0GOVERNMENT OF PUERTO RICO
PUBLIC SERVICE REGULATORY BOARD
PUERTO RICO ENERGY BUREAU

IN RE: REVIEW OF THE PUERTO RICO ELECTRIC POWER AUTHORITY´S 10-YEAR INFRASTRUCTURE PLAN – DECEMBER 2020	**CASE NO.:** NEPR-MI-2021-0002 **SUBJECT:** Motion to Submit Estimated Costs for SOWs Listed in Resolution and Order dated January 14, 2025

MOTION TO SUBMIT ESTIMATED COSTS FOR SOWS LISTED IN RESOLUTION AND ORDER DATED JANUARY 14, 2025

TO THE HONORABLE PUERTO RICO ENERGY BUREAU:

COMES NOW GENERA PR LLC ("Genera"), as agent of the Puerto Rico Electric Power Authority ("PREPA"),[1] through its counsels of record, and respectfully submits and prays as follows:

1. On November 4, 2024, Genera filed a document with the Energy Bureau of the Puerto Rico Public Service Regulatory Board ("Energy Bureau") titled *Motion Submitting Seven (7) Scope of Works in Connection with Genera's FY2025 NME Budget Reallocation Request* ("November 4th Motion"). Through the November 4th Motion, Genera included, as Exhibit A therein, seven (7) Scope of Works ("SOWs") covering fifteen (15) Necessary Maintenance Expense ("NME") projects that Genera attributes Federal Funding.

2. On November 27, 2024, Genera filed a document titled *Motion Submitting Nine Scope of Works in Connection with Genera's FY2025 NME Budget Reallocation Request*

[1] Pursuant to the *Puerto Rico Thermal Generation Facilities Operation and Maintenance Agreement* ("LGA OMA"), dated January 24, 2023, executed by and among PREPA, Genera, and the Puerto Rico Public-Private Partnerships Authority, Genera is the sole operator and administrator of the Legacy Generation Assets (as defined in the LGA OMA) and the sole entity authorized to represent PREPA before the Energy Bureau with respect to any matter related to the performance of any of the O&M Services provided by Genera under the LGA OMA.

("November 27th Motion"). In the November 27th Motion, Genera provided, as Exhibit A therein, the remaining required SOWs for NME projects not yet submitted for evaluation by the Energy Bureau, and for which Genera attributes Federal Funding.

1. On January 14, 2025, the Energy Bureau issued a Resolution and Order titled *Resolution and Order for the Scope of Works (SOWs) of twenty-three (23) Projects in Connection with Genera's FY2025 NME Budget Reallocation Request* ("January 14th Motion"). In the January 14th Resolution, the Energy Bureau noted that Genera had provided SOWs for a total of twenty-five (25) projects attributed to federal funding, grouped into seven (7) SOWs submitted with the November 4th Motion and nine (9) SOWs with the November 27th Motion. The November 27th Motion also included a reference table as Exhibit B, listing which project Genera attributes federal funding. Additionally, the November 27th Motion reused five (5) SOWs submitted in the November 4th Motion, excluding the SOWs for Mayagüez and San Juan. The Energy Bureau expressed concerns about a missing SOW for a repair activity at San Juan Plant (LTSA Units 5 & 6), which Genera had previously identified as federally funded, and requested clarification on the status of this activity, along with confirmation whether it remains federally funded project and a timeline for submission of the relevant SOW.

3. Consequently, in the January 14th Resolution, the Energy Bureau: (i) ordered Genera to clarify the status of Project No. 7 from the September 23rd Motion[2]; (ii) ordered Genera to clarify the funding status for NME Projects No. 23 and No. 43, as approved in the October 28th Resolution[3]; (iii) denied the Statements of Work (SOWs) included in Attachment B of the January

[2] *See Review of the Puerto Rico Electric Power Authority's 10-Year Infrastructure Plan – December 2020*, Case No.: NEPR-MI-2021-0002, *Motion Submitting Response to Resolution and Order Date September 9, 2024*, filed by Genera on September 23, 2024 ("September 23rd Motion").

[3] *See* Resolution and Order, *In re: LUMA Initial Budgets and Related Terms of* Service, Case No.: NEPR-MI-2021-0004, *FY 2025 NME Genera Budget Reallocation Petition* October 28, 2024 ("October 28th Resolution").

14th Resolution due to the absence of required information for approval, specifically a cost estimate of the SOWs; and (iv) ordered Genera to submit, within ten (10) days of the notification of the January 14th Resolution, an estimated cost distribution.[4]

4. On January 24, 2025, Genera filed a document titled *Urgent Request for Extension to Submit Response to the Resolution and Order dated January 14, 2025* ("January 24th Request"), through which Genera requested a ten (10) day extension, until February 3, 2025, to finalize all required responses, clarifications, and cost estimates, as ordered and requested by the Energy Bureau's January 14th Resolution.

5. In compliance with the January 14th Resolution, and in accordance with the January 24th Request, Genera hereby submits, as Exhibit A to this Motion, the estimated cost distribution for the SOWs included in Attachment B of the January 14th Resolution.

6. Furthermore, Genera respectfully brings to the Energy Bureau's attention a matter concerning the January 14th Resolution's directive to clarify the funding status for NME Project No. 23. Although Genera confirms that this project was indeed included in the September 23rd Motion, the October 28th Resolution did not expressly approve or reference Project No. 23, as noted in the January 14th Resolution. Due to this apparent discrepancy, Genera respectfully requests clarification from the Energy Bureau to ensure that Genera's submission aligns with the Energy Bureau's expectations.

7. In addition, Genera continues to evaluate the funding status of NME Project No. 43. Genera reaffirms its commitment to providing a comprehensive response—addressing all requisite clarifications—within the timeframe afforded by the January 24th Request.

[4] *See* January 14th Resolution, p. 3.

WHEREFORE, Genera respectfully requests that this Energy Bureau **take notice** of the above for all purposes; **accept** Genera's response regarding the estimated cost distribution for the SOWs included in Attachment B of the January 14th Resolution, submitted as Exhibit A to this Motion; **clarifies** the January 14th Resolution; and **sustain** Genera's extension request until February 3, 2025, to provide the pending response to the January 14th Resolution.

RESPECTFULLY SUBMITTED.

In San Juan, Puerto Rico, this 31st day of January of 2025.

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CERTIFICATE OF SERVICE

We hereby certify that a true and accurate copy of this motion was filed with the Office of the Clerk of the Energy Bureau using its Electronic Filing System and that we will send an electronic copy of this motion to PREPA, through: Mirelis Valle Cancel, at mvalle@gmlex.net, and Alexis Rivera, at arivera@gmlex.net; and to LUMA, through: RegulatoryPREBOrders@lumapr.com; Margarita Mercado, at margarita.mercado@us.dlapiper.com, Yahaira De La Rosa, at yahaira.delarosa@us.dlapiper.com, Laura Rozas, at laura.rozas@us.dlapiper.com, Julian Anglada Paga, at julian.angladapagan@us.dlapiper.com.

In San Juan, Puerto Rico, this 31st day of January 2025.

/s/ Alejandro López-Rodríguez
Alejandro López-Rodríguez

Exhibit A

Estimated Costs for SOWs Listed in Attachment B of the January 14th Resolution

I. Overview

Project Name:	1.Unit #4 Economizer Water Inlet Valve
	2.Unit #4, Major Repair
Project Type:	428 Detailed SOW
Project Location :	Carretera PR-870, Toa Baja, P.R. 00949
Latitude/Longitude :	18.454764, -66.151414
Version : 0	

II. Introduction

PREPA is a public corporation of the Government of Puerto Rico created pursuant to Act No. 83 of May 2, 1941, as amended. PREPA owns the power plants for electric generation, transmission, and distribution facilities serving all of Puerto Rico. As the sole electric utility in Puerto Rico, PREPA provides electricity to approximately 3.4 million people. Genera-PR is the operator authorized under a Public-Private Partnership agreement of the thermal generation facilities of Puerto Rico. Since 2017, PREPA has performed damage assessments, studies, and evaluations to identify areas of repair and improvement. These include transmission and distribution lines, electrical substations, generation plants, mitigation, and other improvements.

On September 6, 2017, Puerto Rico's northern coastline was struck by Hurricane Irma, a Category 4 storm. Two weeks later, on September 17, Hurricane Maria tore through the island of Puerto Rico as a Category 5 storm. Subjected to 150+ mph winds and more than 25 inches of rain, 3.4 million residents lost power and

a great deal of infrastructure, including critical facilities, was damaged. In particular, the electrical infrastructure suffered catastrophic impacts. In the aftermath, diligent recovery and reconstruction have been going on, not only to restore the electrical infrastructure to pre-storm function and capacity, but to take this opportunity to bring it in line with current standards and technology. With the recovery funding available, "*Everyone can be sure that we are working responsibly to achieve efficiencies, reduce costs, decommission inefficient and polluting plants, and continue to transform our electrical system for the benefit of our economy and our people*" as Governor Pedro Pierluisi said, this being an opportunity to not just to rebuild the system but to transform it into a smarter, more resilient, and cleaner one. Puerto Rico's generation system must meet customer demand and have adequate additional capacity to comply with the reserve required by the standard operating procedures of the T&D system operator (LUMA). In terms of service continuity, the system must be reliable so that service interruptions are within the margins established in the electrical industry standards.

In 2020 the situation became more complicated when earthquakes events 4473DR-PR provoked more damages to Costa Sur Power Plant. Later, in September 2022, Hurricane Fiona 4671DR-PR also impacted Puerto Rico, destroying even more the already fragile generation assets. Unfortunately, the generation system presents critical performance metrics with a deficiency in capacity to meet the energy demand and the minimum reserve requirements. The forced outage percentage of the units is increasing while the generation capacity decreases. This combination of factors puts the continuity of the service at high risk, adversely affecting the quality of life of those who live in PR.

Genera is responsible for operating and maintaining PREPA's legacy asset generation fleet pursuant to the Generation O&M Agreement. The current fleet condition presents poor performance due to the impact of hurricanes María and Fiona. Generation capacity has been reduced to 46% of installed capacity. In addition, of the generation units in operation, about 32% or 640 MW, are disconnected monthly, causing thousands of customers to suffer interruptions in their service.

The Puerto Rico Electric Power Authority ("PREPA") is a public corporation of the Government of Puerto Rico created pursuant to Act No. 83 of May 2, 1941, as amended. PREPA owns and operates electric generation, transmission and distribution facilities serving all of Puerto Rico. As the sole electric utility in Puerto Rico, PREPA provides electricity to approximately 1.5 million customers. Since 2017, PREPA has performed damage assessments, studies, and evaluations to identify areas of repair and improvements. These include transmission and distribution lines, electrical substations, generation plants, mitigation, and other improvements. On January 2023, PREPA and the Puerto Rico Public-Private Partnership Authority ("P3 Authority") selected Genera PR, LLC ("Genera") to operate, maintain and modernize the Generation system of PREPA for ten years through a public-private partnership.

To improve the system's reliability, Genera proposes to submit for approval the Detailed Scope of Work (SOW) to COR3 and FEMA for the 662957 under DR-4339-PR Public Assistance. The document provides a description of the project including scope, schedule, and cost estimates as well as Environmental & Historical Preservation ("EHP") requirements.

III. Project Description

PREPA's Generation System Maintenance Program was developed and is being executed using the industry standards, following the equipment's manufacturer maintenance recommendations and PREPA policies. Periodical inspections, tests are performed to identify critical component repairs/replacement in equipment such as boilers, turbines, generators, power transformers, circuit breakers, protection and control relays, grounding mats, and auxiliary equipment.

Genera PR proposes to perform necessary repair and/or replacement of critical generation components pursuant to the Generation O&M Agreement between PREPA, the P3A, and Genera PR.

A detailed SOW version will be submitted to FEMA per facility.

Palo Seco is located on the northern coast of Puerto Rico in the Cataño municipality near San Juan and a location with approx. 36 acres lot, and project is approx. 2.5 acres lot (131,912 ft²). The Plant consists of four thermal steam units, six Hitachi-GE gas turbines (GTs), and three Pratt & Whitney Power Systems (PWPS) FT8 MOBILEPAC GTs with a total nameplate capacity of 809 MW. Palo Seco has been a major generator in the PREPA fleet and continues to serve on a limited basis as current power distribution challenges face the island.

Palo Seco Steam Plant Units 1 and 2 are tangentially fired Combustion Engineering ("CE," now GE Power), heavy fuel oil-fired (HFO-fired) boilers with reheat and a nameplate capacity of 85 MW each. The units are rated 1450 psi, 1000°F, and the boilers are 857.7 MMBtu/h. Unit 1 began commercial operation in 1960, and Unit 2 began commercial operation in 1961.

Palo Seco Steam Plant Units 3 and 4 are tangentially fired CE HFO-fired boilers with a nameplate capacity of 216 MW each. The steam turbines are rated 1800 psi, and the boilers are 1971 MMBtu/h. Additional details about the boilers and turbines were not provided for review. The units began commercial operation between 1967 and 1968.

Genera PR on behalf of Puerto Rico Power Authority respectfully requests to COR3 and FEMA a project for .....

The project location can be seen in Figure 1.

Figure 1: Project Location

IV. Codes and Standards

The following will be referenced when applying specific codes, specifications, and standards to the project design:

- Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR, February 2020.

- Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.
- FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.
- Rus 1730B - The referenced standards, as defined and as per their requirements, state every system is required to have an Emergency Restoration Plan (ERP) in the event of a major failure or storm event.
- LUMA Operation Reserve Standard - LUMA, as the T&D System Operator, is responsible for ensuring that the system has enough generation resources to function properly. This is also known as resource adequacy. To fulfill this responsibility, LUMA has set a standard for Operational Reserve Capacity. The formula used to determine this capacity is detailed below, with Genera's input in the second column. LUMA may choose to modify the formula or inputs used, such as averages, without input from Genera.

