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

IN RE: **REQUEST FOR PROPOSALS FOR TEMPORARY EMERGENCY GENERATION**	CASE NO.: NEPR-AP-2020-0001 SUBJECT: Supplement to Request for Approval

SUPPLEMENT TO NOTIFICATION AND URGENT REQUEST FOR APPROVAL OF REQUEST FOR PROPOSALS FOR TEMPORARY EMERGENCY GENERATION

TO THE HONORABLE PUERTO RICO ENERGY BUREAU:

COMES NOW the Puerto Rico Electric Power Authority through the undersigned legal representation and respectfully sets forth and pray:

I. Introduction

On February 12, 2020, PREPA submitted the Request for Approval[1] and a Memorandum for Confidentiality. In the Request for Approval, PREPA moves the Energy Bureau to approve a request for proposal for temporary emergency generation to compensate the generation produced by the Costa Sur power plant (the "Proposed RFP"). In compliance with the Joint Regulation, the Request for Approval was filed together with documents that thoroughly detail the Project and support the pray for relief therein made.[2]

[1] Capitalized terms not defined herein shall have the meanings ascribed to them in the Request for Approval and the *Memorandum of Law Requesting Confidential Treatment for Certain Exhibits Attached to the Notification and Urgent Request for Approval of Request for Proposal for Temporary Emergency Generation* (the "Memorandum for Confidentiality") filed on February 12, 2020.

[2] Exhibit B, *Request for Proposals for Temporary Emergency Generation, February 12, 2020 Confidential Draft* (draft agreement) and Exhibit C *Business Case Assessment*, were submitted under seal. PREPA filed the Memorandum for Confidentiality and the Energy Bureau's determination is pending.

PREPA files the instant supplement to provide the Energy Bureau with additional information, documents and statements that further support the Request for Approval.

II. Additional Statements in Support of the Request for Approval

The Joint Regulation provides the mechanism and process to be followed when PREPA intends to pursue a Project and, in its furtherance, prepares to launch a public procurement process. The Joint Regulation provides that:

> Prior to launching any public procurement process, and after receiving the approval of the [PREPA Governing} Board to proceed with the proposed Project and procurement process, the Executive Director will notify in writing to the Energy Commission the recommendation of the Project Committee with respect to[:] (i) the proposed Project, including all associated documents that explain the Project, (ii) the proposed parameters to determine such profit margin and price escalators,[3] (iii) consistency with the IRP approved by the Energy Commission, and (iv) compliance with this Regulation, the Acts and other laws and regulations related to procurement processes by the Authority and the powers of the Energy Commission.[4]

Joint Regulation § 4.2.

In compliance with the requirements of sections 4.1 and 4.2 of the Joint Regulation and to provide additional information to the Energy Bureau to facilitate the evaluation of the Proposed RFP[5], PREPA herein submits that:

a. The documents that are part of the Proposed RFP package include the draft lease and operating agreements. Footnote 3 of the Request for Approval states that, at the time of the filing, PREPA did not have available one of the drafts contracts. To complete the Proposed RFP package, PREPA herein submits the draft *Lease and*

[3] "The parameters related to the profit margin and price escalators shall be based on industry costs and profitability benchmarks in accordance with the anticipated nature of the Project." *Id.*

[4] "The recommendation to the Energy Commission will also provide a detailed narrative, with specific examples, regarding how the proposed project and the terms of the Contract, as described in the proposed RFP and approved by the Board, complies with the IRP." *Id*.

[5] This supplement is made without the notice to identify additional information described in the Joint Regulation, section 4.2.

