for less than one cycle	
	6. Input surge protection	Equipped with input MOV's to withstand surges	
k.	AC output characteristics:		
	1. Voltage regulation	±1% for balanced load, ±2.5% for 100% unbalanced load	
	2. Frequency	60±0.1% when free running	
	3. Voltage distortion	2% (max.) total THD and 1% any single harmonics on 100% linear loads	

Name of Bidder : _____

Signature of Bidder : _____

Description	NPC Requirements	Supplier's Data
4. Voltage transient (step load) response	+3% for 50% step load change ±5% for 100% step load change ±1% for loss of return of AC input power or manual transfer full load	
5. Voltage recovery time	Within 1% of nominal value within 1-cycle	
6. Phase angle displacement	120° ±1° for balanced load 120° ±3° for 100% unbalanced load	
7. Inverter overload capability	120% at rated full load for 1 minute 145% of rated full load for 30 sec.	
l. DC Bus:		
1. DC Bus Voltage		
a. Nominal	125 Vdc	
b. Minimum	106.25 Vdc	
c. Maximum maintenance charge voltage	140 Vdc	
d. Equalization voltage	By Supplier [18]	
2. Maximum DC current	By Supplier [18]	

[18] The Supplier to fill-up the required data.

Name of Bidder : _____

Signature of Bidder : _____

Description	NPC Requirements	Supplier's Data
m. Other Features:		
1. To form part of Distributed Control System (DCS)	Yes	
2. Remote indication for alarm to be provided at the DCS	Yes	
3. RS-232-C/485 communication port to be provided	Yes [19]	
4. Provided with contacts for sequence of events recorder	Yes, all possible indicators	

5.2 TEST AND EXPERIENCE REQUIREMENTS

5.2.1 Test Requirements

1. Design (type) and Routine test and certified test reports of UPS system components required (yes, no) *	Yes	
2. Test frequency requirements	60 Hz	

5.2.2 Equipment and Manufacturer's Experience

1. The manufacturer should have been in the business of manufacturing the type of equipment for not less than: **	10 Years	

[19] The Supplier to give full description of all possible indicators and alarms.

Name of Bidder : _____

Signature of Bidder : _____

Description	NPC Requirements	Supplier's Data
2. The manufacturer should have a supply record of UPS with the same capacity or greater of not less than: **	10 Units	

6.0 POWER, CONTROL and INSTRUMENTATION CABLE

6.1 600V POWER CABLE[20]

6.1.1 Cable Design Data

a. No. of conductors/cable and size	By Supplier[21]	
b. Conductor Material	Annealed copper stranded wire for all conductors	
c. Conductor Shape	Circular stranded for all cables	
d. Type of insulation	PVC for all cables	
e. Thickness of insulation of conductors not less than	Manufacturer's std.	
f. Type of jacket	PVC Jacketed for all cables	
g. Thickness of jacket/outer sheath not less than	1.8 for all cables	
h. Provided with filler and binder tape	Yes, for all cable	
i. Maximum outside diameter	Manufacturer's std.	
j. Maximum operating Temperature	90 °C	

[20] The Cable to be provided shall be capable to withstand insulation test voltage of at least 2000V.

[21] The Supplier to give full description of various number of conductor/cable and sizes.

Name of Bidder : _____

Signature of Bidder : _____

6.2 600V CONTROL & INSTRUMENTATION CABLE

6.2.1 Cable Design Data

Description	NPC Requirements	Supplier's Data
a. No. of conductors/cable and size	By Supplier [21]	
b. Conductor Material	Annealed copper stranded wire for all conductors	
c. Conductor Shape	Circular stranded for all cables	
d. Type of insulation	PVC for all cables	
e. Thickness of insulation of conductors not less than	Manufacturer's std.	
f. Type of jacket	PVC Jacketed for all cables	
g. Thickness of jacket/outer sheath not less than	1.8 for all cables	
h. Provided with filler and binder tape	Yes, for all cable	
i. Overall shield required (yes, no)	Yes	
j. Type of shielding	Annealed copper tape with minimum thickness of 0.05mm applied helically over the binder tape	
k. Maximum outside diameter	Manufacturer's std.	
l. Maximum operating Temperature	90°C	

Name of Bidder : _____

Signature of Bidder : _____

6.3 TEST AND EXPERIENCE REQUIREMENTS

6.3.1 Test Requirements

Description	NPC Requirements	Supplier's Data
1. Design test in accordance with applicable standards and reports required (Yes, No) *	Yes	
2. Certified Design Test Reports of previous tests conducted for same cables are acceptable: (Yes, No)	Yes	
3. Test frequency requirements	60 Hz	
4. Routine test to be performed	Yes	