V. General Scope of Work (work to be complete or % work completed)

UNIT 4 – ECONOMIZER INLET VALVE

The Economizer Inlet Valve is the isolation element between the high-pressure boiler feed water system and the boiler inlet. The current valve has been in service nearly fifty (50) years and is past due its expected life span. This is a high energy zone and should be considered as a critical element in this circuit. The scope of work will include the procurement of the valve-actuator combination, removal of the existing valve and installation of the new element. A telescopic crane, special rigging, insulation replacement, pre-heating, Boiler and Pressure Vessel Code welding and post weld heat treatment will be necessary to perform the task. The selected valve based on the operation conditions (1,800 PSIG and 440 °F) should comply with the following specifications:

VALVE

Fluid:	Water (Ultra Clean – Demineralized)
Operating Pressure:	1,800 PSIG
ΔP at Close Position:	1,800 PSIG
Temperature:	440 Deg. F
Type of Connection:	Butt Welded
Size of Connection:	12"
Pressure Rating:	1500
Valve Type:	Stop Globe
Body/Bonnet Style:	Vertical Pressure Seal
Body Material:	WCB/A216
Disc Material:	Cobalt Chromium (CoCr)
Seat Material:	Cobalt Chromium (CoCr)
Steam Material:	410/A479

ACTUATOR

Power:	480 V – 3 Phase – 60 Hz
Features:	Manual Operator (Reduction Gear Transmission)
	Position Feedback (only close/open)

Unit 4 Major Outage Boiler Rehabilitation

1. GENERAL REQUIREMENTS

1. The work shall be executed by qualified personnel with ten years minimum experience in repairs/rehabilitation of boilers and duly recognized in the industry for this type of work, the rehabilitation of boilers as specified in this document. The Contractor will supply all rigging, including I-beams, channels, steel angles, scallop bars, steel plates, spreaders, beams, and hydraulic cylinders. Furthermore, the Proponent shall present evidence of experience in the repair of boiler components or present a specific and highly detailed work plan to perform this work signed by a Professional Mechanical Engineer (PE) with ten years

minimum experience in repairs/rehabilitation of boilers. In this case, a letter from the above-mentioned Engineer stating willingness to assume Quality Control of this project shall be included in the proposal. Also, evidence of experience from the company, key employees, and the Mechanical Engineer shall be presented with the proposal. Experience documentation shall be arranged in a table including but not limited to: Name of the project, date of completion, area (power plant), customer, phone (customer) & work scope. Proposals without these requirements shall be rejected.

2. GeneraPR shall evaluate the experience presented by Proponents based on the following:

A. Level of knowledge shown on past projects on executing the required work.

B. If the projects were completed within the customer time frame required.

C. Work quality

3. The Proponent shall submit in the proposal the current welding procedures and the Procedure Qualification Records (PQR) for evaluation by GeneraPR. Proposals without these requirements shall be rejected.

4. The Proponent shall submit in the proposal the credentials of the company and personnel that will perform the Non-Destructive Tests (NDT) for evaluation by GeneraPR. Proposals without these requirements shall be rejected.

5. All work shall be carried out continuously, following the commencement date specified by GeneraPR, and the proposed work schedule submitted by the Contractor and accepted by GeneraPR. Works shall be completed in ninety (90) calendar days or less. The Contractor shall consider more than one working period to execute the project 24/7. A penalty of $3,000 per extra day will be applied up to fifteen percent (15%) of the total contract amount.

6. The Contractor shall furnish GeneraPR project Management a summary of weekly reports of the works stating the existing status, rate of progress, estimated time of completion, and cause of delays, if any, including the schedule update.

7. Proponent/Contractor shall comply with the minimum salary requirements under Executive Order OE-2022-014 and/or the Davis Bacon Act, whichever is greater.

8. Concurrent to all work, a written weekly report of conditions as found, work performed, clearances, and test data recorded should be submitted. A final report should be submitted within two (2) weeks after completing all work.

9. The Contractor, within fifteen (15) days after receipt of the Notice to Proceed shall submit a schedule of proposed progress and the proposed detailed method of carrying on the Services including a full statement of equipment and equipment layout for the job. This progress chart and statement of operations shall show the dates of commencement and completion of each item of the Services. This schedule shall also include the milestones for the submittals and material ordering, the critical path of the project, and the man-hours per item. The Contractor shall provide for the use of adequate and sufficient equipment and force and a method of operations to assure the completion of the work within allotted time. The schedule shall be weekly actualized and submitted to GeneraPR in Microsoft Project, PDF format and three (3) hard copies in 11 x 17 size.

10. All welding performed under this Contract shall be in accordance with welding procedures which have been qualified with section IX of the ASME Boiler and Pressure Vessel Code and ASME Boiler and Pressure Vessel Code, Section I, Section VIII, Div. 1, Section IX and NBIC Part 3, latest addenda. All welders engaged in work under this Contract shall be qualified in accordance with the test requirements of Section IX of the ASME Boiler and Pressure Vessel Code, welding, and brazing qualifications. The Contractor shall submit the welding procedures and welder's qualifications before the commencement of the work. Each welder's certification shall be on file at the prefabrication shop and available to GeneraPR's inspector upon request. Welding records shall be kept according to

ASME Section 1; Root passes in piping shall be made by the GTAW (Gas Tungsten Arc Welding) process. The balance of the welds may then be completed by using coated electrodes - shield metal arc welding (SMAW) -. Backing rings are not allowed. Preheat and post-heat treatments shall be in accordance with ASME Boiler and Pressure Vessel Code, Section I, Section VIII, Div. 1, Section IX, and NBIC Part 3, latest addenda. Structural steel welding shall be performed by the SMAW method. The welds and weld design preparation shall be according to ASME Boiler and Pressure Vessel Code, Section I, Section VIII, Div. 1, Section IX, and NBIC Part 3, latest addenda. To the extent that they apply, the Contractor shall impose on each of his sub-suppliers/subcontractors the complete requirements of the technical specifications under this Contract. He shall be directly responsible for seeing that the sub-suppliers/sub-contractors are entirely aware of all these requirements and those they abide by.

11. The Contractor shall submit for GeneraPR evaluation and approval the procedure of rigging, removing, and installation of the components as required within these Specifications. Also, the Contractor shall submit for evaluation the Crane Inspection Documents.

12. The Contractor is responsible for opening and closing all necessary accesses to perform the works detailed in the Scope of Work, including removal and reinstallation of any inner or outer casings, tube fins, braces, membranes, vibration baffles, insulation, etc., and any other part attached to boiler tubes.

13. Any cut bevel preparation needed to fit the components described shall be considered part of the Contractor's scope of work.

14. Insulation works by the Contractor.

15. Asbestos and lead abatement by GeneraPR.

16. Any material to be welded to a pressure part shall have the Manufacturer Data Report in compliance with ASME and NBIC latest editions.

17. The Contractor shall supply all necessary equipment to perform the Pre-heat and Post Weld Heat Treatment as specified by the latest ASME Code and NBIC edition.

18. To perform this scope of work, the Contractor shall prepare all required bevels as specified or required.

19. To perform works inside the boiler or in a confined space, the Contractor shall comply with all the requirements under regulations 29 CFR 1910.146 and 29 CFR 1910.269(e) for confined space and enclosed space entry. Before commencement, any work shall be approved by GeneraPR (Plant Safety Officer). The Contractor shall provide a complete working plan, training evidence, and required medical exams for workers who will perform any activity under a confined or closed space environment as required by regulation 29 CFR 1910.146.

20. The contractor shall implement the Foreign Material Entry (FME) Prevention Program. The requirements for this program are the following:

A. Access Control - The requirements for ingress and egress from the designed area. At this point, the people are required to remove the jewelry and all contents of pockets and leave these things with the designed FME clerk or at the assigned area.

B. Tool Control- The method used to ensure that tools are individually marked from other items, identified to the user or worker and storage location, and inventoried at the beginning and end of each task or shift.

C. Clean As You Go- The practice of cleaning assigned tools, parts, equipment, work site, etc., during and at the end of a given task or shift to promote work safety.

2. PRODUCTS, STANDARDS AND QUALITY CONTROL

1. Definitions

A. ASME – American Society of Mechanical Engineers.

B. ASME B&PV Code – ASME Boiler and Pressure Vessel Code.

C. ASNT – American Society for Nondestructive Testing.

D. AWS - American Welding Society.

E. GeneraPR – Genera Puerto Rico individual responsible for the overall management of the project and legal agent representing the Puerto Rico Electric Power Authority (PREPA).

F. ISO - International Organization for Standardization.

G. Manufacturer - The organization that fabricate the raw materials or elements (e.g., tubing, membrane, etc.).

H. Supplier - The organization providing the elements.

2. Reference Industry Standards

A. ASME Boiler & Pressure Vessel Code, Section I, "Rules for Construction of Power Boilers".

B. ASME Boiler & Pressure Vessel Code, Section II, Parts A and B, "Ferrous and Nonferrous Material Specifications".

C. ASME Boiler & Pressure Vessel Code, Section II, Part C, "Specifications for Welding Rods, Electrodes, and Filler Metals".

D. ASME Boiler & Pressure Vessel Code, Section V, "Nondestructive Testing".

E. ASME Boiler & Pressure Vessel Code, Section IX, "Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators".

F. SNT TC-1A, “Personnel Qualification and Certification in Nondestructive Testing".

3. Responsibility

A. The Supplier shall be responsible for fulfilling the requirements set forth in this specification, including all required inspection and testing and submitting all required documentation. GeneraPR shall delineate exceptions to and deviations from this specification in the Vendor’s bid for disposition.

B. The Supplier shall hold a valid “S” Certificate of Authorization issued by the ASME.

C. The Supplier shall provide a Manufacturer’s Partial Data Report (ASME Form P-4).

D. The material or tube Manufacturer shall have a Quality Program in compliance with and certified to ISO 9001.

E. If the Supplier is not the Manufacturer, the Supplier must have a formal program for qualifying their manufacturers and evidence of periodic performance monitoring.

F. The Supplier shall clearly identify all subcontractors intended to be used in their proposal. GeneraPR must approve all subcontractors before issuing a purchase order.

4. Material

A. Tube materials, fabrication, and testing procedures shall comply with ASME SA-450 and the applicable ASME B&PV Code, Section II material specifications.

B. Supplier to furnish either cold-finished or hot-finished tubing. If hot- finished tubing is furnished, the Manufacturer shall meet the applicable ASME SA-450 tolerances for cold-finished tubing.

C. Tubing shall be seamless unless otherwise specified.

D. Membrane, filler bar, and spacer bar dimensions, materials, and type or style shall be as stated in the project specification.

E. The Supplier shall provide certified material test reports (CMTR) for all tubing and welding electrodes (typical deposit analysis is adequate for electrodes). CMTRs shall report chemical and mechanical test data as required by the applicable ASME B&PV Code, Section II material specification. CMTRs shall be prepared in English units or in metric units with conversions to English units.

F. The Supplier shall provide a certification of compliance for membrane material stating the specified material chemistry in accordance with ANSI or other nationally recognized standards.

G. All materials of construction shall be new. Previously used tubing and scrap use is prohibited.

H. All tubing shall be free of injurious mill scale, grit, flaking, rust, etc., prior to fabrication.

5. Welding

A. Welding shall be performed in accordance with the requirements of the ASME B&PV Code, Section I, and the quality control requirements.

B. Welding procedures, welders, and welding operators shall be qualified per the Supplier's Quality Program and the ASME B&PV Code, Section IX.

C. Weld procedure specifications (WPS) and supporting procedure qualification records (PQR) shall be made available to GeneraPR for review prior to the start of fabrication.

D. Copies of all welding operator and welder performance qualifications, along with applicable welder continuity data, shall be made available to GeneraPR for review prior to the start of fabrication.

E. The Supplier shall identify all proposed filler metals to GeneraPR for review and approval prior to the start of fabrication.

F. The following welding practices are prohibited:

a. Backing rings

b. The gas metal arc welding process (GMAW) in the short-circuit in g arc transfer mode.

c. The Flux Cored Arc Welding process (FCAW) without gas shielding.

G. Welding processes shall limit heat input to 60,000 joules/inch maximum. The following formula shall determine heat input:

$$\frac{\text{volts x amps x 60}}{\text{travel speed (in/min.)}} = \frac{\text{Joules}}{\text{inch}}$$

H. All circumferential butt welds shall utilize a gas tungsten arc (GTA) welded root pass unless otherwise approved by GeneraPR.

I. Welding materials utilized for fabrication shall be in accordance with the ASME B&PV Code, Section II, Part C, including the following restrictions:

J. Low carbon ('L' Grade) filler materials are prohibited when welding ferritic materials.

6. Preheat and Post-Weld Heat Treatment

A. The maximum inter-pass temperature shall be 800°F for carbon and low alloy steels.

B. Post-weld heat treatment, if required, shall be performed in accordance with the ASME B&PV Code, Section I, Paragraph PW-39 for the subject tube material grade.

C. For low-alloy steel panels, if straightening is required to meet the requirements of Paragraph 7.5, post-weld heat treatment shall be performed prior to straightening.

D. Post-weld heat treatment shall be performed after bending for carbon steel and low-alloy steel gang-bent panels.

E. The Supplier shall submit the post-weld heat treatment procedure to GeneraPR for review and approval prior to fabrication. Use of localized torches or heating tips is prohibited.

7. Inspection and Testing

A. Non-destructive examination (NDE) procedures shall follow the ASME B&PV Code, Section V. The Supplier shall make all NDE procedures available to GeneraPR for review.

B. Personnel performing NDE shall have Level II qualifications and be certified in accordance with the requirements of SNT TC-1A. The Supplier shall make available all NDE personnel qualifications to GeneraPR for review. Visual inspections may be performed by an AWS Certified Weld Inspector or designated shop QC Inspector.

C. If the specification, codes, laws, ordinances, or any state agency or Authorized Inspector having jurisdiction over the Supplier's shop require any work to be specifically tested or approved, the Supplier shall assume the responsibility and cost thereof and shall give GeneraPR timely notice of its readiness for inspection or testing.

D. Tube wall thickness shall be measured before fabrication on a sample of tubes to confirm that the tubing meets the minimum wall

thickness described in the purchase order. The sample size is determined by Table 1 below.

a. Wall thickness measurements shall be made using the Ultrasonic Pulse-Echo Contact Method in accordance with ASME B&PV Code, Section V, Subsection B, Article 23, SE-797.

b. In lieu of the ultrasonic method described above, micrometer measurements may be taken at each tube end.

c. Readings are to be taken at the 0-, 90-, 180- and 270- degree positions at each end of the tube.

d. Any tube in the sample group found with readings below minimum wall thickness shall cause the entire lot to be rejected. Disposition of the rejected lot shall be discussed and approved by GeneraPR.

Table 1

Lot Size (# of tubes)	Sample Size
1 to 8	Entire Lot
9 to 90	8
Greater than 90	5%

Notes:

1. Lot size is the entire number of tubes provided with the Purchase Order.
2. Each heat of steel provided by the tubing manufacturer must be considered a separate lot.

E. Eddy's current examination shall be performed before fabrication on a sample of tubes to confirm the absence of abrupt imperfections — sample size determined by Table 1 above.

a. Eddy's current testing shall be conducted by Paragraph 24 of ASME SA-450 for carbon and ferritic tubes.

b. Any tube in the sample group found with readings below the minimum wall shall cause the entire lot to be rejected. Disposition of the rejected lot is to be discussed and approved by GeneraPR.

c. If eddy current testing was conducted by the tube Manufacturer and satisfactory results are documented on the tube material CMTR, the eddy recent testing of Section 2.7.D is not required.

F. Visual inspection of tubing shall be performed along the entire length to assure proper surface finish and the absence of any harmful defects, gouges, tears, cracks, flat spots, and kinks, the presence of which shall be cause for rejection. All weld spatter, slag, and flux shall be removed before visual inspection.

G. Visual inspection of all membrane welds shall be performed in addition to the requirements of Paragraph 7.45. Any of the following are unacceptable and grounds for rejection:

a. Cracks

b. Surface undercut greater than 1/32" deep or 10% of wall thickness, whichever is less.

c. Surface porosity.