Operating Agreement relating to the emergency, lease and operation of dispatchable [renewable energy] generation and battery energy storage technology, located at [●] Puerto Rico as part of PREPA's Temporary Generation Program.[6] *See* Exhibit A.

b. The temporary, short-term generation contracts that would result from the Proposed RFP will have fixed, non-variable prices that will not change during the 12-month agreements.[7]

c. The Proposed RFP aims to identify and secure a solution to temporarily replace the loss of the Costa Sur Power Plant generation after the damages caused by the January 7, 2020 earthquake. The Project is not included in the operative integrated resource plan (IRP) or in the most recent draft of the proposed IRP[8], because it is not a long-term solution.[9]

d. The Proposed RFP and the Project comply with the following laws and regulations that govern PREPA's competitive processes, including requests for proposals:

    a. The Electric Power Authority Act, approved on May 2, 194, as amended.

    b. The Puerto Rico Energy Transformation and Relief Act, approved on May 27, 2015, as amended.

    c. The Joint Regulation.

[6] Statement in support of the Joint Regulation, section 4.2 (i).
[7] Statement in support of the Joint Regulation, section 4.2 (ii).
[8] The proposed Integrated Resource Plan is for the consideration of the Energy Bureau in case *In Re: Review of the Puerto Rico Electric Power Authority Integrated Resource Plan*, case no. CEPR-AP-2018-0001.
[9] Statement in support of the Joint Regulation, sections 4.1 and 4.2 (iii).

d. PREPA's Procurement Process: *Procedimiento para las Compras por Solicitud de Cotizaciones u Ofertas Exentas del Proceso de Subasta Formal de la Autoridad de Energía Eléctrica de Puerto Rico.*

e. PREPA's Formal Bid Process.

Also, and to PREPA's knowledge, the Proposed RFP and Project are not contrary to any applicable act or regulation of the Commonwealth of Puerto Rico and the United States.[10]

III. Additional Documents in Support of the Request for Approval

In order to make a more complete and robust record for the Energy Bureau to consider the Request for Approval, PREPA herein submits the following documents and reports:

a. *Load Forecast vs Generation Availability, Generation Availability / Outage Schedule, Updated 24 Sep 2020*. *See* Exhibit B.

b. *Load Forecast vs Generation Availability, Generation Availability without Costa Sur, January to December 2020* (the "Forecast"). *See* Exhibit C.

c. *Puerto Rico Power Authority Generation Directorate Costa Sur Recovery Project Rev. 2/21/2020*. *See* Exhibit D.

IV. Request for Expedited Consideration

PREPA respectfully restates its request for the Energy Bureau to consider the Request for Approval on an expedited basis. As the Forecast shows, there is a true need to include additional generation to the system to satisfy the projected demand and properly serve PREPA's customers and the people of Puerto Rico. PREPA's officers and expert witnesses are prepared and available

[10] Statement in support of the Joint Regulation, section 4.2 (iv).

to appear before the Energy Bureau to testify in support of the Request for Approval as soon as the Energy Bureau schedules a technical conference.

V. Conclusion

Wherefore, PREPA respectfully requests the Energy Bureau to review and approve the draft Request for Proposals for Temporary Emergency Generation.

RESPECTFULLY SUBMITTED.

In San Juan, Puerto Rico, this 25th day of February 2020.

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Exhibit A

Lease and Operating Agreement relating to the emergency, lease and operation of dispatchable [renewable energy] generation and battery energy storage technology, located at [●] Puerto Rico as part of PREPA's Temporary Generation Program

[*This exhibit has been submitted under seal.*]

Exhibit B

Load Forecast vs Generation Availability, Generation Availability / Outage Schedule, Updated 24 Sep 2020

Load Forecast vs Generation Availability
Generation Availability/Outage Schedule
Updated 24 Sep 2020