6.3.2 Equipment and Manufacturer's Experience

1. The manufacturer should have been in the business of manufacturing power and control cables for not less than: **	10	

Name of Bidder : _____

Signature of Bidder : _____

SECTION VII

SCHEDULE OF REQUIREMENTS

SECTION VII - SCHEDULE OF REQUIREMENTS

UPGRADING OF ANNUNCIATOR, CONTROL AND PROTECTION SYSTEM OF UNIT NO. 1 AT AGUS 4 HEP PLANT

PRE - PR

ITEM NO.	DESCRIPTION	QTY.- UNIT	* CODE	UNIT PRICE FOR GOODS AND RELATED SERVICES TO BE SUPPLIED AND DELIVERED					TOTAL PRICE
				Unit Price of Goods Delivered up to Philippine Port +(Phil. Peso)	Import Duties & other Levies Imposed by Phil. Govt. (Phil. Peso)	Value Added Tax and other Taxes Imposed by Phil. Govt. (Phil. Peso)	Local Transport from Port to Delivery Site <(Phil. Peso)	Labor (Installation, Testing and Commissioning) >(Phil. Peso)	Local Currency (Phil. Peso) ({E+F+G+H+I} x C)
(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)
1.0	Upgrading of Annunciator, Control and Protection System of Unit no. 1 at Agus 4 HEP Plant including all other works and services as specified in the Technical Specifications.	1 Lot							
	---------- Nothing Follows ----------								

* Bidders shall enter a code representing the Country of Origin of all imported Equipment, Materials and Accessories

\+ Cost of equipment, freight, insurance, etc. up to Phil. port of entry

< Unit Price for Local Transportation, insurance and other local costs incidental to delivery of the goods from the Phil port of entry to final delivery site

> Unit Price for Local Transportation, insurance and other local costs incidental to delivery of the goods from local source to final delivery site

Note: Final delivery site of the equipment shall be at:
Agus 4 HEP Plant, Bato-i, Lanao del Norte

Name of Bidder: _____

Signature of Bidder: _____

Code	Country of Origin	

SECTION VIII

BIDDING FORMS

SECTION VIII – BIDDING FORMS

TABLE OF CONTENTS

Standard Form No: NPCSF-GOODS-01

Checklist of Technical & Financial Envelope Requirements for Bidders

A. THE 1ST ENVELOPE (TECHNICAL COMPONENT) SHALL CONTAIN THE FOLLOWING:

1. ELIGIBILITY DOCUMENTS

a. (CLASS A)

➢ Any of the following:

- PhilGEPS Certificate of Registration and Membership under Platinum Category in accordance with Section 8.5.2 of the IRR;

OR:

- The following updated and valid Class "A" eligibility documents enumerated under "Annex A" of the Platinum Membership:
  - Registration Certificate from the Securities and Exchange Commission (SEC) for corporations, Department of Trade and Industry (DTI) for sole proprietorship, or Cooperative Development Authority (CDA) for cooperatives;
  - Mayor's/Business permit issued by the city or municipality where the principal place of business of the prospective bidder is located, or the equivalent document for Exclusive Economic Zones or Areas.

    In cases of recently expired Mayor's/Business permits, it shall be accepted together with the official receipt as proof that the bidder has applied for renewal within the period prescribed by the concerned local government unit, provided that the renewed permit shall be submitted as a post qualification requirement in accordance with Section 34.2 of the Revised IRR of RA 9184.
  - The prospective bidder's audited financial statements, showing, among others, the prospective bidder's total and current assets and liabilities, stamped "received" by the BIR or its duly accredited and authorized institutions, for the preceding calendar year which should not be earlier than two (2) years from the date of bid submission.
  - Tax clearance per Executive Order 398, Series of 2005, as finally reviewed and approved by the BIR *or* as stated under GPPB NPM-039-2014, for Non-Resident Foreign Corporation (NRFC) and Non-Resident Alien Not Engaged in Trade or Business (NRANETB), a Delinquency Verification Certificate may be submitted as a form of Tax Clearance;

OR:

- A combination thereof

➢ Statement of all its ongoing government and private contracts if any, whether similar or not similar in nature and complexity to the contract to be bid *(NPCSF-GOODS-02)*

➢ The Statement of the bidder's Single Largest Completed Contract (SLCC) similar to the contract to be bid, and whose value, adjusted to current prices using the Philippine Statistics Authority (PSA) consumer price index, must be at least 50% of the ABC *(NPCSF-GOODS-03)* complete with the following supporting documents:

1. Contract/Purchase Order
2. Certificate of Acceptance; or Certificate of Completion; or Official Receipt (O.R); or Sales Invoice

(The Single Largest Completed Contract (SLCC) as declared by the bidder shall be verified and validated to ascertain such completed contract. Hence, bidders must ensure access to sites of such projects/equipment to NPC representatives for verification and validation purposes during post-qualification process.

It shall be a ground for disqualification, if verification and validation cannot be conducted for reasons attributable to the Bidder.)