H. Tube bends shall exhibit good quality and be free of wrinkles, splits, and surface defects.

a. Wall thickness and ovality at the bend sections shall be measured on 10% of the bends.

b. This measurement does not apply to burner panels.

c. For panels whose spacer or wear bars restrict O.D. measurements on both axes, the flattest section accessible shall be measured and compared to the tube nominal OD.

d. Maximum allowable wall thinning shall be 10% of the specified minimum wall thickness.

e. Maximum ovality, defined by the following equation, shall be 10%.

Ovality = [(Major OD – Minor OD) X 100] / Nominal Tube OD

I. Ten percent (10%) of all tubes with a specified minimum wall thickness of less than 0.180" shall be inspected for weld burn- through (as indicated by ID blistering, distortion, or other surface imperfections other than discoloration) using a borescope or equivalent device. All burn-through indications observed during borescope examination shall be considered detrimental to the tubing integrity and rejected. GeneraPR reserve the right to perform a borescope examination of additional tube internal surfaces.

J. All completed panels shall be inspected to ensure the absence of any obstruction or constriction inside the tubes. This shall be done by passing steel balls through the inside diameter of each tube following membrane welding and before the assembly of welded inserts or panel bending. The Supplier shall set up an accountability system to ensure the recovery of all balls inserted into the tubes.

a. Ball Size = 0.9 X (Minimum tube OD – 2 X Maximum Wall Thickness) where:

Minimum tube OD = specified OD – SA-450 tolerance Maximum wall thickness – specified wall + SA-450 tolerance

b. Balls shall be selected from the next smallest commercial size from the result obtained in Paragraph 10.11.1, but not less than 1/16" of the result obtained in Paragraph 10.11.1

K. Twenty percent (20%) of all tube bends, panel membrane welds, and attachment welds on the tension side of gang-bent panels shall be examined by magnetic particle testing. The inspections of tube bends shall be conducted between the bend tangent points. Any of the following are unacceptable and grounds for rejection:

a. Any cracks or linear indications

b. Rounded indications with dimensions greater than 3/16"

c. Four or more rounded indications in a line separated by 1/16" or less, edge to edge.

L.One hundred percent (100%) of all butt welds shall be inspected by radiography.

M. The radiographic examination shall be performed using the single- shot elliptical technique by the ASME B&PV Code, Section V.

N. Radiography acceptance criteria shall conform to the ASME B&PV Code, Section I, PW-51. The radiograph film, copies thereof, or an electronic copy of digital radiographs shall be provided to GeneraPR for review. The film will be returned after review.

O. A hydrostatic test shall be conducted for each tube panel that contains butt welds. Tests shall be performed by the ASME B&PV Code, Section I, at 1.5 times the design pressure. Water used for testing shall not exceed five ppm of chlorides and fluorides. After testing, the assembly shall be drained and air-dried. Air used for drying shall be free from all oil or oil vapors.

P. Final inspections shall be performed before applying any protective coating and capping of the tubes or panels for shipping or storage.

8. Repairs

A. Through-wall defects shall not be repaired by welding. A new tube or tube section shall be installed.

B. When a new tube section is installed, the following applies:

a. Butt welds shall be examined per Sections 2.7.M and 2.7.N.

b. The repair procedure, including welding and NDE procedures, shall be submitted to NRG for approval before repair. NDE shall be by Sections 2.7.A and 2.7.B.

c. The repair shall be documented on an NCR and submitted to GeneraPR for approval.

C. If it becomes necessary to rework the outside surfaces of the tubes due to arc strikes or other physical damage, this shall be done by previously approved methods to maintain the minimum wall thickness. Following re-working, liquid penetrant testing shall be performed to ensure that no harmful defects are left on the pressure boundary of the tubes.

9. Quality Control Requirements

A. The Supplier shall develop and implement a Quality Program to control the quality of all materials and services to be supplied. The Supplier's Quality Program shall be documented by written policies, procedures, and instructions, which, as a minimum, shall comply with the requirements of the codes and standards in Section 2.2 The Supplier's Quality Program shall be submitted to GeneraPR for review and approval with the bid documents.

B. Supplier's Quality Program shall address inspection planning, inspections, inspection personnel, and inspection results and shall include, but not be limited to, the following:

a. The Supplier shall establish a documented, pre-planned inspection program that the Supplier shall use for inspections to be performed at receiving, during storage, during in-process work, upon completion of fabrication, and before shipment.

b. The inspection program shall identify those elements, characteristics, and processes essential for verification by the Supplier's inspection personnel to assure conformance to applicable specifications and drawing requirements.

c. The Supplier shall prepare inspection checklists identifying the specific elements, characteristics, and steps in the process to be inspected and shall include the accept/reject criteria for each. Criteria and recording of inspection results shall be quantitative where possible.

d. The Supplier's inspection checklist or shop traveler shall be submitted to GeneraPR for review, approval, and identification of those inspection activities to be witnessed by GeneraPR. The Supplier shall submit checklists at least four (4) weeks before scheduled inspections to which they apply.

e. The Supplier's utilization of approved inspection checklists does not relieve the Supplier of responsibility for compliance with the contract requirements, specifications, and drawings.

f. The Supplier shall implement the pre-planned inspection program by performing the inspections identified on the checklists and documenting actual inspection observations, measurements, and results. The examination shall be performed and recorded as work

progresses. A copy of the actual results of each inspection shall be submitted to GeneraPR after the work.

g. Supplier personnel performing NDE shall be qualified and certified in accordance with the Supplier's written program. Evidence of their qualification and certification shall be available to GeneraPR for review.

C. The Supplier shall arrange for GeneraPR to have free access to all Supplier's or Supplier's Subcontractor's facilities concerned with the supply or manufacture of materials for the purpose of performing inspection or surveys of parts before or during assembly and to witness any or all fabrication processes, testing, or NDE. The Supplier shall advise GeneraPR of any advance-notice requirements that must be met to access the Supplier's or Supplier's Subcontractor's facilities.

D. Inspection Witness Points will be indicated by GeneraPR on the Supplier's inspection checklist or shop traveler and returned to the Supplier.

E. Supplier shall notify GeneraPR of the expected fabrication start date, expected dates of Witness Point(s), and expected date of final inspection by the Supplier.

F. The Supplier shall provide any documents and copies of or access to all drawings, procedures, or test reports related to the job as deemed necessary by GeneraPR.

G. GeneraPR inspection or surveys at the Supplier's facilities and the Supplier's Subcontractor's facilities may be performed at GeneraPR's discretion. Specific GeneraPR inspections may be identified upon receipt of the Supplier's Quality Program.

H. Supplier shall initiate, disposition, and control Nonconformance Reports (NCRs) to report deficiencies in characteristics, documentation, or

procedures that do not comply with the specification or drawing requirements. Items that can be corrected (reworked) by completion, re-machining, reassembly, or other means to conform to drawing/specification requirements shall be documented by the Supplier on the appropriate inspection checklists. Items that cannot be corrected to the original drawing/specification requirements shall be reported immediately on an NCR. Supplier shall provide recommended disposition for each deficiency and route the NCR form to GeneraPR for review and approval. Upon GeneraPR's approval of the recommended disposition of the NCR, the Supplier shall take the necessary actions to correct the nonconforming item by the disposition on the approved NCR.

I. The Supplier's work shall comply with applicable drawings, specifications, and contract documents. GeneraPR's final acceptance of the Supplier's work shall be based upon satisfactory completion of inspection/tests and resolution of all open or incomplete items.

10. Shipping

A. All weld spatter, mill scale, arc strikes, rust, loose particles, and any potentially harmful foreign matter shall be removed from the completed panels. All sharp edges and roughness shall be ground smooth to a rounded contour. Sponging shall be performed to ensure internal tube cleanliness. Unless otherwise specified in the project specification, preservatives shall not be used on the tube internal surfaces.

B. All completed panels shall be permanently marked with the material designation and size, panel number, Supplier's Job Number, and the GeneraPR Purchase Order Number. This information shall be stamped onto a 1/8" or ten gage carbon steel plate using letters not less than 1/4" in height. Each waterwall panel shall have this identification plate located 18" from either end at the panel centerline. The plate shall be attached to the casing side of the panel by welding to the membrane and not the tubes.

C. Suitable weather protection shall be provided to protect the equipment from damage in transit and during storage for up to six months. Such protection shall include, but not be limited to, applying dealuminate on weld end preps and protective end caps. Capping shall not be done prior to final inspection or release by GeneraPR, as specified in Paragraph 10.17. The method of protection shall be submitted to GeneraPR for review and approval.

11. Documentation

The Supplier's final documentation package shall include the following:

A. Signed P-4 forms

B. Certified material test reports

C. Copy of tube manufacturer's ISO 9001 certification

D. Filler metal identification

E. General arrangement drawings

F. Hydrostatic test certificate of compliance

G. Heat treatment charts or certificate of compliance (when applicable)

H. NDE reports including:

a. Visual/dimensional results

b. Tube wall thickness report

c. Eddy current examination (when applicable)

d. Radiography examination of butt welds (when applicable)

e. Magnetic particle testing (when applicable)

f. Borescope Inspection (when applicable)

I. Repair procedures (when applicable)

J. Nonconformance reports

12. Dimensional Tolerances

Dimension	Tolerance (inches)
Panel Width	+0, -1/4"
Panel Length	±1/8"
Tube Centerline to Centerline	±1/16"
Membrane Recess Length	±1/4"
Membrane Cut Back Length	±1/4"
Membrane Cut Back Width	3/16" max.
Membrane Length	±1/4"
Tube End OD Scarfing	+1/8", -0"
Outside Tube to Outside Tube Center-line	+0", -1/4"
Bowing	±1/4"
Crowning	±1/4"
Membrane Flatness	±1/4"
Panel Squareness	±1/4"
Tube End Parallelism	±1/16"
Tube Ovality (straight tubes only)	2%

A. The inspection definitions and terminology are as follows:

a. Bowing – a measure of the flatness of the panel, top to bottom. Bowing is measured by stretching a tape from one end of the panel to the other on a randomly selected tube of each panel. This measurement shall be done on both the front and back of the panel. The

maximum bowing shall be the most significant distance between the tape and the tube.

b. Crowning – a measure of the flatness of the panel, side to side. Crowning is measured by stretching a tape from the panel's left side tube to the panel's right-side tube. This measurement shall be done on both sides the front and the back of the panel at two different locations along a panel's length. The largest distance between tape and the tube shall be the maximum crowning.

c. Flatness (for bars only) - shall be measured on membrane bars by stretching a tape from one end to the other lengthwise along the bar and perpendicular to the ends. The maximum distance between the tape and the bar shall be the out-of-flatness.

d. Panel Squareness - a combination of how parallel the opposite sides of a panel are to how perpendicular the adjacent sides of the same panel. This condition is achieved when the diagonal distance from panel corners is equal within the tolerance specified.

e. Tube End Parallelism - a measure of the straightness or "saw-toothing" of the tube ends of a panel. This attribute shall be measured by checking the tubes at each corner for squareness (see definition of squareness). Next, stretch a line taut from one side of the panel to the other across the tube faces. The line shall be tangent to the tube faces. The distance from the line to each tube face is the deviation from tube end parallelism.

f. Tube End Squareness - a measure of how closely the tube ends match a right angle. This property shall be measured with a template at two points around the tube end's circumference. The points shall be opposite each other.
g. Tube Ovality - the out-of-roundness of the tube. The measurement shall be made at each end and at the tube center. At the tube ends, the inner diameter shall be checked at four equally spaced

locations. The center of the tube shall be tested for ovality by measuring the outside diameter at four different, equally spaced points.

13. Ambient Operational Conditions

A. Elements will be installed at sea level (on the coast in a hostile and harsh maritime environment) and will operate in a tropical climate zone, at an ambient temperature of 40° C (104° F). It will be operated continuously during a natural year (8,760 hours). This equipment will be operated in an area subject to severe dust and mild salt spray (sea water) due to prevailing winds. And occasionally hurricane winds of up to 150 miles per hour (50 lb/ft2) may originate at the area where it will be installed, and it shall be capable to withstand these winds without damage or negative effects on its operational characteristics.

3. SCOPE OF WORK

To perform all necessary works for the rehabilitation of the Palo Seco Steam Plant Unit #4 Boiler. Contractor shall include all services and materials described hereon, except otherwise explicitly noted.

1. General

A. All labor, materials not provided by GeneraPR, tools, equipment, as crane of the proper capacity, hoists, finger lift, drills, grinders, trailer tractor, chain falls, hydraulic and air jacks, welding machines, ladders, scaffolds, welding equipment, air compressors, tubes expansion, cutting machines, wood, facilities, sanitary facilities, hand wash station, etc.

B. Certified Rigging Plans for each type of maneuver.

C. Full-time safety officer.

D. Full-time Professional Engineer (CIAPR Member & PE License)

E. Full-time (Project Engineer)

F. Fixtures require to restrain and protect the elements from excessive overload during lift and installation.

G. Remove, reinstall and test any boiler part necessary for access.

H. Any thermal insulation removal or installation required to perform the scope of work.

I. All necessary equipment to perform the Pre-heat and Post Weld Heat Treatment and Stress Relieving procedures

J. Mill Test Reports and P4 Forms shall be available and delivered upon request for all applicable material.

K. Field office facilities for Contractor's personnel.

L.Sanitary and first aid facilities for his personnel.

M. Safety equipment, such as helmets, welders' jackets, goggles, gloves, etc.

N. Adequate and proper identification of Contractor's personnel.

O. Materials and accessories, and expendable materials like cleaning agents, solvents, thread and gasket compounds, greases, wiping cloths, blasting materials, welding rod, drinking cups, ice, paper towels, toilet paper, etc.

P. Adequate field facilities and vigilance to keep safe all materials, tools, equipment and spares

Q. GeneraPR-PR will verify completeness of the work required. After the site work is concluded and before authorize demobilization of the contractor, a meeting to report all findings and results of the project shall be performed by the contractor with GeneraPR's representative.

R. While on site, the contractor must keep GeneraPR's representative informed, regarding the progress of work. Furthermore, GeneraPR shall be notified immediately by the contractor about any finding that requires immediate corrective action.

2. Economizer Nose Arch (B-002B)

A. GeneraPR will provide the Economizer Nose Arch panels at site.

B. Remove existing Economizer Nose Arch elements.

a. Parts removed shall be trim to fit into a 20' x 5' recycling dumpster.