UNIT	DATE OUT	DATE IN	DESCRIPTION	AVAIL IN
AG 2	8-Apr-19	8-Mar-20	Generator Stator Cooling System Inspection	450
SJ STM 5	14-Sep-19	12-Apr-20	Generator Repair	50
SJ 8	10-Jan-20	8-Mar-20	CCWP 8-1 Vibration Repair (Limited to 40 MW pending IDF 8-2 Replacement)	40
SJ STM 6	26-Jan-20	27-Sep-20	Generator Repair	50
SJ Gas 6	29-Feb-20	12-Apr-20	Natural Gas Conversion	150
AG 1	22-Mar-20	4-Apr-20	MPT Maintenance	450
AES 2	20-Apr-20	20-May-20	Annual Maintenance	227
PS 3	23-May-20	23-Aug-20	Environmental Maintenance & Condenser Repair	150
SJ CC 5	4-Jul-20	27-Sep-20	Catalytic Installation	200
ECO CT 2	1-Oct-20	10-Oct-20	Annual Maintenance	257
AES 1	18-Oct-20	18-Nov-20	Annual Maintenance	227
SJ 7	21-Nov-20	3-Jan-21	Environmental Maintenance	70
PS 4	21-Nov-20	3-Jan-21	Environmental Maintenance	160
AG 1			Environmental Maintenance - Last Day on Mid-August (EPA Waver Required)	

Exhibit C

Load Forecast vs Generation Availability, Generation Availability without Costa Sur, January to December 2020