Standard Form No: NPCSF-GOODS-01

- Duly signed computation of its Net Financial Contracting Capacity (NFCC) at least equal to the ABC (NPCSF-GOODS-04) or a Committed Line of Credit (CLC) at least equal to ten percent (10%) of the ABC, issued by a Universal or Commercial Bank; If the Bidder opted to submit a Committed Line of Credit (CLC), the bidder must submit a granted credit line valid/effective at the date of bidding.

b. (CLASS B)

- For Joint Venture (if applicable), any of the following:
  - Valid Joint Venture Agreement *(NPCSF-GOODS-05)*

    OR

  - Notarized statements from all the potential joint venture partners stating that they will enter into and abide by the provisions of the JVA, if awarded the contract
- Certification from the relevant government office of their country stating that Filipinos are allowed to participate in their government procurement activities for the same item/product *(For foreign bidders claiming eligibility by reason of their country's extension of reciprocal rights to Filipinos)*

2. Technical Documents

- Bid Security, any one of the following:
  - Bid Securing Declaration (NPCSF-GOODS-06c)

    OR

  - Cash or Cashier's/Manager's check issued by a Universal or Commercial Bank – *2% of ABC;*

    OR

  - Bank draft/guarantee or irrevocable letter of credit issued by a Universal or Commercial Bank: *(NPCSF-GOODS-06a) - 2% of ABC;*

    OR

  - Surety Bond callable upon demand issued by a reputable surety or insurance company *(NPCSF-GOODS-06b) - 5% of ABC, with*
    - Certification from the Insurance Commission as authorized company to issue surety
- Duly signed, completely filled-out and notarized Omnibus Sworn statement (Revised) (NPCSF-GOODS-07), complete with the following attachments:
  - For Sole Proprietorship:
    - Special Power of Attorney
  - For Partnership/Corporation/Cooperative/Joint Venture:
    - Document showing proof of authorization (e.g., duly notarized Secretary's Certificate, Board/Partnership Resolution, or Special Power of Attorney, whichever is applicable)
- Data and Information to be submitted with the Bid/Proposal as specified in Clause TS-9.0(a) of Section VI - Technical Specifications
- Complete eligibility documents of the proposed subcontractor, if any

Standard Form No: NPCSF-GOODS-01

B. THE 2ND ENVELOPE (FINANCIAL COMPONENT) SHALL CONTAIN THE FOLLOWING:

- Duly signed Bid Letter indicating the total bid amount in accordance with the prescribed form *(NPCSF-GOODS-08)*
- Duly signed and completely filled-out Schedule of Requirement *(Section VII)* indicating the unit and total prices per item and the total amount in the prescribed Price Schedule form.
- For Domestic Bidder claiming for domestic preference:
  - Letter address to the BAC claiming for preference
  - Certification from DTI as Domestic Bidder in accordance with the prescribed forms provided

CONDITIONS:

1. *Each Bidder shall submit one copy of the first and second components of its Bid. NPC may request additional hard copies and/or electronic copies of the Bid. However, failure of the Bidders to comply with the said request shall not be a ground for disqualification.*

2. *In the case of foreign bidders, the eligibility requirements under Class "A" Documents (except for Tax Clearance) may be substituted by the appropriate equivalent documents, if any, issued by the country of the foreign bidder concerned. The eligibility requirements or statements, the bids, and all other documents to be submitted to the BAC must be in English. If the eligibility requirements or statements, the bids, and all other documents submitted to the BAC are in foreign language other than English, it must be accompanied by a translation of the documents in English. The documents shall be translated by the relevant foreign government agency, the foreign government agency authorized to translate documents, or a registered translator in the foreign bidder's country; and shall be authenticated by the appropriate Philippine foreign service establishment/post or the equivalent office having jurisdiction over the foreign bidder's affairs in the Philippines.*

   These documents shall be accompanied by a Sworn Statement in a form prescribed by the GPPB stating that the documents submitted are complete and authentic copies of the original, and all statements and information provided therein are true and correct. Upon receipt of the said documents, the PhilGEPS shall process the same in accordance with the guidelines on the Government of the Philippines – Official Merchants Registry (GoP-OMR).

3. *A Bidder not submitting bid for reason that his cost estimate is higher than the ABC, is required to submit his letter of non-participation/regret supported by corresponding detailed estimates. Failure to submit the two (2) documents shall be understood as acts that tend to defeat the purpose of public bidding without valid reason as stated under Section 69.1.(i) of the revised IRR of R.A. 9184.*

Standard Form Number: NPCSF-GOODS-02

List of All Ongoing Government and Private Contracts Including Contract Awarded But Not Yet Started

Business Name : _____
Business Address : _____

Name of Contract/ Project Cost	a. Owner's Name b. Address c. Telephone Nos.	Nature of Work	Bidder's Role		a. Date Awarded b. Date Started c. Date of Completion or Contract Duration/ Date of Delivery	Value of Outstanding Works / Undelivered Portion
			Description	%		
Government						
Private						
					Total Cost	

The bidder shall declare in this form all his on-going government and private contracts including contracts where the bidder (either as individual or as a Joint Venture) is a partner in a Joint Venture agreement other than his current joint venture where he is a partner. Non declaration will be a ground for disqualification of bid.

Note : This statement shall be supported with the following documents for all the contract(s) stated above which shall be submitted during Post-qualification:
1. Contract/Purchase Order and/or Notice of Award
2. Certification coming from the project owner/client that the performance is satisfactory as of the bidding date.