C. Prepare and install new Economizer Nose Arch elements.

a. Elements description (supply by GeneraPR):

i. Economizer Nose Arch panels comprising (135) tubes, 2-1/2" OD, 0.200" MWT, SA210-A1 material. Tubes spaced on 3"centers. The panel will extend from elevation 87' to elevation 94' in five (5) sub-panels comprising (27) tubes per sub-panel. The panels shall include a 35° bend with a radius of 16″ originating from EL 91'-21/32″, tubes adjacent to each sidewall will be loose items. The three tubes at each sidewall shall have bends per Detail "LA" in Combustion Engineering drawing no. F-604-592.

ii. All membrane bar materials will be 1/4" thick carbon steel material and stop 1" from each end. The outside tubes on each panel will be bare, no half width membrane.

iii. The membrane bar will be cut 6" long with 1/4" Dia. Drilled hole at the end of the slot at both ends to aid fit-up of the tube pressure welds.

iv. The panels shall include the cable openings in the same locations.

v. Include 180 linear feet of fin bar 1/4" thick x 1/2" wide, carbon steel material will be shipped loose to be used during the site assembly.

vi. Include 30 linear feet of 1/2″ round stock, carbon steel material shipped loose for use during site assembly.

vii. Include 10 linear feet of fin bar 1/4″ thick x 1″ wide, carbon steel material shipped loose for use during site assembly.

viii. Include 50 feet of scallop bar 1/4″ thick x 2 1/2″ wide, carbon steel material shipped loose for use during site assembly.

ix. Tube field weld ends will be cut and beveled to length

3. Waterwall Tube Panels (B-004B)

A. GeneraPR will provide the Waterwall panels at site.

B. Remove existing Waterwall Panels.

a. Parts removed shall be trim to fit into a 20' x 5' recycling dumpster.

C. Prepare and install new Waterwall panels.

a. Provide and install any required fixture to restrain and protect the elements from excessive overload during lift and installation.

b. Element description (supply by GeneraPR):

i. Each Waterwall panel comprising (30) tubes, 2-1/2" OD, 0.200" MWT, SA210-A1 material. Tubes spaced on 3"centers. The panel will extend from elevation 46' to elevation 56' in two (2) sub-panels comprising (30) tubes per panel.

ii. The panels will be fabricated and shipped in two (2) sub-panels comprising (30) tubes per panel.

iii. All membrane bar materials will be 1/4" thick carbon steel material and stop 1" from each end. The outside tubes on each panel will be bare, no half width membrane.

iv. The membrane bar will be cut 6" long with 1/4" Dia. Drilled hole at the end of the slot at both ends to aid fit-up of the tube pressure welds.

v. Include 60 linear feet of fin bar 1/4" thick x 1/2" wide, carbon steel material will be shipped loose to be used during the site assembly.

vi. Include 25 feet of scallop bar, 1/4″ thick x 2 1/2″ wide, carbon steel material.

vii. Tube field weld ends will be cut and beveled to length.

viii. Pressure Parts Arrangements-Side Elevation DWG F-604-592.

ix. General Arrangements-Sectional Side DWG F-604-596.

4. Air Preheater Rehabilitation

A. Complete set of T-Bar replacement and calibration.

B. Curve Angle inspection and maintenance.

C. Radial and Axial Sector Plates inspection and maintenance.

D. Inspection and repair of the Radial and Axial Statics Seals.

E. Inspection and maintenance of the Radial and Axial Sector Plates Adjusters.

F. Inspection and maintenance of the Rotor Pin Rack. Including liquid penetrant test to welds.

G. Rotor diaphragms and baskets holder's inspection and maintenance.

H. Center Section Inspection and repair.

I. Inspection and repair of Sector Plate cold and hot liners.

J. Guide Bearing internal inspection, cleaning, locking cap bolts inspection, clearance between the adapter sleeve and housing sleeve verification, clearance between outer race and roller verification, new cover assembly gasket removal and installation, replacement of housing packing, oil and filter change.

K. Support Bearing internal inspection, cleaning, visual inspection to the lubrication piping, pump coupling and guide shoe bolts. Housing cover gasket replacement. Visual inspection of housing packing area, replace if necessary. Replace oil and filters.

L.Rotor Drive unit's visual inspection. Multi point lubrication, coupling grid member inspection and lubrication, oil replacement. Replacement of air motor, overrunning clutch and coupling. Repair of casing between rotor drive and low speed gear.

M. Air preheater soot blowers lance inspection. Repair lance cracks and wear nozzles. Reconditioning of lance support structure and rollers.

N. Washing device piping and nozzles maintenance. Inspection of the main insolation valve and check valve, replace if needed.

O. Inspection of the gas and air hot end stainless steel expansion joints, replace if needed.

P. Diaphragms End Plates inspection and repair.

Q. Air Preheaters Outer Casing inspection and repairs.

R. Structural elements and stiffeners inspection and maintenance.

S. Hot and cold connecting plate assembly inspection and repair.

T. Inspection and maintenance of structure in air preheater hanger's connections.

5. Induced Draft Fans Expansion Joint

A. Removal of expansion joints from induce draft fans 3-1 and 3-2.

B. Inspection and repair of flange of expansion joint.

C. Installation of new Glass Reinforced EPDM Belt .25" Thick, 172" X 46"_ 12 (12) V 2", mounting hardware and wide backing bars.

6. Air Preheaters Support Bearing Trunnions Replacement

A. The Contractor needs to remove the Support Beam to replace the cold end trunnions, consider the approximate weight of 275,000# (225,000# the baskets and 50,000# the preheater) and take measurements to return it to the correct location.

B. If the Contractor needs to remove the Air Preheater baskets to complete the Scope of Work, he shall be responsible for keeping the baskets stored in a safe way to reuse after the trunnion replacement. Otherwise, if the Contractor decides to replace the cold end trunnion without removing the baskets, he shall submit to PREPA's representative the structural support design to hold the Air Preheater in place, approved by a Structural Professional Engineer.

C. The Contractor shall perform the Scope of Work without damaging the seals and the Air Preheater components. If the Contractor damages any seal, threads, bolts, gaskets, or any part from the Air Preheaters during

the replacement process, it shall replace the parts without cost to GeneraPR.

D. The Contractor shall perform the Scope of Work in such a way that could reuse all the bearings parts components.

E. If during the trunnion replacement activity, the Contractor needs to cut, arc gauge, or weld to the Air Preheater, the Contractor shall ground the parts to avoid damage to the bearings. Also, the Contractor shall use qualified welders on any weld performed and a Welds QC log to azure they meet the GeneraPR and AWS requirements.

F. After the reassembly, the Contractor shall verify the Support Beam and Air Preheater alignment and trunnion eccentricity concerning the Kingsbury bearing housing.

G. The final report shall include a description of the scope of work performed, photos, and a letter of completion, according to equipment specifications, from the OEM technical advisor.

7. Inspect and Repair Air Preheaters Outer Casing, Ducts and Expansion Joints

A. 250 feet length of expansion joints.

B. 1,500 square feet of repairs for ducts.

8. Technical Advisor Service

A. The contractor shall be responsible for providing Technical Advisor services from the manufacturing company Arvos (Air Preheater Company), which shall be present on-site during part of the installation to have expert installation supervision, establish guidelines and commission the scope of work.

B. The price for the technical advisor service shall be included in the bid price as part of the lump sum price.

C. A letter of acceptable completion of the scope of work from the Technical Advisor shall be included in the final report.

9. Air Preheaters Baskets Replacement (B-003B)

A. GeneraPR will provide all new Air Preheater baskets.

B. Scope is for all basket of the unit, hot and cool sides for both ducts (384 Total).

C. Remove necessary insulation.

D. Remove all existing baskets and transfer to recycling dumpster.

E. Install all new Air Preheater baskets.

F. Replace insulation.

VI. Estimate Cost:

Estimated cost for Project

Item	Description	Cost Estimate
1	Unit #4 Economizer Water Inlet Valve	$150,000.00
2	Unit #4, Major Repair	$8,250,000.00
	Total	**$8,400,000.00**

VII. Environmental & Historic Preservation ("EHP") Requirements

A. Other than design, planning and non-destructive due diligence studies, no construction work will commence prior to the issuance of specific expressed written FEMA approval for the specific scope of work. FEMA required EHP compliance review will precede the execution of each proposed scope of work submitted by PREPA through its agent Genera PR to FEMA. PREPA through its agent Genera PR is aware of its responsibility for coordinating, notifying, obtaining permits, and complying with applicable federal, state, and local laws, regulations, and executive orders and understands that failure to comply with EHP requirements will jeopardize FEMA funding.

B. See the following for general methods of repair and list of equipment to be used:

a. Dismantle & Salvage
- Complete testing for any containments or hazardous waste.
- All contaminated materials will be delivered to the approved waste disposal as per Disposal Management Plan.
- If equipment is to be salvaged, it will be loaded and removed from the site.
- All debris will be taken to the approved waste disposal facility as per the Waste Management Plan.

C. List of Equipment to be used but it is not limited to the following:
- Crawler Crane
- Semi-truck with low-bed trailer
- Man lift

D. Removal of vegetation
- N/A.

E. List the type of debris:
- Metal scrap, domestic waste, wood.

- The debris will be separated and taken to an approved waste disposal facility. Location permits and supporting documentation will be provided at closeout.

F. Description of Staging Area:
    - N/A – only minor equipment staging near the existing equipment to be dismantled and installed.

G. Hazardous Material:

a. Describe the activity and the hazardous material involved. Calculate the quantity to be generated or disposed and include the management and disposal plan.

- The identified hazardous materials that can be found in the Generation Plant are asbestos, PCBs, Lead, SF6 gas, oil from the transformer & breakers. These hazardous materials, will be handled, and disposed of as per Federal and State Laws.
- GENERA will provide actual disposal locations and quantities as a Condition of FEMA Record of Environmental Considerations
- These products and their residues will be stored in special covered areas for disposal by an authorized company and provided with temporary spill controls until collected. All paint containers and curing compounds will be tightly sealed and stored when in use. Excess paint will not be discharged to the storm system, but properly disposed of, according to the manufacturer's instructions.
- Material amounts will be provided by a certified management contractor performing a site evaluation calculation for asbestos and lead paint.
- Prior to the start of any equipment dismantling activities, inspections for the presence of asbestos will be conducted by a trained and certified contractor.

- All asbestos waste found at the Generation Plant will be disposed of at an approved landfill designated by the Department of Environmental Health & Safety. All asbestos waste generated will be bagged and transported in accordance with all applicable State and Federal regulations. There will be no exceptions.
- Any asbestos spills will be cleaned up immediately to prevent the dispersal of fibers. Prudence will be exercised to avoid contamination of laboratory facilities or exposure of personnel to asbestos. Asbestos spills will be cleaned up with wet methods and/or a High-Efficiency Particulate-Air (HEPA) filtered vacuum.

b. If the project includes building demolition with asbestos, provide a copy of the EQB approved plan or evidence of plan submission.

- Not Applicable.

c. If the project includes disposal of damaged transformers or wood poles with creosote, include the management and disposal plan. The plan must include the final disposition site.

- Transformers and pole disposal will be handled as per the Waste Disposal Management Plan. GENERA will provide actual disposal locations and quantities as a Condition of FEMA Record of Environmental Considerations.
- The removal of the transformer will require testing of the existing oil for PCB's levels, drain oil, and delivery to the approved waste disposal site as per Environmental Regulations.
- Removal of wood poles with creosote treatment will be handled according to the Federal and State Laws.

H. Water Crossings:

a. Specify if the project will affect a waterway or body of water.

- Not Applicable

b. Modification of a body of water or wetland: Does the project require dredging, excavation, disposal of material, adding fill material that might result in any modification of a body of water or wetland designated as "waters of the U.S."?

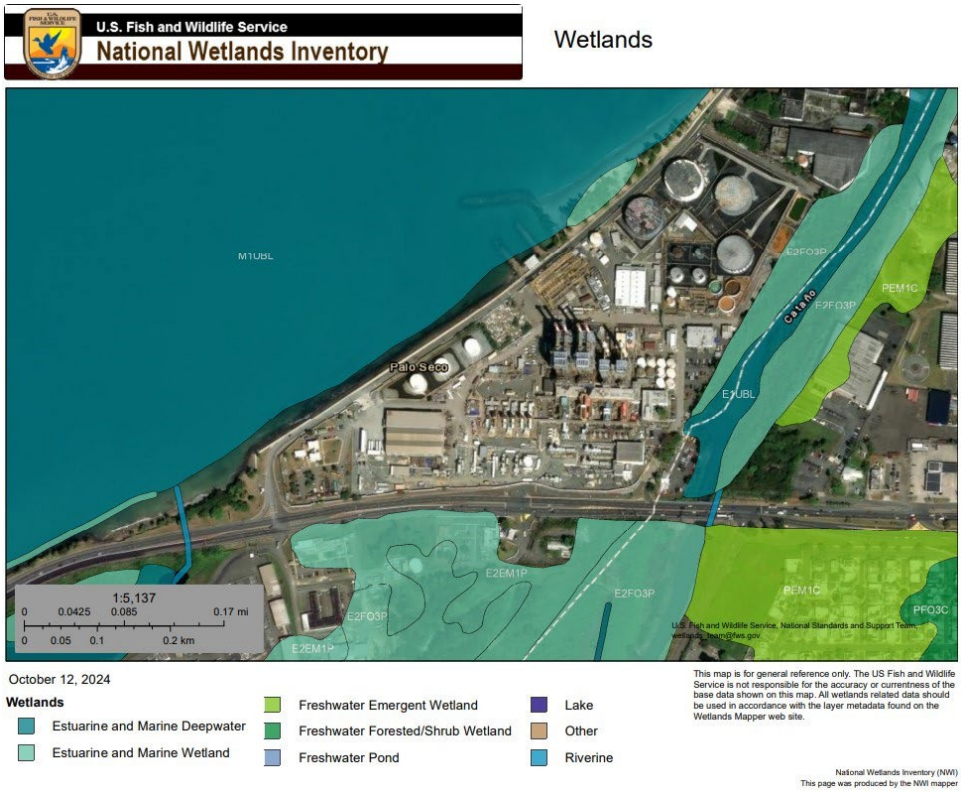
- Not Applicable

c. Does the project alter a watercourse, water flow patterns, or a drainage way, regardless of its floodplain designation?