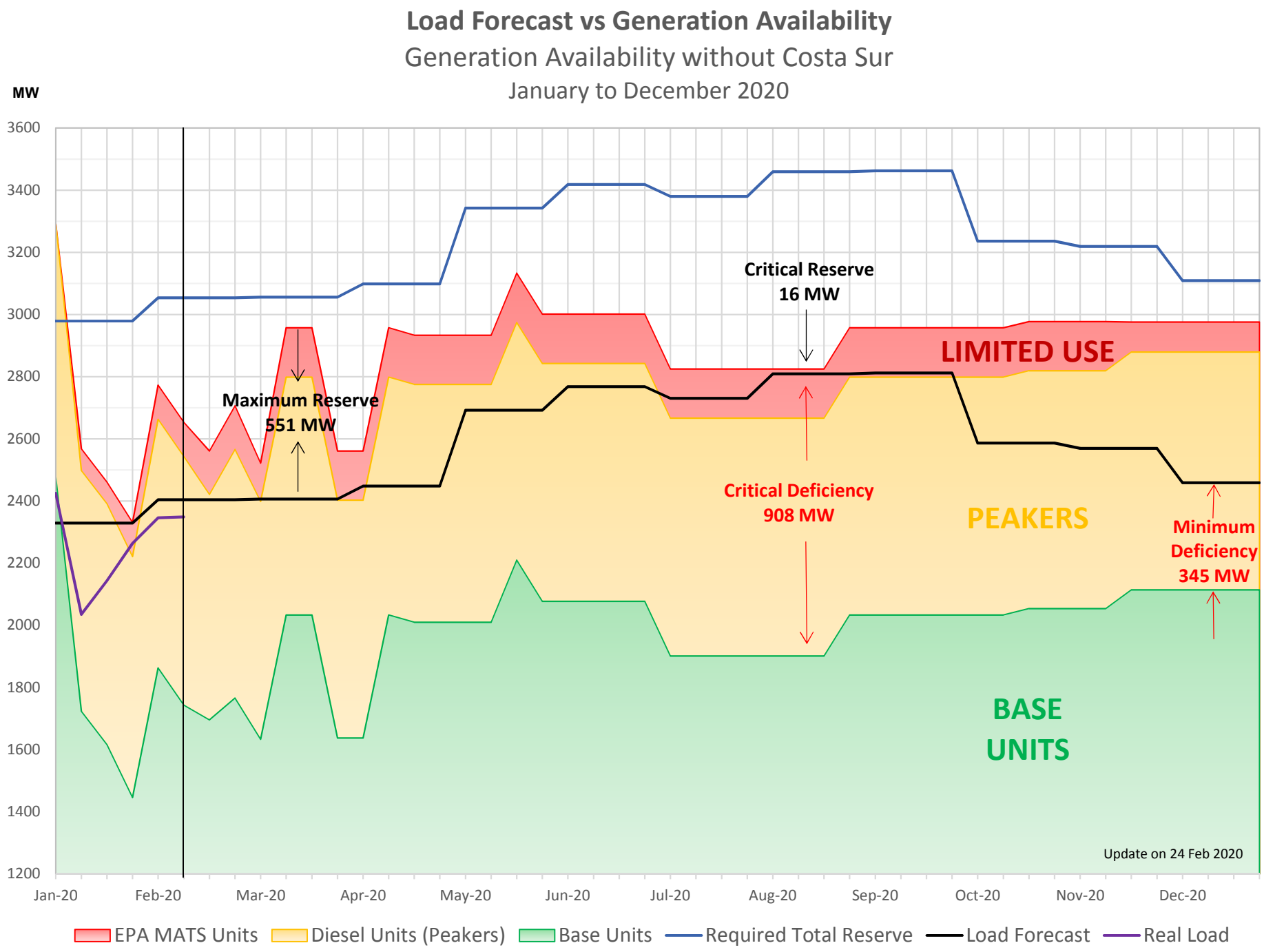

Load Forecast vs Generation Availability
Generation Availability without Costa Sur
January to December 2020
MW
3600
3400
3200
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
Critical Reserve
16 MW
LIMITED USE
Maximum Reserve
551 MW
Critical Deficiency
908 MW
PEAKERS
Minimum
Deficiency
345 MW
BASE
UNITS
Update on 24 Feb 2020
Jan-20
Feb-20
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
EPA MATS Units
Diesel Units (Peakers)
Base Units
Required Total Reserve
Load Forecast
Real Load

Exhibit D

Puerto Rico Power Authority Generation Directorate Costa Sur
Recovery Project Rev. 2/21/2020

[*This exhibit has been submitted in redacted version.*]

PUERTO RICO ELECTRIC POWER AUTHORITY

GENERATION DIRECORATE

COSTA SUR RECOVERY PROJECT REPORT

Rev. 2/21/2020

Table of Contents

Cardinal.