Submitted by : _____
(Printed Name & Signature)
Designation : _____
Date : _____

Standard Form Number: NPCSF-GOODS-03

The Statement of the bidder's Single Largest Completed Contract (SLCC) similar to the contract to be bid

Business Name : _____
Business Address : _____

Name of Contract	a. Owner's Name b. Address c. Telephone Nos.	Nature of Work	Contractor's Role		a. Amount at Award b. Amount at Completion c. Duration	a. Date Awarded b. Contract Effectivity c. Date Completed
			Description	%		

Notes: 1. The bidder must state only one (1) Single Largest Completed Contract (SLCC) similar to the contract to be bid.
2. Supporting documents such as Contract/Purchase Order and any of the following: Certificate of Acceptance; *or* Certificate of Completion; *or* Official Receipt (O.R); or Sales Invoice for the contract stated above shall be submitted during Bid Opening.

Submitted by : _____
(Printed Name & Signature)
Designation : _____
Date : _____

Standard Form Number: NPCSF-GOODS-04

NET FINANCIAL CONTRACTING CAPACITY (NFCC)

A. Summary of the Supplier's/Distributor's/Manufacturer's assets and liabilities on the basis of the income tax return and audited financial statement for the immediately preceding calendar year are:

		Year 20__
1.	Total Assets	
2.	Current Assets	
3.	Total Liabilities	
4.	Current Liabilities	
5.	Net Worth (1-3)	
6.	Net Working Capital (2-4)	

B. The Net Financial Contracting Capacity (NFCC) based on the above data is computed as follows:

NFCC = [(Current assets minus current liabilities) x 15] minus the value of all outstanding or uncompleted portions of the projects under ongoing contracts, including awarded contracts yet to be started coinciding with the contract for this Project.

NFCC = P _____

Herewith attached is certified true copy of the audited financial statement, stamped "RECEIVED" by the BIR or BIR authorized collecting agent for the immediately preceding calendar year.

Submitted by:

_____
Name of Supplier / Distributor / Manufacturer

_____
Signature of Authorized Representative

Date : _____

Standard Form Number: NPCSF-GOODS-05

JOINT VENTURE AGREEMENT

KNOW ALL MEN BY THESE PRESENTS:

That this JOINT VENTURE AGREEMENT is entered into by and between: _____, of legal age, *(civil status)*_____, authorized representative of _____ and a resident of _____.

- and –

_____, of legal age, *(civil status)*_____, authorized representative of _____ a resident of _____.

That both parties agree to join together their capital, manpower, equipment, and other resources and efforts to enable the Joint Venture to participate in the Bidding and Undertaking of the hereunder stated Contract of the **National Power Corporation.**

NAME OF PROJECT	**CONTRACT AMOUNT**
_____	_____

That the capital contribution of each member firm:

NAME OF FIRM	CAPITAL CONTRIBUTION
1.	₱
2.	₱

That both parties agree to be jointly and severally liable for their participation in the Bidding and Undertaking of the said contract.

That both parties agree that _____ and/or _____ shall be the Official Representative/s of the Joint Venture, and are granted full power and authority to do, execute and perform any and all acts necessary and/or to represent the Joint Venture in the Bidding and Undertaking of the said contract, as fully and effectively and the Joint Venture may do and if personally present with full power of substitution and revocation.

That this Joint Venture Agreement shall remain in effect only for the above stated Contract until terminated by both parties.

_____	_____
Name & Signature of Authorized Representative	*Name & Signature of Authorized Representative*
_____	_____
Official Designation	*Official Designation*
_____	_____
Name of Firm	*Name of Firm*

Witnesses

1. _____ 2. _____

[Jurat]

[Format shall be based on the latest Rules on Notarial Practice]

Standard Form Number: NPCSF-GOODS-06a

FORM OF BID SECURITY (BANK GUARANTEE)

WHEREAS, *(Name of Bidder)*_____ (hereinafter called "the Bidder") has submitted his bid dated *(Date)*_____ for the *[name of project]* (hereinafter called "the Bid").

KNOW ALL MEN by these presents that We *(Name of Bank)*_____ of *(Name of Country)*_____ having our registered office at _____ (hereinafter called "the Bank" are bound unto National Power Corporation (hereinafter called "the Entity") in the sum of *[amount in words & figures as prescribed in the bidding documents]* for which payment well and truly to be made to the said Entity the Bank binds himself, his successors and assigns by these presents.

SEALED with the Common Seal of the said Bank this _____ day of _____ 20___.

THE CONDITIONS of this obligation are that:

1) if the Bidder withdraws his Bid during the period of bid validity specified in the Bidding Documents; or
2) if the Bidder does not accept the correction of arithmetical errors of his bid price in accordance with the Instructions to Bidder; or
3) if the Bidder, having determined as the LCB, fails or refuses to submit the required tax clearance, latest income and business tax returns and PhilGEPs registration certificate within the prescribed period; or
4) if the Bidder having been notified of the acceptance of his bid and award of contract to him by the Entity during the period of bid validity:
   a) fails or refuses to execute the Contract; or
   b) fails or refuses to submit the required valid JVA, if applicable; or
   c) fails or refuses to furnish the Performance Security in accordance with the Instructions to Bidders;

we undertake to pay to the Entity up to the above amount upon receipt of his first written demand, without the Entity having to substantiate its demand, provided that in his demand the Entity will note that the amount claimed by it is due to the occurrence of any one or combination of the four (4) conditions stated above.