- Not Applicable

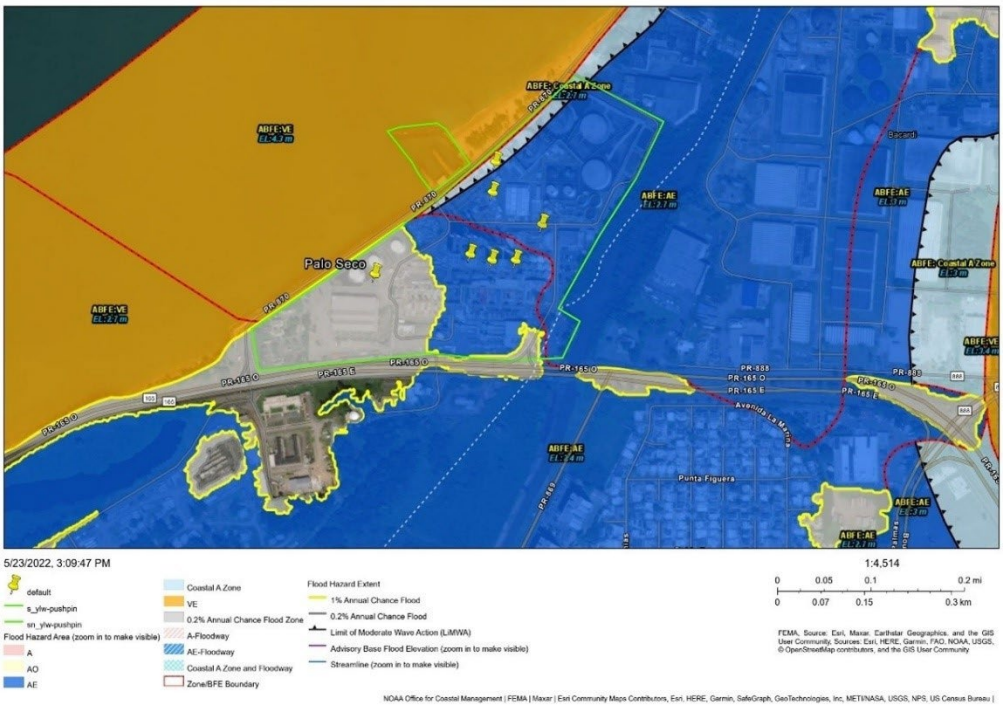
d. Flood zone: Is the project located in a flood zone, floodway or will it have a negative impact on the flood zone?

- The Generation Plant is in Flood Zone A (SFHA per ABFE). Equipment replacement only. No negative impact.
- In accordance with the updated version of FEMA Region II Memorandum, dated October 10, 2017, Guidance for the use of Available Flood Hazard Information for the Government of Puerto Rico in complying with FEMA Policy 104-008-2, 44 CFR Part 9, and Executive Order 11988 (Floodplain Management). All hazard mitigation proposals under alternative procedures must be designed using the best available flood hazard data and in compliance with applicable regulations and policy.



American International Plaza
250 Av. Luis Muñoz Rivera, Suite 1200
San Juan, PR 00918

Floodplains



I. Structure Age:
   a. Provide the construction date of any buildings or structures within the project. Include those near the project.
      - Not Applicable.

b. Provide date and information of any prior repairs, remodeling and/or rehabilitation of the property. Include current and previous use of building or structure.
   - Not Applicable.

c. If a building includes both older and newer sections, confirm which section of the building the work is being done.
   - Not Applicable

d. Include plans, drawings, blueprints, any architectural documentation available for new construction or substantial improvements regardless of the age of the building or structure.

- Not Applicable

e. Provide at least five color pictures of every structure or building, showing the four facades and the contextual view. Include additional pictures of architectural details. Also provide pictures of buildings (45 years old or older) on the proximities.
   - Not Applicable.

f. Provide an aerial photo map with the GPS coordinates of each structure.
   - If it Apply, Refer to Attachment xxxxx - Maps if not apply Not Applicable

J. Ground Disturbance

a. Provide a description of the new ground disturbance by giving the dimensions (area, depth, volume, etc.), if any. Include an aerial photo map showing the extent of the disturbance with coordinates.
   - Not Applicable.

Figure 7 – Add photos of equipment

b. The project SOW will not affect water or sewer utility services.

c. Indicate the prior/current use of the area to be impacted.
   - Not Applicable. Area is an existing Generation Plant. 100% of the work to be completed will be within the existing and already impacted Generation Plant perimeter.

d. Explain how materials will be stockpiled and disposed of.
   - Not Applicable.
   - GENERA will provide actual disposal locations and quantities as a Condition of FEMA Record of Environmental Considerations.

e. Specify final disposition site.
   - The disposal of materials will be handled as per the Waste Management Plan.

K. Soil Stabilization measures:

a. Does the project involve any soil stabilization measures?
    - No

Version 0

In Re: 4339 DR-PR Initial Scope of Work
Project # 669498

I. Overview

Project Name: 1. ASP Nautilus Rehabilitation Project

2. Manufacture and Delivery BFWP 5,000 HP Motor

3. Improvements to the Pier and Replacement of Sections of Fuel Oil Pipelines

Project Type: 428 Detailed SOW

Project Location : Central Aguirre, Puerto Rico 00704

Latitude/Longitude : 17.95111, -66.23554

Version : 2

II. Introduction

PREPA is a public corporation of the Government of Puerto Rico created pursuant to Act No. 83 of May 2, 1941, as amended. PREPA owns the power plants for electric generation, transmission, and distribution facilities serving all of Puerto Rico. As the sole electric utility in Puerto Rico, PREPA provides electricity to approximately 3.4 million people. Genera-PR is the operator authorized under a Public-Private Partnership agreement of the thermal generation facilities of Puerto Rico. Since 2017, PREPA has performed damage assessments, studies, and evaluations to identify areas of repair and improvement. These include transmission and distribution lines, electrical substations, generation plants, mitigation, and other improvements.

On September 6, 2017, Puerto Rico's northern coastline was struck by Hurricane Irma, a Category 4 storm. Two weeks later, on September 17, Hurricane Maria tore through the island of Puerto Rico as a Category 5 storm. Subjected to 150+ mph winds and

more than 25 inches of rain, 3.4 million residents lost power and a great deal of infrastructure, including critical facilities, was damaged. In particular, the electrical infrastructure suffered catastrophic impacts. In the aftermath, diligent recovery and reconstruction have been going on, not only to restore the electrical infrastructure to pre-storm function and capacity, but to take this opportunity to bring it in line with current standards and technology. With the recovery funding available, "*Everyone can be sure that we are working responsibly to achieve efficiencies, reduce costs, decommission inefficient and polluting plants, and continue to transform our electrical system for the benefit of our economy and our people*" as Governor Pedro Pierluisi said, this being an opportunity to not just to rebuild the system but to transform it into a smarter, more resilient, and cleaner one. Puerto Rico's generation system must meet customer demand and have adequate additional capacity to comply with the reserve required by the standard operating procedures of the T&D system operator (LUMA). In terms of service continuity, the system must be reliable so that service interruptions are within the margins established in the electrical industry standards.

In 2020 the situation became more complicated when earthquakes events 4473DR-PR provoked more damages to Costa Sur Power Plant. Later, in September 2022, Hurricane Fiona 4671DR-PR also impacted Puerto Rico, destroying even more the already fragile generation assets. Unfortunately, the generation system presents critical performance metrics with a deficiency in capacity to meet the energy demand and the minimum reserve requirements. The forced outage percentage of the units is increasing while the generation capacity decreases. This combination of factors puts the continuity of the service at high risk, adversely affecting the quality of life of those who live in PR.

Genera is responsible for operating and maintaining PREPA's legacy asset generation fleet pursuant to the Generation O&M Agreement. The current fleet condition presents poor performance due to the impact of hurricanes María and Fiona. Generation capacity has been reduced to 46% of installed capacity. In addition, of the generation units in operation, about 32% or 640 MW, are disconnected monthly, causing thousands of customers to suffer interruptions in their service.

The Puerto Rico Electric Power Authority ("PREPA") is a public corporation of the Government of Puerto Rico created pursuant to Act No. 83 of May 2, 1941, as amended. PREPA owns and operates electric generation, transmission and distribution facilities serving all of Puerto Rico. As the sole electric utility in Puerto Rico, PREPA provides electricity to approximately 1.5 million customers. Since 2017, PREPA has performed damage assessments, studies, and evaluations to identify areas of repair and improvements. These include transmission and distribution lines, electrical substations, generation plants, mitigation, and other improvements. On January 2023, PREPA and the Puerto Rico Public-Private Partnership Authority ("P3 Authority") selected Genera PR, LLC ("Genera") to operate, maintain and modernize the Generation system of PREPA for ten years through a public-private partnership.

To enhance the system's reliability, Genera proposes to submit for approval the Detailed Scope of Work (SOW) to COR3 and FEMA for the project 669498 under DR-4339-PR Public Assistance. The document provides a description of the project including scope, schedule, and cost estimates as well as Environmental & Historical Preservation ("EHP") requirements.

III. Facility Description

PREPA's Generation System Maintenance Program was developed and is being executed using the industry standards, following the equipment's manufacturer maintenance recommendations and PREPA policies. Periodical inspections, tests are performed to identify critical component repairs/replacement in equipment such as boilers, turbines, generators, power transformers, circuit breakers, protection and control relays, grounding mats, and auxiliary equipment.

Genera PR proposes to perform necessary repair and/or replacement of critical generation components pursuant to the Generation O&M Agreement between PREPA, the P3 Authority, and Genera PR.

Aguirre is located on the south coast of Puerto Rico in the Salinas municipality and is owned and operated by PREPA. The Plant has two 450-

MW thermal steam power generation units, two 296-MW combined cycle (CC) power generation units that can also operate in simple-cycle mode, and two 21-MW black-start capable gas turbines (GTs). The nameplate capacity of the Plant is 1534 MW (gross), including the units that are currently out of service for repairs

The two 450-MW thermal units, referred to as Units 1 and 2, were commissioned in 1971 and 1972, respectively. A 1991 upgrade to 500 MW on their General Electric (GE) (formerly ABB) steam turbines (STs) is based on 3430-kilopound/hour main steam flow at 2400 psig and 1000°F and hot reheat conditions of 594 psig and 1000°F. Boiler restrictions on steam flow have limited the units to their original 450 MW. The boilers burn heavy fuel oil (HFO) and are tangentially fired models by Combustion Engineering, now GE Power.

Figure 1: Facility Location

IV. Codes and Standards

The following will be referenced when applying specific codes, specifications, and standards to the project design:

- Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR, February 2020.
- Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.
- FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.
- Rus 1730B - The referenced standards, as defined and as per their requirements, state every system is required to have an Emergency Restoration Plan (ERP) in the event of a major failure or storm event.

V. Project Description - ASP Nautilus Rehabilitation Project

This project aims to ensure the structural integrity and operational efficiency of the Nautilus Tanks through comprehensive rehabilitation and protective measures. Tanks are located in 17.949504, -66.227227. 3 tanks are going to be rehabilitated with approximate dimensions of 48 FT diameter, 19.89 FT high and 3,000 SF of interior wall surface.

Figure 2: Nautilus Tanks Location

Initial Scope of Work

The work includes providing labor, supervision, materials, equipment, inspection and everything necessary for the installation and acceptance by Genera PR of a Coating-Ceramic Reinforced Lining system throughout the interior and anti-corrosion protection in the external part of the Nautilus Tanks that is located in the facilities of the Aguirre Power Plant, Salinas PR. Part of the work will be mechanical repair with welded steel plates to repair walls, channels and floor of tanks where the loss of thickness exceeds 50% of the original thickness. The scope of work will

also include removing and reinstalling all the existing mechanical equipment that is part of the operation of the tank, i.e., mixers, motor-transmission, sprocket and chain for the flocculation wheels, transmission of the syphon car with chain mechanism and honeycombs.

It will be the responsibility of the contractor to mechanically dismantle the tank systems in order to have adequate access to the interior of the tank and to be able to carry out the repair work by welding and interior coating. You shall store and identify the parts, equipment, and mechanical attachments of the tank operating mechanism in a safe and protected area to prevent damage. After the completion of the rehabilitation work, he will be in charge of assembling all the parts and equipment and will leave the tank mechanism operable. Any hardware required for the reinstallation of the equipment again will be the responsibility of the contractor, it is allowed to reuse the existing hardware that is in good condition and not corroded. The contractor should consider that during the re-installation of the equipment, any incidental damage to the interior cladding must be repaired at its own cost and following the manufacturer's recommendations for repair.

A. Installation of Coating-Ceramic Reinforced Lining System
    1. Apply Coating-Ceramic Reinforced Lining system throughout the interior of the Nautilus Tanks.
        a. Interior Surface Area: 3,000 sq. ft.
        b. Additional Coating Area: 250 sq. ft.
        c. Top Area Coating: 500 sq. ft.
        d. Remove new and existing weld spatter debris prior to preparation and coating application.
    2. Apply anti-corrosion protection to the external parts of the tanks.
        a. This includes the additional 250 sq. ft. area specified for anti-corrosion coating.
B. Mechanical Repairs
    1. Repair of Tank Walls, Channels, and Floor
        a. Welded Steel Plates: Repair areas where the loss of thickness exceeds 50% of the original thickness.

2. Removal and Reinstallation of Mechanical Equipment
    a. Mixers: Dismantle, store, and reinstall.
    b. Motor-Transmission: Dismantle, store, and reinstall.
    c. Sprocket and Chain for Flocculation Wheels: Dismantle, store, and reinstall.
    d. Transmission of the Syphon Car: Dismantle, store, and reinstall.
    e. Honeycombs: Remove, pressure wash (1,800 psi), store, and reinstall.

C. Dismantling and Reassembly
    1. Mechanically dismantle the tank systems to provide adequate access for interior repairs.
    2. Store and identify all parts, equipment, and mechanical attachments safely to prevent damage.
    3. Reassemble all parts and equipment post-rehabilitation, ensuring the tank mechanism is operable.

D. Hardware and Incidental Repairs
    1. Supply any necessary hardware for reinstallation, reusing existing hardware that is in good condition and not corroded.
    2. Repair any incidental damage to the interior cladding during reinstallation at the contractor's cost, following the manufacturer's repair recommendations.

E. Structural Repairs
    1. Catwalk Railings
        a. Reinforcement: Check for damage and modify to meet OSHA codes. Strengthen the railings in areas identified as unsafe. This may involve adding additional support structures or reinforcing existing ones.
    2. Control Panel Structure
        a. Frame Dimensions: The new frame for the control panels will be constructed using 4-inch channels, matching the original dimensions.
        b. Roof Plates: The coated with anti-corrosion roof plates will be installed as part of the structure matching the existing structure to ensure proper fit and coverage.

Special Considerations to be Addressed Under this Scope of Work

A. Lead Inspection Test shall be performed prior any activities takes place.
    1. If necessary, Lead abatement of existing surfaces will be performed.
B. All repairs of weld patches on the tank wall and floor must be tested with a Penile Dye Non-Destructive Test (NDT Penetrant Tints-PT).
C. All welds shall be made in such a manner as to ensure complete fusion with the base metal, within the limits specified for each joint and strictly following the Qualified Procedure.
D. Welders must be qualified for the type of work to be performed.
E. Only procedures qualified by the company will be accepted to carry out the welding work.
F. Removal and installation of existing transmission and installation of flocculation wheels, including chain supply in non-metallic chain UHMW material. The contractor shall render the equipment operable.
G. Included is the removal, 1,800psi pressure washing, and installation of the clarifier honeycombs once the interior tank rehabilitation work is completed. The contractor will be responsible for installing them and all the materials necessary for their installation will be reused from the existing ones. Red cedar woods will also be reused, and it will be the contractor's responsibility for cleaning and safe storage during the course of the project.
H. The catwalk railings around the tanks will be reinforced, as they are unsafe on some sides and require repair. The contractor will check the guardrails for damage and modify them to meet OSHA codes.
I. The replacement of the protective structure of the control panel is contemplated, the contractor will install the new frame of the structure of the control panels of each tank, includes the installation of roof plates, the frame will be in a 4" channel as the original and of the same dimensions. It shall be coated with the anti-corrosion system specified for the outside of the tank.
J. The entire surface and all components inside and an additional area of (250pc) of the exterior shall be part of the anti-corrosion coating and preparation of the surface to the grade of NACE No.1 White Metal Blast Cleaning, this includes but

is not limited to (manholes, nozzles, chime, walls(shell), internal divider walls, buffer area of all UV-exposed walls- non-immersion areas, butt gutters and their components, flanges, saddles, reinforcing plates, anchor bolts, MH covers, stairs, props, pipes, overflow, pipe supports, angles, angles, brackets of fiberglass panels, valves, posts, angles, Unistrut's, stiffener , etc.).