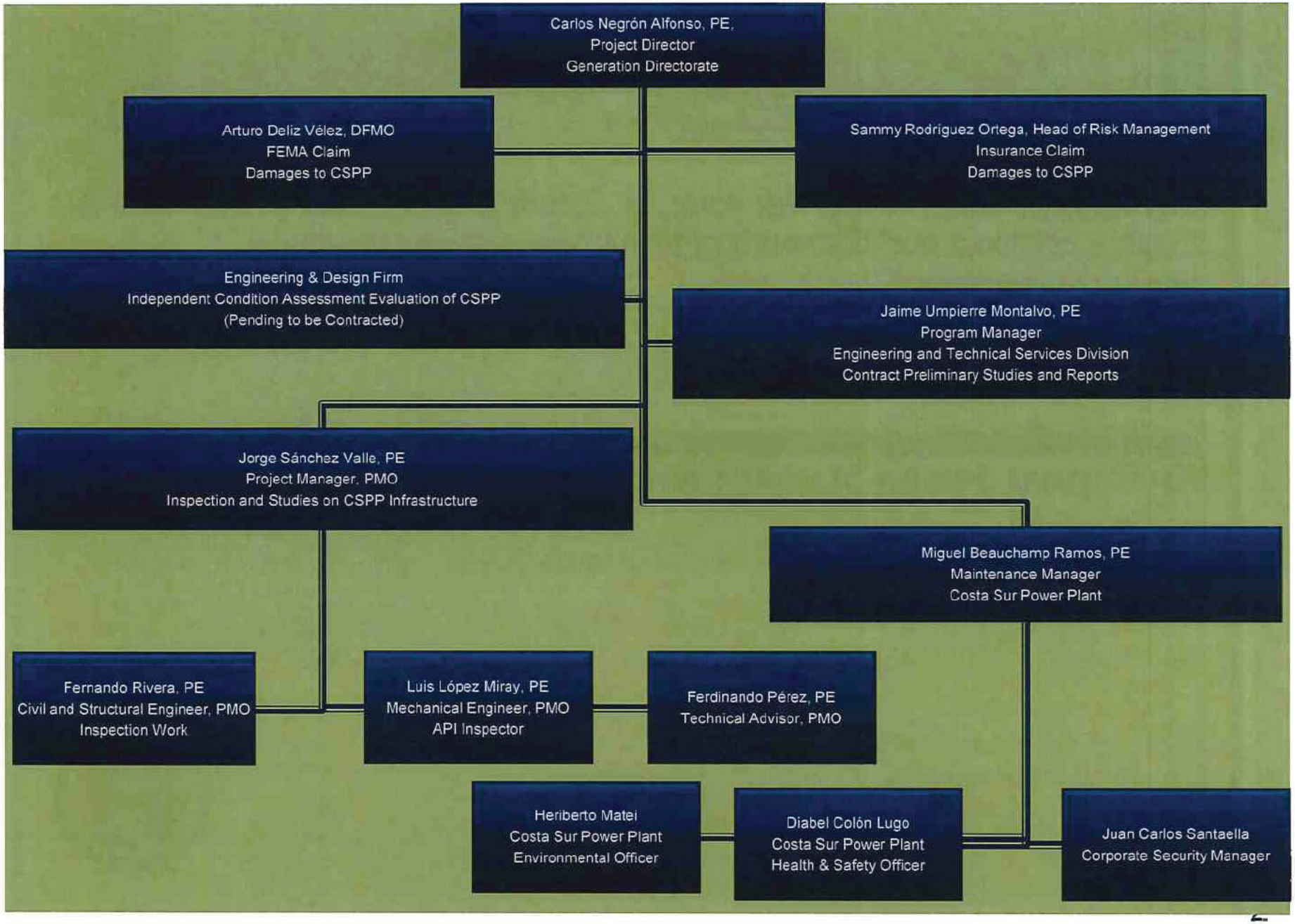
1 Strategic Action Plan CSPP Presentation

Puerto Rico Electric Power Authority

Strategic Action Plan
Condition Assessment, Value Engineering and Decision Making
Restoration of Lost Power Capacity at Costa Sur Power Plant (CSPP) due to Earthquake Damages

January, 2020

Organigram – Execution Strategic Action Plant CSPP



Strategic Action Plan - Condition Assessment, Value Engineering and Decision Making Restoration of Lost Power Costa Sur Power Plant

I. First Step - as an initial response, just after the earthquake hit PR, PREPA began an inspection of the facilities of the CSPP to determine safety issues and operational capability.

II. Second Step – Prepare and execute an Strategic Action Plan (SAP) to determine the feasibility of restoring the lost power capacity of the CSPP through repair or replacement works.

FIRST STEP

- As an initial response, just after the earthquake hit PR, PREPA began an inspection of the facilities of the CSPP.
- Objective – to determine safety issues and operational capability.
- Purpose –
  - If the work area was safe for the employees
  - That there had not been an incident of spillage of fuel, oil or any other chemical that could directly affect any natural resources or the live or property of the people of Guayanilla and Peñuelas
  - If the power plant could once again enter into operations and continue contributing energy to the electrical system of the island.
  - Quantify the damages that occurred to begin the claim process to the insurance companies, in coordination with any claim that was to be made to the Federal Emergency Management Agency (FEMA).
- Results – After studying the data obtained from these inspections, taking into account the continuous seismic aftershocks, and the priority the safety of the personnel that operates and administers the power plant, PREPA made the difficult decision to close the operations of this facility.