The Guarantee will remain in force up to 120 days after the opening of bids or as it may be extended by the Entity, notice of which extension(s) to the Bank is hereby waived. Any demand in respect of this Guarantee should reach the Bank not later than the above date.

DATE _____ SIGNATURE OF THE BANK _____

WITNESS _____ SEAL _____

_____
(Signature, Name and Address)

Standard Form Number: NPCSF-GOODS-06b

FORM OF BID SECURITY (SURETY BOND)

BOND NO.: _____ DATE BOND EXECUTED: _____

By this bond, We *(Name of Bidder)* _____ (hereinafter called "the Principal") and *(Name of Surety)* _____ of *(Name of Country of Surety)* _____, authorized to transact business in the Philippines (hereinafter called "the Surety") are held and firmly bound unto National Power Corporation (hereinafter called "the Employer") as Obligee, in the sum of *(amount in words & figures as prescribed in the bidding documents)*, callable on demand, for the payment of which sum, well and truly to be made, we, the said Principal and Surety bind ourselves, our successors and assigns, jointly and severally, firmly by these presents.

SEALED with our seals and dated this _____ day of _____ 20 _____

WHEREAS, the Principal has submitted a written Bid to the Employer dated the _____ day of _____ 20 _____, for the _____ (hereinafter called "the Bid").

NOW, THEREFORE, the conditions of this obligation are:

1) if the Bidder withdraws his Bid during the period of bid validity specified in the Bidding Documents; or
2) if the Bidder does not accept the correction of arithmetical errors of his bid price in accordance with the Instructions to Bidder; or
3) if the Bidder, having determined as the LCB, fails or refuses to submit the required tax clearance, latest income and business tax returns and PhilGEPs registration certificate within the prescribed period; or
4) if the Bidder having been notified of the acceptance of his bid and award of contract to him by the Entity during the period of bid validity:
    d) fails or refuses to execute the Contract; or
    e) fails or refuses to submit the required valid JVA, if applicable; or
    f) fails or refuses to furnish the Performance Security in accordance with the Instructions to Bidders;

then this obligation shall remain in full force and effect, otherwise it shall be null and void.

PROVIDED HOWEVER, that the Surety shall not be:

a) liable for a greater sum than the specified penalty of this bond, nor

b) liable for a greater sum that the difference between the amount of the said Principal's Bid and the amount of the Bid that is accepted by the Employer.

Standard Form Number: NPCSF-GOODS-06b
Page 2 of 2

This Surety executing this instrument hereby agrees that its obligation shall be valid for 120 calendar days after the deadline for submission of Bids as such deadline is stated in the Instructions to Bidders or as it may be extended by the Employer, notice of which extension(s) to the Surety is hereby waived.

PRINCIPAL _____	SURETY _____
SIGNATURE(S) _____	SIGNATURES(S) _____
NAME(S) AND TITLE(S) _____	NAME(S) _____
SEAL _____	SEAL _____

Standard Form No: NPCSF-GOODS-06c

REPUBLIC OF THE PHILIPPINES)
CITY OF _____) S.S.

BID-SECURING DECLARATION
UPGRADING OF ANNUNCIATOR, CONTROL AND PROTECTION SYSTEM OF UNIT NO. 1 AT AGUS 4 HEP PLANT (PR NO. PR NO. MG-A5M23-003)

To: **National Power Corporation**
BIR Road cor. Quezon Ave.
Diliman, Quezon City

I/We[1], the undersigned, declare that:

1. *I/We* understand that, according to your conditions, bids must be supported by a Bid Security, which may be in the form of a Bid-Securing Declaration.
2. *I/We* accept that: (a) *I/we* will be automatically disqualified from bidding for any contract with any procuring entity for a period of two (2) years upon receipt of your Blacklisting Order; and, (b) *I/we* will pay the applicable fine provided under Section 6 of the Guidelines on the Use of Bid Securing Declaration, within fifteen (15) days from receipt of the written demand by the Procuring Entity for the commission of acts resulting to the enforcement of the Bid Securing Declaration under Sections 23.1 (b), 34.2, 40.1 and 69.1, except 69.1 (f) of the IRR of R.A. 9184; without prejudice to other legal action the government may undertake.
3. *I/We* understand that this Bid-Securing Declaration shall cease to be valid on the following circumstances:
   (a) Upon expiration of the bid validity period, or any extension thereof pursuant to your request;
   (b) *I am/we are* declared ineligible or post-disqualified upon receipt of your notice to such effect, and (i) *I/we* failed to timely file a request for reconsideration or (ii) *I/we* filed a waiver to avail of said right;
   (c) *I am/we are* declared as the bidder with the Lowest Calculated and Responsive Bid, and *I/we* have furnished the performance security and signed the Contract.

IN WITNESS WHEREOF, *I/we* have hereunto set my hand this ____ day of ____ 20____ at _____, Philippines.