1. The interior surface area for preparation to NACE No.1 grade and application of Ceramic Lining is approximately 3,000(pc) three thousand square feet. The contractor will be responsible for making its own area calculations for the coating material estimate.

K. The scope of work inside the tank included NACE No.1surface preparation and application of a system equal or with better performance than Chesterton ARC S2-Epoxy Ceramic Reinforced Lining to the entire floor, all internal walls, supports, channels, non-submerged wall stops, and all interior components to NACE No.1 / White Metal Blast Cleaning.

L. The scope of work inside the tank includes surface preparation and application of a system equal or with better performance than Chesterton ARC 858-Epoxy Ceramic Reinforced Filler Lining to an additional area of (250pcs) to the grade of NACE No.1/White Metal Blast Cleaning. Adry weight of 1/16" in: (62.0mils) DFT for the calculation of the required material. This material will be applied in areas and zones that have been lost due to corrosion not exceeding 50% of the original thickness of the steel member.

M. The scope of work inside the tank includes the application of a system equal or with better performance than PPG PSX-700 siloxane epoxy coating to the stop and top area of all tank walls and channels. This coating will be applied over the Chesterton ARC S2 product and will have a width of (3') feet. The approximate coating area shall be approximately: 500 (pc) sq. ft. The dry thickness for the PPG PSX-700 will be: 4.0 mils (dft).

N. Maintenance will be performed on the outside of the tank where sandblasting will be performed to NACE No. 2 SSPC-SP10 Near White Metal for areas with corrosion until an anchor profile of 3 @ 5 mils is reached to apply a system equal or with better performance than ARC 858 filler material [(performance for 858 (50pc)] followed by a layer of a system equal or with better performance than Amercoat 240 product epoxy in thickness of 5 mils. For the tank area to be removed, it should be done in combination of the surface preparations to the grade SSP C-SP1, SSPC-SP2 & SSPC-SP3, and then apply 2 coats of a system

equal or with better performance than the PSX700 topcoat in thickness of 5 mils. In the areas or zones where the base metal is exposed a system equal or with better performance than Amercoat 240 epoxy must be applied first at 5 mils DFT prior to the application of the topcoat. The contractor is responsible for performing the exterior area calculations for the estimation of materials and labor for this item.

O. This includes sealing on the outside of the perimeter of the tank between the steel floor plate of the tank and the concrete floor to prevent moisture from entering through the bottom of the floor plate. A groove must be made in the tie of the concrete floor and the steel tola to apply the Sika Flex 1A product. The thickness of the system will be in accordance with the manufacturer's technical data.

P. The contractor and/or sub-contractor must have no less than 5 years of experience in tank rehabilitation and must include evidence of at least three references of similar complexity work with their proposal. Proposals that do not meet this requirement will not be accepted.

Initial Scope of work

Manufacture and Delivery BFWP 5,000 HP Motor

A. Scope

These Technical Specifications are prepared for the purchase of two new horizontal solid shaft induction motor to drive Aguirre Steam Plant Unit 1 or 2 Boiler Feed Water Pumps. The new motor shall be interchangeable with the existing ones in use at the plant.

New motor, in the future, will be connected in series to the existing Boiler Feed Water Pump (tandem connection). The front end of motor 1 will be connected to the pump and the rear end will be connected to motor 2.

The motor shall be delivered within 300 consecutive days after Notice to Proceed. Two motors shall be delivered to the Aguirre Steam Plant.

B. Kind of Service

The new motor shall be used as a substitute to existing equipment of the same capacity (5,000 hp), shall be designed to fit in the existing bases **without modifications to existing facilities**, and shall be capable to drive the existing horizontal pumps.

Available technical data for the driven equipment to be mechanically coupled to the motor to be purchased is provided as follows:

General Type	Boiler Feed Water Pump Elect Utility Pump
Manufacturer	De Laval Turbine, Inc
Type	Barrel Type BFP 9BB3I310 Shaft Driven Pump
Stages	9 stages twin suction, double case
RPM	3,570-3,600
Rotation	Clockwise (looking toward pump)
GPM	4,500
BHP	9,000
Pump Rated Capacity	2,000,000 lbs/hrs
Suction Press	168 psi
Discharge Press	3,018 psi
Discharge Head	7,835 Ft
Curves	See drawings attached

C. Ambient operational conditions

The motor will be installed at sea level and will operate in a tropical climate zone, at an ambient temperature of 40 C. Motor will be operated continuously at full load during a natural year (8,760 hours). This equipment

will be operated at an area subject to severe dust and mild salt spray due to prevailing winds. Hurricane winds of 150 miles per hour (50 lb/ft^2) may be originated at the area where the motor will be installed, and it shall be capable of withstanding these winds without damage or negative effects on its operational characteristics.

D. Capacity and performance

The new motor shall be of general-purpose characteristics, with heavy-duty design and construction. The new induction motor shall be squirrel cage type, horizontal, solid shaft and shall replace the existing 5000 horsepower motors in operation. The characteristics of the new motor shall be identical to existing (original) motors characteristics but with modern design and construction, high operational efficiency and the specified horsepower rating (5000 HP).

E. Type of equipment to be acquired

1. Standard manufacturing

Unless inconsistent with this specification, the contractor shall supply equipment of standard construction as per industry manufacturing standards and policies for the construction of electrical motors.

2. Standards and applicable codes

Unless otherwise specified herein, the latest applicable standards of the American National Standards Institute (ANSI), Institute of Electronic and Electrical Engineers (IEEE), National Electrical Manufacturers Association (NEMA), Electrical Apparatus Service Association (EASA), and all other applicable standards or codes of other organizations related to electrical motors design, construction or operation, shall govern.

3. Construction

The equipment shall be manufactured to operate within appropriate safety standards, taking in consideration not only the equipment, but also the operating personnel. It shall operate in a proper way within the operational requirements described or implied in this specification without undue strain, wear, heating, vibration, corrosion, or other operational troubles.

4. Materials used in motor construction

   The equipment and all its components and parts shall be capable of operating at high temperatures or other severe conditions, and they shall be manufactured with the best available materials adequate for the required service. Toxic or other hazardous materials, parts or paints shall not be used. GENERA PR may require, at any moment, the Material Safety Data Sheet of any product used in the manufacture of this equipment.

5. Replacement parts

   Parts subject to wear, corrosion or other deterioration, or requiring adjustment, inspection, or repair caused by normal use shall be accessible and capable of reasonable and convenient removal when required. Diagrams and/or instruction manuals for the replacement of such parts shall be provided with the motor.

6. Threads of bolts, nuts, stud and screws

   Bolts, nuts, studs and screws shall have threads conforming to ANSI Standards, preferably in integer unit measurement (whole numbers) in the English System. In the event that the equipment and its threaded components are constructed using the metric system, this fact shall be indicated in the "Exceptions" of the Proposal and in the quotation submitted to Genera PR. Only hexagonal nuts shall be used.

7. Lifting points

   Threaded holes to attach eye bolts of standard size in the English

System and of common use, shall be provided on the external frame of the motors to allow the lifting of the equipment in a safe manner including the heaviest components.

8. Support points

Support points provided by the manufacturer shall be designed for reasonable convenient connection to the foundations or supports at the installation site.

9. Electrical insulation materials

Insulating materials used in motor construction shall be of the best quality available and shall comply with the latest ANSI, NEMA, IEEE Standards, and the Electric Apparatus Service Association (EASA). The use of asbestos material is totally prohibited.

10. Conflicts or discrepancies

In case of conflict between standards, the more stringent requirements will apply.

F. Proposal required information

Bidders shall include the following information in their proposals. Bid proposals not including the required information will be rejected and considered not responsive.

1. Compliance with latest standards and organizations:

Bidders shall certify that the proposed motor complies in its design, construction and materials used, with the latest applicable standards and regulations from the following organizations:

a. American National Standard Institute (ANSI)
b. National Electrical Manufacturers Association (NEMA)

c. Institute of Electrical and Electronics Engineers (IEEE)
d. National Electric Code (NEC)

2. Technical information required

Contractor shall provide technical information related to motor performance and manufacture. This shall include drawings showing all the dimensions and technical specifications of the proposed motor.

Motor operational characteristics recommended and maximum limits of electrical and mechanical parameters like current, voltage, efficiency, power, temperature, vibrations, etc., shall be included also. See Article III.F of the Special Conditions: "Required Information with Bidders Proposal and Evaluation Factors" for detailed requirements.

3. Electric insulation

Details of insulation class and treatment given to stator coils of motor shall be included with the Proposal support documentation.

G. New motor electrical specifications

The following information defines PREPA requirements for the new motor to be supplied by means of this specification. These requirements are based on existing motors nameplate data, and the operational experience with existing equipment. Requirements in this section may be stricter than original requirements to correct existing problems with old equipment.

1. Design requirements

The new induction motor shall be squirrel cage type as per the following specifications:

New Motor Electrical, Physical and Operational Specifications	
Generic Design and Motor Type	Horizontal Squirrel Cage Induction Motor
Horsepower Capacity	5,000 HP

New Motor Electrical, Physical and Operational Specifications	
Stator Winding Configuration	Wye
Nominal/Rated Voltage	4,000 VAC
Locked Rotor Amps	3524 (data from existing motor)
Phases	3
Frequency	60 Hz
Differential Protection Current Transformer Ratio Type	800/5 (Existing GE Type JKM-3)
Type od Squirrel Cage Motor and Electrical Characteristic	Normal starting torque characteristic and normal starting equivalent to NEMA design B motors
Rotation	Bidirectional
Insulation	Class F
Temperature Rise @ 1.15 SF	90⊠ C
Service Factor	1.15
Enclosure	Weather Protected WPII
Duty	Continuous
Full load Current	632 A (Data from existing motors)
Stator RTD's	10 Ohm Copper 25ºC
Bearing Thermocouples	Copper Constantan Dual Element, Type T
Rotor and Stator	Copper
RPM	3,570
Frame	8512Z
Motor Heater Rating	120 V, 800 W, 1 PH

2. Other requirements

a. Rotation and axial play

The shaft rotation shall be bi-directional, with an appropriate motor endplay, adequate to the specific characteristics and specific application of the motor as per NEMA MG 1-2021.

b. Service Factor

The motor shall be capable to be loaded up to 1.15 times its nominal capacity of 5000 HP and its load equivalent in amperes at nominal voltage, frequency and temperature, without exceeding the 90°C temperature rise.

c. Frame and foundations

The frame of the new motor shall be of similar physical characteristics and dimensions of existing motor frames, in order for the new motor to be installed **directly and without modifications** to the existing installations or bases at the plant.

The supplier is sole responsible to check and verify in place the actual dimensions in order that new motor shall be installed directly and without modifications to the existing bases and/or facilities. On indicated required field verification visit, supplier shall also thoroughly inspect existing motors foundations sole plate or grouting as applicable, to determine the possible need to perform repair/re-construction work on this part of existing installation. The contractor is responsible to expressly notify PREPA on its bid proposal of any and all identified work required or recommended to be performed on foundations before new proposed equipment installation.

d. Winding insulation temperature measurement

e. This temperature shall be measured by a minimum of six-10 ohms RTD's, factory embedded and equally distributed around stator winding (360 degrees). The temperature rise specified shall never be exceeded by any part of the operating equipment, nevertheless that the motor be operated continuously at its maximum electrical and mechanical power, including its additional capacity provided by the service factor specified above its nominal capacity.

f. Bearing thermocouples and thermometers

Each motor bearing shall be provided with **dual element, type T thermocouples (copper-constantan)** provided with its wiring and independent connection box. See Section H.13.d.

Each bearing shall also be provided with one dial thermometer, helix type bimetal element, 3-inch diameter head (minimum), 0.5 inch NPT male connection nut, rugged 304 SS construction, 0°F to 240°F dial range, 2° divisions, back connection and an appropriate stem length for the application.

g. Thermal resistors

The motor shall be provided with thermal heating resistors (space heaters) of the adequate capacity to operate at 120 volts, one phase, 60 Hertz. Space heaters shall be cartridge type. The space heaters shall never be in contact with stator windings. The motor shall include an independent connection box of appropriate size with the provisions to connect the heaters to the existing facilities. The thermal resistor will be installed to transfer the heat to the core instead of the winding, keeping at least 10□C over the environment (ambient) temperature (approximately 40□C), ensuring that no internal water vapor condensation occurs inside the new proposed equipment.

h. New motor base

The new motor shall include eight holes equally spaced around the base, to provide flexibility and facilitate the installation of the motor in the existing motor-pump bases.

i. Lighting Arrestors and Three Phase Protection Capacitors

The new motor shall be supplied with NON-PCB surge protection three phase capacitor and internal discharge resistor. The new capacitors shall have adequate capacity in order to minimize starting motor power surge.
The surge protection capacitors and the discharge resistor shall be provided and installed as part of the external motor connection box and shall be used to complete the physical connection of the incoming feeder lines and power leads.

3. Electrical insulation technical requirements

a. General characteristics

The motor shall be provided with class F (non-hygroscopic) insulation with design and operational characteristics adequate to be operated in an ambient and conditions usually found in power plants. The motors are located in a tropical zone near sea level. The insulation shall have anti-fungi properties. The insulation shall have integrity and shall be sealed and made with materials capable of protecting against the detrimental effects of high (100%) relative humidity, oil and chemicals.

b. Insulation methods

Insulation method required for the conductors, coils and material in motor windings shall be **vacuum pressure impregnated ("VPI")** or solventless B-stage Epoxy-resin rich tapes. Whenever VPI is not utilized, after coils are completed, the stator assembly shall be completely flooded by immersion with the best available dirt resistant insulating

varnish, drained and baked, producing a sealed, dry and smooth external winding surface. Conventional winding insulation methods not expressly indicated in this section will be rejected. Any insulating method used on motor fabrication shall improve coil performance and motor life in severe environments and eliminate all corona-generating points on the windings.

c. Windings and end turns

The windings and end turns shall be firmly braced and firmly secured to avoid vibrations. The contractor, supplier or manufacturer shall verify that end turns do not interfere with the installation and removal of the motor rotor, with its normal operation and with the future assembly and disassembly.

4. Starting and operating requirements

To being able to evaluate Bidder's proposal, the following information, expressly confirming requirements fulfillment as specified or differences as applicable, shall be provided on bid proposal.

a. Rotation

Motor electrical and mechanical characteristics shall allow the motor rotation and cooling system to be bidirectional.

b. Starting characteristics

The new motor minimum starting torque requirements shall be 100% of the load. The breakdown torque shall be equal or greater than 250% of the full load torque. The motor shall be capable of across the line starting, and accelerating with 100% mechanical coupled load, up to rated (nominal, nameplate) speed including the service factor required.

The motor shall be capable of two consecutive starts, additional starts should be according to starting restrictions of induction motor, as per NEMA MG 1-2021. A separate starting information plate should be supplied on the motor.

c. Operational voltage limits

The motor shall be designed to be capable of across the line starting with ninety percent (90%) nominal voltage on its power leads and accelerating with 110% mechanical coupled load, up to rated (nominal, nameplate) speed including the service factor required.

Also, the motor shall be capable of continuous operation at full load with ninety percent (90%) nominal voltage on its power leads, satisfying the starting requirements in a range between 90% to 110% of nameplate's nominal operation voltage (NEMA MG 1-2021).

d. Operational currents limits

Full load current when operating within ten percent (10%) of rated voltage shall not exceed by more than fifteen percent (15%) rated full load current (1.15 times) including the power factor.

e. Operational time and starting current limits

1) The real starting current of the motor shall not exceed the established limits of KVA per horsepower.

2) The locked rotor time interval shall be equal or greater than the maximum acceleration period when the equipment is started with maximum load, including the service factor, at minimum voltage limit (80% of the nominal voltage), without any detrimental effect to the operating equipment.

f. Winding temperature increment

Winding real temperature increment, when operating the equipment continuously at its nominal full load and mechanical capacity, including the specified service factor, shall not exceed the temperature rise limits as specified and required.

g. Grounding connections

Motor shall have provisions for grounding according to the latest NEMA MG 2-2014 revision, National Electric Code and all other applicable standards. The motor shall have two (2) suitable grounding pads, one located on main conduit lead box side of motor, and the other in opposite side, both on or near the frame base, capable of accepting #4/0 AWG copper conductors for this purpose.

5. Rotor specifications

a. General

Motor rotor bars and rings of the squirrel cage type shall be constructed using copper or copper alloys approved for this kind of equipment with appropriate structural reinforcements for adequate operation and failure prevention. **Proposals offering motors with aluminum conductors/bars will be rejected**.

The number of rotor flutes shall not be equal to the number of poles of the motor to permit the use of predictive equipments without electrical interference or distortion.

b. Mechanical balance of the rotor

The rotor shall be statically and dynamically balanced (at its nominal load and speed) in accordance with the requirement of the standard MG-1-2021 and its latest recommendations and revisions. When a new mechanical coupling is requested to be included with the motor, the balance shall be done with the whole coupling installed on the motor.

c. Vibrations

The vibrations of the motor, at its maximum load and nominal speed, shall be tested, measured and not exceed the maximum amplitude recommended as per IEEE Standard 7-16-1969 as revised 9-15-1982, NEMA MG1-1998, API 541 or its most recent revisions. In relation to the equipment characteristics referred to the horizontal, vertical and axial vibrations, the supplier shall submit for any equipment supplied to the Authority, the following:

- Estimated horizontal, vertical and axial vibrations as expected for the equipment.
- Tolerable limits of vibration in normal operation and recommended limit for shut down.
- Vibration and current spectrum of the equipment manufactured for PREPA.

Note: The manufacturer may supply these data in his preferred measurement units, but it shall include at least one set of data in inches/second.

d. Design, materials and construction

New motor design, materials and construction shall secure the most reliable service; the best operation characteristics, oscillation elimination and the lower possible noise measured as per IEEE Standard 85 and its latest revision.

H. Mechanical specifications

1. Motor bearings

Heavy-duty sleeve bearings are required by PREPA, preferably of the outboard type. They shall be of easy removal, bi-directional, split housing, and lubricated by means of a self-lubrication system. The bearings shall be constructed as per NEMA and any other applicable standards for the design, for the materials to be used and for the construction of motor bearings for the specific application of the reference motor. Bearings shall be appropriate to operate under the conditions established for the motor operation. They shall be sealed against leaks and vapors of the lubricant to the interior of the motor. They shall also be sealed externally against the incoming moisture, dirt and dust.

The bearing housing shall provide, for each bearing, in an adequate location, drain plugs that could be easily removed when necessary. Lines with adequate valves shall be provided to allow for oil sampling for each bearing and/or for the main tank(s) of the lubricant. These lines for oil sampling shall not be taken directly from the bottom of the bearing or tank reservoirs where sludge precipitates (to avoid sediment in the samples). Facilities to add and remove oil easily shall be provided. Ball bearings will not be accepted as an alternative to the main proposal. Proposals of motors with ball bearings will be rejected.

Proponents shall quote for two spare sets of bearings as an option to be evaluated at GENERA PR, LLC discretion, one for each motor. Each set will include a front-end bearing assembly and one rear end assembly. Each assembly must include the following: housing, bearing liners, bearing seals and lubrication rings. If the assemblies are identical, two shall be provided.

2. Lubrication system

The motor shall be provided with two (2) split sleeve bearings, as described on Item H.2 below, designed to operate by means of a self-lubrication system, presently in service with the existing motor. The lubricant or oil shall be supplied to the bearing or equipment during its start up, operation and shut down by means of the

required lubrication system.

3. Bearing electric insulation

One of the motor bearings shall be electrically insulated to eliminate the possibility of circulating eddy currents through the shaft and journal with their detrimental effects. One and only one of the bearings shall be designed and constructed to drain or allow the current flow to ground without any detrimental effects to the equipment.

4. Mechanical coupling

The new motor shall use existing couplings without any required modification. Bidders are responsible for the verification of the coupling type and its dimensions at the existing equipment. If the new motor needs a different coupling, then it shall be included with the motor without additional cost to GENERA PR. The load side of the coupling shall be supplied without perforation (blind).

5. Frame

The new motor frame shall be similar to the existing motors physical characteristics and shall be designed for its direct installation without any modifications to the existing bases and power connection facilities, as specified in Articles B.1 and G.2.c.

Any repairable difference or discrepancy between the offered or supplied equipment and the existing installation or equipment shall be explicitly indicated in the Exceptions section of the Proposal.

No matter the provided information and drawings of these motors, the supplier is sole responsible to check and verify in place the actual dimensions of the frame, in order to design and provide a new

motor that can be installed directly and without modifications in all the existing bases and/or facilities.

6. Minimum information required in the nameplate

The nameplate of the new motor shall provide all the information required by the standards ANSI C50.41, NEMA MG 1-2021 and its later revisions. Also, the following additional information is required:

a. Rotation, specifying whether fan blade changes are needed or not.

b. Displacement limits of the magnetic center of the motor at full speed and load and location of marks for its verification.

c. Number and frequency of allowable start-ups and their restrictions.

d. Electrical configuration of the winding (wye, delta, etc.) and designation or name of the connecting terminals.

e. The identification of each bearing shall be done in accordance with the Anti Friction Bearings Manufacturers Association (AFBMA) and the bearing manufacturer.

f. Type and characteristics of the lubricant or recommended lubricants.

g. Mechanical rotation in relation with the phase sequence of the incoming line.

h. Space heaters operating parameters: capacity, voltage, watt, current, etc.

i. Type and characteristics of all the temperature detectors required and installed in the motor.

j. Serial number unique and specific for the equipment.

k. Name and location of the factory which manufactured the equipment.

l. Total weight of the motor and individual weight of the rotor and the stator.

m. Material(s), design, capacity, construction characteristics and number of bars of the rotor. This information is necessary to set the vibrations monitor equipment and its program.

The identification plates shall be constructed in stainless steel and fixed permanently to the motor located where it can have any easy access and reading. The information shall be printed off set or stamped on the surface of the plate.

8. Inspection Peepholes

Motors with sleeve bearings shall have inspection peepholes to visually inspect lubricant flow and ring sight gauges to see the oil level and condition. They shall be constructed using clear glass. The sight gauge shall be provided with drain plug for easy removal for each one of the bearings.

9. Allowable axial displacements

The maximum axial displacement allowed to the shaft, motor end-play, shall be as required in the Article G.2.a. This should be measured from both ends of displacement up to the magnetic center of the rotor at maximum load and nominal speed. The magnetic center and its allowable limits shall be clearly indicated and identified on the journal housing and/or on the motor frame.

10. Frame characteristics

The motor frame shall be designed so that it can be easily cleaned without the necessity of dismantling the equipment for this purpose. Cooling vents shall be provided with stainless steel protectors or screens and reusable air filters with their filter housing. Filters shall be provided. **The required external housing is Weather**

Protected Type II (WPII).

11. Connection boxes characteristics

The connection boxes for the power leads, RTD's, thermocouples, lighting arrestors, capacitors and heaters shall be of appropriate dimensions and with enough space to allow the connection and disconnection easily. The connection boxes shall be located in accordance with the existing motor boxes location or as per supplied diagram by GENERA PR if a written requirement is made by the bidder or supplier.

12. External protective paint

All the external components exposed to the ambient or subject to heating being fabricated from cast iron, iron, steel or carbon steel shall be painted in factory with at least two layers of the best quality paint in the market and shall be heat, oil and dirt resistant. They shall resist ambient effects as they apply in accordance with the best industry practices on the equipment manufacturer.

All the other components and parts made in iron, steel or steel alloys, not exposed to the ambient or subject to high temperatures, shall be finished in factory with at least one priming coat plus a second external coat in order to obtain minimum thickens of 4.5 mils. The primer should be a red iron oxide zinc chromat alkyd of 0.75 to 1 mil adequate to protect equipment against corrosion in the conditions and location of the equipment in a tropical zone. The outer paint layers shall be as per manufacturer standard color or as per instructions supplied by GENERA PR through its representative. Motor external frame and parts shall be completely painted. No lead-based paints shall be used.

13. Personnel qualifications and labor development requirements

All work shall be performed and completed in a thorough workmanlike manner and shall follow the best modern practice in the manufacture of materials and apparatus of the type covered by this specification, without any omission from the specification or drawings. All parts shall be made accurately and to standard gauge, where possible, so as to facilitate replacement and repairs.

14. Requirements to adapt the motor to existing facilities

a. Power leads

Stator leads shall extend at least **36 inches** beyond the frame. The power conductors shall be constructed of super stranded copper conductor or approved copper alloys of the appropriate gauge for this particular application. The conductor insulation shall be super flexible with the required voltage capacity. The holes in the stator frame through which the leads extend shall be equipped with insulated bushings or substantial non-degradable material, designed to protect leads from chafing due to bending or friction. They shall be of ample dimension to permit them to be securely fastened to the frame. Motor leads shall have sufficient ampacity that total temperature of the conductor will not exceed the temperature according to ANSI/NEMA C50.41-2012.

b. Space heater cables

The space heater cables shall be provided with weatherproof electrical terminals and shall be brought out to a separated weatherproof connection box, which shall be used exclusively for this application.

c. RTD and thermocouples cables

The stator temperature detectors and bearing thermocouples cables shall be brought out to a separate terminal weatherproof box on the motor frame for convenient connection. The leads and conductors shall be appropriate for this application.

d. Bearings thermocouples and thermometers

Motor bearings shall be equipped with dual element, type "T" thermocouples (copper-constantan), to be used to obtain temperature readings in the lubricated area. Thermocouple leads shall be brought out to terminals located on an appropriate connection box at head assembly (see Item H.14.c). Insulated holders shall be used as required to prevent static pick-up. The head assemblies shall be arranged for convenient connection to GENERA PR existing conduits. The leads and conductors should be designed and constructed for this application.

Bearings shall also be equipped with one dial thermometer, helix type bimetal element, 3-inch diameter head (minimum), 0.5 inch NPT male connection nut, rugged 304 SS construction, 0°F to 240°F dial range, 2° divisions, back connection and an appropriate stem length for the application.

e. Noise contamination

The no load overall sound power level (dBA reference, 10^{-12} watts) of this motor shall be less than 85 decibels when measured in accordance with IEEE Standard 85;

and ANSI/NEMA C50.41-2012 or latest revisions.

f. Winding temperature detectors

Stator winding temperature shall be measured by six (factory embedded) resistance temperature detectors (RTD's) 10 ohms at 25□C. (two RTD's per phase configuration). They shall be located and equally distributed around the 360 degrees of the winding. The leads and conductors shall be designed and constructed for this particular application.

g. Inspection windows

Two inspection windows (if applicable) shall be provided, one on each side of the housing. These windows shall have handles and gaskets to protect them from the ambient. They shall be of the appropriate dimensions to allow cleaning and inspection of the motor.

15. Range of Preferred Weight

New motor total weight shall not exceed existing motor weight of 17,300 lbs. However, GENERA PR reserves the right to approve and accept new equipments proposed with additional weight up to 15% above existing motor weight.

I. Tests

1. General

The manufacturer shall make all necessary tests to ensure his material and workmanship are of the required degree of excellence and that the equipment furnished by him shall perform as specified and guaranteed. All tests shall be conducted in accordance with the latest applicable tests codes for this type of equipment from the National Electrical Manufacturers Association, the American National Standard Institute, the Institute of Electrical and Electronics Engineers and other related organizations.

The manufacturer shall provide GENERA PR all data obtained from the equipment tests as required. The obtained values shall be tabulated in each and every one of the tests and written certified including the graphs and curves obtained. Any test failure due to inability to meet appropriate parameters as required by GENERA PR and as proposed and guaranteed by the contractor, shall be considered sufficient cause for motor rejection.

2. Factory/Shop acceptance tests

Factory acceptance tests are required by PREPA.

The following minimum tests shall be made on the motor during factory acceptance tests:

a. Measurement of winding resistance

b. Magnetic center determination

c. Air gap measurement

d. Bearing temperature rise at running speed

e. No-load readings of current, voltage, power and nominal speed at rated voltage and frequency

f. Mechanical vibration

g. Direction of rotation versus phase sequence

h. Insulation resistance

i. High-potential test

j. Determination of locked-rotor (zero-speed) torque and current

k. Determination of speed-torque curve

l. Determination of speed-current curve

m. Temperature tests

n. Sound measurement as per IEEE 85

o. Shaft voltage test as per IEEE 112.9.4

p. Determination of efficiency and power factor at 100% load

The results of the tests shall be sent to PREPA within five (10) days after their completion and before equipment shipment to PREPA.

3. Motor efficiency tests

Motor efficiency shall be determined using IEEE 112 test method F. The results of the efficiency tests shall be used to determine motors compliance with the efficiencies offered and guaranteed by the contractor in his proposal. Failure to meet guaranteed efficiency shall be considered sufficient cause for motor rejection.