_____
[Name and Signature of Bidder's Representative/ Authorized Signatory]
[Signatory's legal capacity]
Affiant

[Jurat]
[Format shall be based on the latest Rules on Notarial Practice]

[1] *Select one and delete the other. Adopt same instruction for similar terms throughout the document.*

Standard Form No: NPCSF-GOODS-07

Omnibus Sworn Statement (Revised)

REPUBLIC OF THE PHILIPPINES)
CITY/MUNICIPALITY OF _____) S.S.

AFFIDAVIT

I, [Name of Affiant], of legal age, [Civil Status], [Nationality], and residing at [Address of Affiant], after having been duly sworn in accordance with law, do hereby depose and state that:

1. *[Select one, delete the other:]*

   [If a sole proprietorship:] I am the sole proprietor or authorized representative of [Name of Bidder] with office address at [address of Bidder];

   [If a partnership, corporation, cooperative, or joint venture:] I am the duly authorized and designated representative of [Name of Bidder] with office address at [address of Bidder];

2. *[Select one, delete the other:]*

   [If a sole proprietorship:] As the owner and sole proprietor, or authorized representative of [Name of Bidder], I have full power and authority to do, execute and perform any and all acts necessary to participate, submit the bid, and to sign and execute the ensuing contract for [Name of the Project] of the [Name of the Procuring Entity], as shown in the attached duly notarized Special Power of Attorney;

   [If a partnership, corporation, cooperative, or joint venture:] I am granted full power and authority to do, execute and perform any and all acts necessary to participate, submit the bid, and to sign and execute the ensuing contract for [Name of the Project] of the [Name of the Procuring Entity], as shown in the attached [state title of attached document showing proof of authorization (e.g., duly notarized Secretary's Certificate, Board/Partnership Resolution, or Special Power of Attorney, whichever is applicable;)];

3. [Name of Bidder] is not "blacklisted" or barred from bidding by the Government of the Philippines or any of its agencies, offices, corporations, or Local Government Units, foreign government/foreign or international financing institution whose blacklisting rules have been recognized by the Government Procurement Policy Board, by itself or by relation, membership, association, affiliation, or controlling interest with another blacklisted person or entity as defined and provided for in the Uniform Guidelines on Blacklisting;

4. Each of the documents submitted in satisfaction of the bidding requirements is an authentic copy of the original, complete, and all statements and information provided therein are true and correct;

5. [Name of Bidder] is authorizing the Head of the Procuring Entity or its duly authorized representative(s) to verify all the documents submitted;

6. *[Select one, delete the rest:]*

   [If a sole proprietorship:] The owner or sole proprietor is not related to the Head of the Procuring Entity, members of the Bids and Awards Committee (BAC), the Technical Working Group, and the BAC Secretariat, the head of the Project Management Office or the end-user unit, and the project consultants by consanguinity or affinity up to the third civil degree;

   [If a partnership or cooperative:] None of the officers and members of *[Name of Bidder]* is related to the Head of the Procuring Entity, members of the Bids and Awards Committee (BAC), the Technical Working Group, and the BAC Secretariat, the head of the Project

Management Office or the end-user unit, and the project consultants by consanguinity or affinity up to the third civil degree;

[If a corporation or joint venture:] None of the officers, directors, and controlling stockholders of *[Name of Bidder]* is related to the Head of the Procuring Entity, members of the Bids and Awards Committee (BAC), the Technical Working Group, and the BAC Secretariat, the head of the Project Management Office or the end-user unit, and the project consultants by consanguinity or affinity up to the third civil degree;

7. *[Name of Bidder]* complies with existing labor laws and standards; and

8. *[Name of Bidder]* is aware of and has undertaken the responsibilities as a Bidder in compliance with the Philippine Bidding Documents, which includes:

   a. Carefully examining all of the Bidding Documents;

   b. Acknowledging all conditions, local or otherwise, affecting the implementation of the Contract;

   c. Making an estimate of the facilities available and needed for the contract to be bid, if any; and

   d. Inquiring or securing Supplemental/Bid Bulletin(s) issued for the *[Name of the Project]*.

9. *[Name of Bidder]* did not give or pay directly or indirectly, any commission, amount, fee, or any form of consideration, pecuniary or otherwise, to any person or official, personnel or representative of the government in relation to any procurement project or activity.

10. In case advance payment was made or given, failure to perform or deliver any of the obligations and undertakings in the contract shall be sufficient grounds to constitute criminal liability for Swindling (Estafa) or the commission of fraud with unfaithfulness or abuse of confidence through misappropriating or converting any payment received by a person or entity under an obligation involving the duty to deliver certain goods or services, to the prejudice of the public and the government of the Philippines pursuant to Article 315 of Act No. 3815 s. 1930, as amended, or the Revised Penal Code.

IN WITNESS WHEREOF, I have hereunto set my hand this __ day of ___, 20__ at _____, Philippines.

[Insert NAME OF BIDDER OR ITS AUTHORIZED REPRESENTATIVE]
[Insert signatory's legal capacity]
Affiant

[Jurat]
[Format shall be based on the latest Rules on Notarial Practice]

Standard Form No: NPCSF-GOODS-08

BID LETTER

Date: _____

To: **THE PRESIDENT**
National Power Corporation
BIR Road cor. Quezon Ave.
Diliman, Quezon City

Gentlemen:

Having examined the Bidding Documents including Bid Bulletin Numbers *[insert numbers]*____, the receipt of which is hereby duly acknowledged, we, the undersigned, offer to perform **UPGRADING OF ANNUNCIATOR, CONTROL AND PROTECTION SYSTEM OF UNIT NO. 1 AT AGUS 4 HEP PLANT (PR NO. PR NO. MG-A5M23-003)** in conformity with the said Bidding Documents for the sum of *[total Bid amount in words and figures]*_____ or such other sums as may be ascertained in accordance with the Schedule of Prices attached herewith and made part of this Bid.

We undertake, if our Bid is accepted, to supply and deliver the goods and perform other services, if required within the contract duration and in accordance with the scope of the contract specified in the Schedule of Requirements and Technical Specifications.

If our Bid is accepted, we undertake to provide a performance security in the form, amounts, and within the times specified in the Bidding Documents.

We agree to abide by this Bid for the Bid Validity Period specified in Bid Documents and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

Until a formal Contract is prepared and executed, this Bid, together with your written acceptance thereof and your Notice of Award, shall be binding upon us.

We understand that you are not bound to accept the Lowest Calculated Bid or any Bid you may receive.

We certify/confirm that we comply with the eligibility requirements pursuant to the Bidding Documents.

We likewise certify/confirm that the undersigned, ***[for sole proprietorships, insert:*** as the owner and sole proprietor or authorized representative of *[Name of Bidder]*_____has the full power and authority to participate, submit the bid, and to sign and execute the ensuing contract, on the latter's behalf for the *[Name of Project]*_____ of the National Power Corporation ***[for partnerships, corporations, cooperatives, or joint ventures, insert:*** is granted full power and authority by the *[Name of Bidder]*_____ to participate, submit the bid, and to sign and execute the ensuing contract on the latter's behalf for *[Name of Project]*_____ of the National Power Corporation.

We acknowledge that failure to sign each and every page of this Bid Letter, including the attached Schedule of Requirements (Bid Price Schedule), shall be a ground for the rejection of our bid.

_____ _____
[name and signature of authorized signatory] *[in the capacity of]*

Duly authorized to sign Bid for and on behalf of _____
[name of bidder]

Bank Guarantee Form for Advance Payment

To: **THE PRESIDENT**
National Power Corporation
BIR Road cor. Quezon Ave.
Diliman, Quezon City

[name of Contract]

Gentlemen and/or Ladies:

In accordance with the Advance Payment Provision, of the General Conditions of Contract, *[name and address of Supplier]* (hereinafter called the "Supplier") shall deposit with the PROCURING ENTITY a bank guarantee to guarantee its proper and faithful performance under the said Clause of the Contract in an amount of *[amount of guarantee in figures and words]*.

We, the *[name of the universal/commercial bank]*, as instructed by the Supplier, agree unconditionally and irrevocably to guarantee as primary obligator and not as surety merely, the payment to the PROCURING ENTITY on its first demand without whatsoever right of objection on our part and without its first claim to the Supplier, in the amount not exceeding *[amount of guarantee in figures and words]*.

We further agree that no change or addition to or other modification of the terms of the Contract to be performed thereunder or of any of the Contract documents which may be made between the PROCURING ENTITY and the Supplier, shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition, or modification.

This guarantee shall remain valid and in full effect from the date the advance payment is received by the Supplier under the Contract and until the Goods are accepted by the PROCURING ENTITY.

Yours truly,

Signature and seal of the Guarantors

_____
[name of bank or financial institution]

_____
[address]

_____
[date]

CERTIFICATION AS A DOMESTIC BIDDER

This is to certify that based on the records of this office, *(Name of Bidder)* _____ is duly registered with the DTI on _____.

This further certifies that the articles forming part of the product of *(Name of Bidder)* _____, which are/is *(Specify)* _____ .are substantially composed of articles, materials, or supplies grown, produced or manufactured in the Philippines. (Please encircle the applicable description/s).

This certification is issued upon the request of *(Name of Person/Entity)* _____ in connection with his intention to participate in the bidding for the *(Name of Project)* _____ of the National Power Corporation (NPC).