4. Alternative or simulated Tests

When operational factory acceptance tests at nominal voltage, current and/or speed can not be accomplished at manufacturer facilities due to sound and valid reasons including under capacity to operate the motor, then alternative tests as simulated tests at lower than nominal capacities can be utilized. Alternative tests shall be authorized by PREPA in written, depending on the validity of the reasons to satisfaction. The obtained values shall be tabulated in each and every one of the tests and written certified including the graphs and curves obtained. The results shall be sent to the PREPA within five (5) days after the tests completion and before the equipment shipment to PREPA.

5. Additional tests

PREPA reserves its right to perform all necessary electrical tests to the motor or additional tests using its personnel or third-party contractors before or after the final acceptance and installation at PREPA discretion.

J. Motor Drawings and Instruction Manuals

Supplier shall supply in addition to the final AS BUILT set of drawings, a digital copy of motor drawings and operational curves compatible with. Motor instruction manuals shall be included also in Adobe Acrobat Reader (.pdf) format. Two sets in original of the motor instruction manuals shall also be provided.

Initial Scope of Work

Improvements to the Pier and Replacement of Sections of Fuel Oil Pipelines

The work includes providing labor, supervision, materials, equipment, inspection and everything necessary for Improvements to the Pier and Replacement of Sections of Fuel Oil Pipelines at. Aguirre Power Plant, located in Salinas PR

The Contractor will inspect and address everything necessary for the rehabilitation and replacement of 12- and 8-inches diameter Bunker-C and Diesel pipeline sections including multiple of the supports and structural components of this operational infrastructure facility. The scope of work includes the rehabilitation, by repair, replace and coating system on the entire exterior surface of the pipeline and related structural support elements. The utilities impacted under this scope were used for the fuel oil supply needs in Aguirre Steam Plant Units 1 & 2 respectively.

In addition, the rehabilitation of the existing pile support type foundation at the Fuel Oil Receiving Dock is required to be rehabilitated using a *Pile Encapsulation*

System designed to address these issues attained to marine and industrial environment and applications. Such System shall be in accordance with technical specifications an applicable codes described on *Special Considerations to be Addressed Under this Scope of Work* described below.

Whereas necessary it will be the responsibility of the contractor to store and identify the parts, equipment, and mechanical attachments of the utility under repair in a safe and protected area to prevent damage. After the completion of the rehabilitation work, he will be in charge of assembling all the parts and equipment and will leave the mechanism operable. Any hardware required for the reinstallation of the equipment again will be the responsibility of the contractor, it is allowed to reuse the existing hardware that is in good condition and not corroded. The contractor should consider that during the re-installation of the equipment, any incidental damage to the interior cladding must be repaired at its own cost and following the manufacturer's recommendations for repair.

Special Considerations to be Addressed Under this Scope of Work

1. All existing coating must be removed from the entire area of the pipe to be rehabilitated, modified and/or repaired. Then, the surface preparation and application of the coating system will be carried out according to the technical specifications and special conditions. The location of the pipe sections and elements related will be identified and selected by Genera-PR in a previous NDT Inspection to be supplied as part of the contract specifications.
2. The scope of work includes the preparation of the surface with abrasive media to the grade of NACE No.2 or "Near White Wet Abrasive Blast Cleaning / SSPC-SP 10 (WAB)/NACE WAB-2" with a Flash-Rust grade no greater than NACE WAB-2 L (Light) and application of anti-corrosion coating to the entire area of the pipe impacted by the rehabilitation work, beams, columns, structural supports, saddle plates, U-bolts, all installed

components, steel areas exposed to the environment, and all impacted areas.

3. All existing coating (paint) must be removed from the entire area of the pipe to be rehabilitated, modified and/or repaired.
4. Lead Inspection Test shall be performed prior any activities takes place.
    a. If necessary, Lead abatement of existing surfaces will be performed.

5. All repairs of weld patches must be tested with a Penile Dye Non-Destructive Test (*NDT Penetrant Tints-PT).*
6. All welds shall be made in such a manner as to ensure complete fusion with the base metal, within the limits specified for each joint and strictly following the Qualified Procedure.
7. Welders must be qualified for the type of work to be performed. The contractor shall submit to the project manager on behalf of Genera PR the qualification of the welder and the substance of his qualification. Only procedures qualified by the company will be accepted to carry out the welding work.
8. Whereas necessary Handling, cutting, fabrication, beveling, removal coating will be performed by the contractor.
9. Radiographic (RT) X-Rays tests shall be included at 100% of the welds in the pipe sections which will be replaced, according to ASME code B31.3 (ASME Code for Pressure Piping, B31) and B16.5 (Pipe Flanges and Flanged Fittings)**.** Include ASNT inspectors and perform NDT – PT Penetrant Liquid tests on all welds in the pipe, according to ASME code B31.3 Latest edition Including Inspection (VT) and Final Report of all welding work performed on the project by a CWI@ASME-AWS certified welding inspector.
10. Whereas necessary the works includes the cutting and installation of steel plates on the concrete bases:
11. All repairs in pipelines, supports and related components shall comply with current building codes (ACI-318, ASTM, ASME, AISC, ICRI, UBC-IBC)

and others that apply according to their latest editions. The design and details must be submitted to Genera-PR for evaluation.

12. Whereas necessary Pipelines/Utilities Lettering will be supplied by Contractor.
13. All work described shall be performed by experienced personnel and in accordance with the best practices of:
    a. NACE "National Association of Corrosion Engineers"
    b. SSPC "The Society of Protective Coatings"
    c. ISO *"International Organization for Standardization"*
    d. EPA
    e. OSHA
    f. API "American Petroleum Institute"
    g. ASME "American Society of Mechanical Engineers"
    h. ASNT "The American Society for Nondestructive Testing"
    i. ASTM "American Society for Testing Materials"
    j. Agencias locales y estatales con jurisdicción
    k. ACI "American Concrete Institute"
    l. ICRI "International Concrete Repair Institute"
    m. AISC "American Institute of Steel Construction"
    n. UBC-IBC "Uniform Building Code-International Building Code"
    o. All others that apply

VI. Cost Estimate

Item	Description	Cost
1	Manufacture and Delivery BFWP 5,000 HP Motor	$500,000.00
2	ASP Nautilus Rehabilitation Project (3 tanks)	$1,550,000.00

3	Improvements to the Pier and Replacement of Sections of Fuel Oil Pipelines	$3,250,000.00
	Total	**$5,300,000.00**

VII. Environmental & Historic Preservation ("EHP") Requirements

A. Other than design, planning and non-destructive due diligence studies, no construction work will commence prior to the issuance of specific expressed written FEMA approval for the specific scope of work. FEMA required EHP compliance review will precede the execution of each proposed scope of work submitted by PREPA through its agent Genera PR to FEMA. PREPA through its agent Genera PR is aware of its responsibility for coordinating, notifying, obtaining permits, and complying with applicable federal, state, and local laws, regulations, and executive orders and understands that failure to comply with EHP requirements will jeopardize FEMA funding.

B. See the following for general methods of repair and list of equipment to be used:

a. Dismantle & Salvage
- Complete testing for any containments or hazardous waste.
- All contaminated materials will be delivered to the approved waste disposal as per Disposal Management Plan.
- If equipment is to be salvaged, it will be loaded and removed from the site.
- All debris will be taken to the approved waste disposal facility as per the Waste Management Plan.

C. List of Equipment to be used but it is not limited to the following:
- Crawler Crane

- Semi-truck with low-bed trailer
- Man lift

D. Removal of vegetation
   - N/A.

E. List the type of debris:
   - Metal scrap, domestic waste, wood.
   - The debris will be separated and taken to an approved waste disposal facility. Location permits and supporting documentation will be provided at closeout.

F. Description of Staging Area:
   - N/A – only minor equipment staging near the existing equipment to be dismantled and installed.

G. Hazardous Material:

a. Describe the activity and the hazardous material involved. Calculate the quantity to be generated or disposed and include the management and disposal plan.
   - The identified hazardous materials that can be found in the Generation Plant are asbestos, PCBs, Lead, SF6 gas, oil from the transformer & breakers. These hazardous materials, will be handled, and disposed of as per Federal and State Laws.
   - GENERA will provide actual disposal locations and quantities as a Condition of FEMA Record of Environmental Considerations
   - These products and their residues will be stored in special covered areas for disposal by an authorized company and provided with temporary spill controls until collected. All paint containers and curing compounds will be tightly sealed and stored when in use. Excess paint will not be discharged to the storm

system, but properly disposed of, according to the manufacturer's instructions.

- Material amounts will be provided by a certified management contractor performing a site evaluation calculation for asbestos and lead paint.
- Prior to the start of any equipment dismantling activities, inspections for the presence of asbestos will be conducted by a trained and certified contractor.
- All asbestos waste found at the Generation Plant will be disposed of at an approved landfill designated by the Department of Environmental Health & Safety. All asbestos waste generated will be bagged and transported in accordance with all applicable State and Federal regulations. There will be no exceptions.
- Any asbestos spills will be cleaned up immediately to prevent the dispersal of fibers. Prudence will be exercised to avoid contamination of laboratory facilities or exposure of personnel to asbestos. Asbestos spills will be cleaned up with wet methods and/or a High-Efficiency Particulate-Air (HEPA) filtered vacuum.

b. If the project includes building demolition with asbestos, provide a copy of the EQB approved plan or evidence of plan submission.

- Not Applicable.

c. If the project includes disposal of damaged transformers or wood poles with creosote, include the management and disposal plan. The plan must include the final disposition site.

- Transformers and pole disposal will be handled as per the Waste Disposal Management Plan. GENERA will provide actual disposal locations and quantities as a Condition of FEMA Record of Environmental Considerations.
- The removal of the transformer will require testing of the existing oil for PCB's levels, drain oil, and delivery to the approved waste disposal site as per Environmental Regulations.
- Removal of wood poles with creosote treatment will be handled according to the Federal and State Laws.

H. Water Crossings:

a. Specify if the project will affect a waterway or body of water.

- Not Applicable

b. Modification of a body of water or wetland: Does the project require dredging, excavation, disposal of material, adding fill material that might result in any modification of a body of water or wetland designated as "waters of the U.S."?

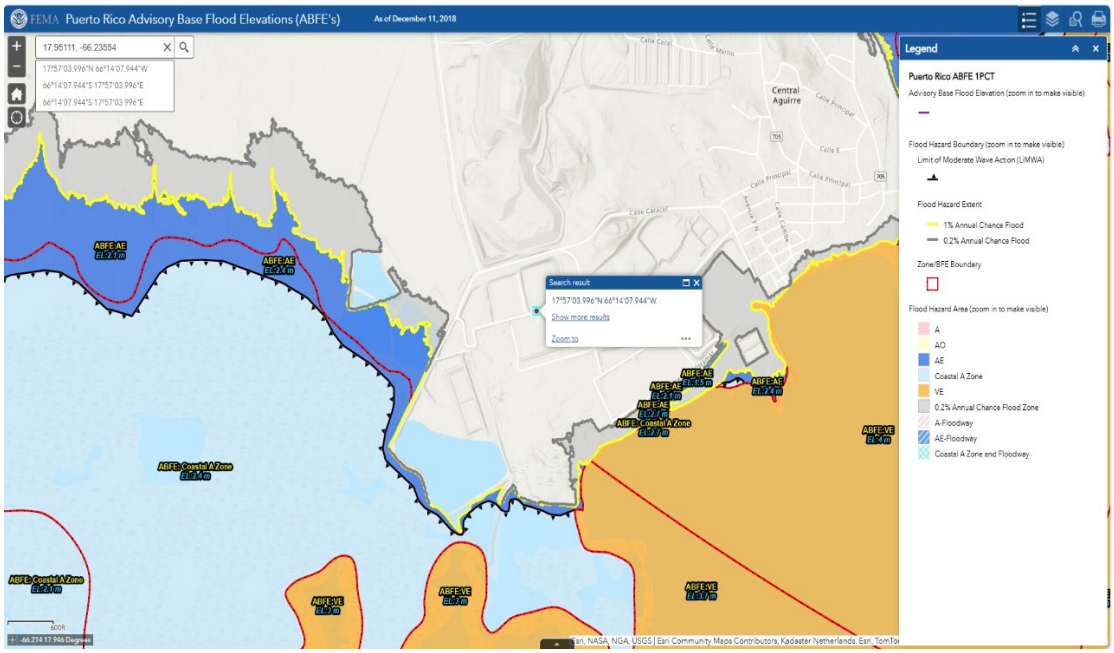
- Not Applicable

c. Does the project alter a watercourse, water flow patterns, or a drainage way, regardless of its floodplain designation?

- Not Applicable

d. Flood zone: Is the project located in a flood zone, floodway or will it have a negative impact on the flood zone?

- The Generation Plant is in Flood Zone A (SFHA per ABFE). Equipment replacement only. No negative impact.
- In accordance with the updated version of FEMA Region II Memorandum, dated October 10, 2017, Guidance for the use of Available Flood Hazard Information for the Government of Puerto Rico in complying with FEMA Policy 104-008-2, 44 CFR Part 9, and Executive Order 11988 (Floodplain Management). All hazard mitigation proposals under alternative procedures must be designed using the best available flood hazard data and in compliance with applicable regulations and policy.



I. Structure Age:

a. Provide the construction date of any buildings or structures within the project. Include those near the project.

- Not Applicable.

American International Plaza
250 Av. Luis Muñoz Rivera, Suite 1200
San Juan, PR 00918

b. Provide date and information of any prior repairs, remodeling and/or rehabilitation of the property. Include current and previous use of building or structure.
    - Not Applicable.
c. If a building includes both older and newer sections, confirm which section of the building the work is being done.
    - Not Applicable
d. Include plans, drawings, blueprints, any architectural documentation available for new construction or substantial improvements regardless of the age of the building or structure.
    - Not Applicable
e. Provide at least five color pictures of every structure or building, showing the four facades and the contextual view. Include additional pictures of architectural details. Also provide pictures of buildings (45 years old or older) on the proximities.
    - Not Applicable.

J. Ground Disturbance
a. Provide a description of the new ground disturbance by giving the dimensions (area, depth, volume, etc.), if any. Include an aerial photo map showing the extent of the disturbance with coordinates.
    - Not Applicable.

Figure 7 – Add photos of equipment

b. The project SOW will not affect water or sewer utility services.
c. Indicate the prior/current use of the area to be impacted.
    - Not Applicable. Area is an existing Generation Plant. 100% of the work to be completed will be within the existing and already impacted Generation Plant perimeter.

d. Explain how materials will be stockpiled and disposed of.

- Not Applicable.
- GENERA will provide actual disposal locations and quantities as a Condition of FEMA Record of Environmental Considerations.

e. Specify final disposition site.
- The disposal of materials will be handled as per the Waste Management Plan.

K. Soil Stabilization measures:

a. Does the project involve any soil stabilization measures?
- No

L. Required Permits

List of the permits needed for Costa Sur Site:

- Environmental Compliance Determination in Oficina de Gerencia de Permisos
- General Consolidate Permit – OGPe
- Genera Will provided proof of all permits as a Condition of FEMA Record of Environmental Considerations (REC).