Given this __ day of _____20__ at _____, Philippines

_____
Name

_____
Position

_____
Department of Trade & Industry

SECTION IX

ANNEXES

DCS harnesses the power of the industrial Internet of Things (IIoT) to bring your plant into the future. It is a single automation system to engineer, operate, and maintain your entire infrastructure for a sustainable, productive and market-agile plant

REDUNDANT SERVER
- Fault Tolerant
- High availability

Galaxy Repository
Automation Object Server

Display Workstations
Operator/Engineering Station

ETHERNET NETWORK

SERVICE BUILDING CONTROL ROOM

PRIMARY

SECONDARY

Remote Terminal Unit 1 Remote Terminal Unit 2 Remote Terminal Unit 3

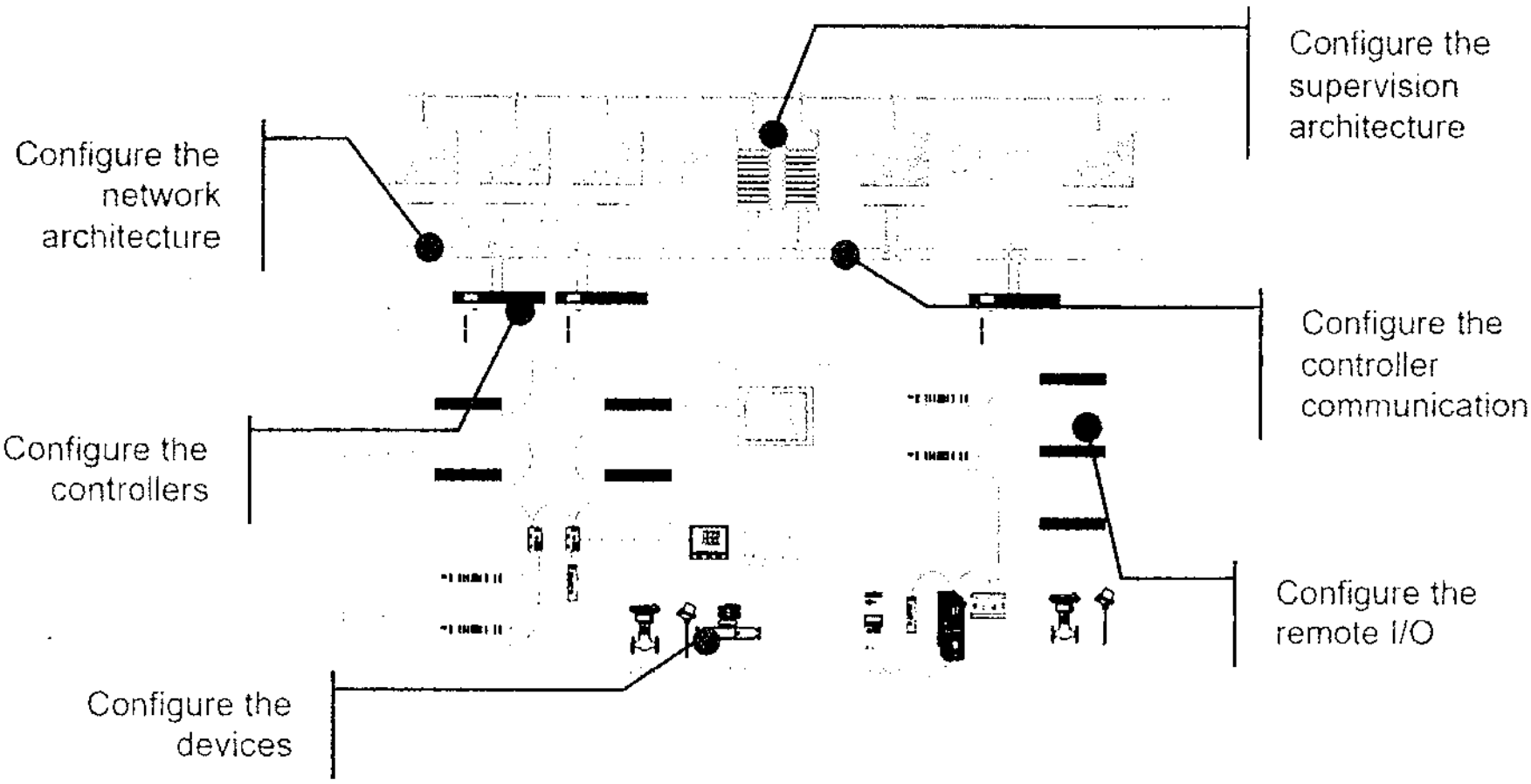
POWER CAVERN CONTROL ROOM

PRIMARY

Remote Terminal Unit 1

Remote Terminal Unit 2

PREPARED BY:	REVIEWED BY:	APPROVED BY:	TITLE:	DWG NO.
CHER ANTHONY C. BORJA Plant Supt., Agus 4 HEP	**CEDRIC VON L. ALAMAG** Plant O/M Manager, Agus 4 HEP	**NICHOLAS T. BENIGRA** Plant Manager, Agus 4&5 HEPC	**UPGRADING OF ANNUNCIATOR, CONTROL AND PROTECTION SYSTEM FOR UNIT 1 AT AGUS 4 HEP**	1 / 2



PREPARED BY:	REVIEWED BY:	APPROVED BY:	TITLE:	DWG NO.
CHER ANTHONY C. BORJA Plant Supt., Agus 4 HEP	**CEDRIC VON L. ALAMAG** Plant O/M Manager, Agus 4 HEP	**NICHOLAS T. BENIGRA** Plant Manager, Agus 4&5 HEPC	**UPGRADING OF ANNUNCIATOR, CONTROL AND PROTECTION SYSTEM FOR UNIT 1 AT AGUS 4 HEP**	2 / 2