SECOND STEP

- Prepare an Strategic Action Plan (**SAP**) to determine the feasibility of restoring the lost power capacity of the CSPP through repair or replacement works.
- Purpose –
  - The purpose of this step is to require to a qualified Engineering and Design Firm (E&D) all the activities necessary to present an engineering and commercial opinion of whether is feasible to put back into service a more resilient and safe Costa Sur Power Plant.
- The SAP is broken-down in 4 Phases:
  - Phase 1 – Commissioning by PREPA of Engineering Studies on Four Critical Parts of the Power Plant
    - Boilers Unit 5 and 6 Exterior and Interior Inspection and Report
    - Boilers and Main Equipment Steel Structure Units 1, 2, 3, 4, 5 and 6
    - Fuel and Water Tanks (Storage and Service) Inspection and Report
    - Concrete Pedestals Supports for Power Turbine and Generator Units 5 and 6
  - Phase 2 – (Selection of E&D) – is intended for the selection of a recognized and specialized E&D for the condition assessment survey, value engineering and decision making on the future of CSPP.

SECOND STEP (Cont.)

- The SAP is broken-down in 4 Phases (Cont.):
  - Phase 3 (Formalize a Contract between PREPA and E&D) –is intended to comply with all commercial and legal steps necessary to formalize a contract between the E&D and PREPA for execution of all activities require under this SAP.
  - Phase 4 (Condition Assessment Survey, Value Engineering and Decision Making on the Future of CSPP) – is intended to provide PREPA with a value engineering study in order to make a decision as to repair or replace the plant for restoration of lost generation capacity as noted above. A qualified (E&D) shall perform a condition survey and value engineering study with a recommendation for at least two options including repair or replace to restore 820 MW capacity due to earthquake damages. The two options are:
    a) **If the power plant is to be repair, design shall be based on current code and standards to the extent practical.**
    b) **If a new power plant must be built, it shall be in compliance with all current codes and standards. Also, if this new plant may be built at the same existing site.**

SECOND STEP - Status on Phase 1

Item Num	Inspection/Study Title	Start Date	Completion Date	Percentage Completed	Comments
1	Exterior Mechanical Inspection Boilers Units 5 and 6	Jan 8, 2020	Feb 11, 2020	100%	Report by General Electric recommends Non-destructive testing.
2	Preliminary Inspection of Steam Piping and Equipment Structural Supports	Jan 27, 2020	Feb 5, 2020	100%	Report by General Electric recommends repair works.
3	Preliminary Inspection of Steel Structural Elements for Boilers and Auxiliary Equipment U. 3-6	Jan 27, 2020	Jan 31, 2020	100%	Report by General Electric recommends immediate repair works to continue interior inspections of the units.
4	Structural Elements Repair Work to Allow Additional Interior Inspection of the Boilers and Other Equipment of the CSPP	Feb 14, 2020	Mar 16, 2020	1%	Immediate repairs recommended by GE Structural study as step 1 to continue with inspection of interior of boilers and other equipment and structures.
5	Interior mechanical inspection of the condition of the boilers	Mar11, 2020	April 11, 2020	0%	Shall start after finishing with immediate repair works.

SECOND STEP - Status on Phase 1 (Cont.)

Item Num	Inspection/Study Title	Start Date	Completion Date	Percentage Completed	Comments
6	More Detail Inspection, Structural Design Work for Repairs Units 5 and 6 (Before Put On Service)	Feb 12, 2020	Mar 12, 2020	5%	This work shall be performed as Recommendation on Preliminary Study for this Structure by the company Island Structure Engineering, PC (GE/Fieldcore)
7	Fuel and Water Tanks Structural Assessment	Feb 11, 2020	Mar 30, 2020	10%	Inspection and report on the structural conditions of 20 tanks.
8	Condition Survey and Testing for Concrete Pedestals for Power Turbine and Generator Units , 5 and 6	Feb 24, 2020	April 30, 2020	0%	Structural condition assessment of the concrete support for the Units 5 and 6 Power Blocks. The study shall include visual inspection, concrete resistance test, petrographic testing.

SECOND STEP - Status on Phase 2 and 3

- PREPA is on the process of selecting of a recognized and specialized E&D for the condition assessment survey, value engineering and decision making on the future of CSPP. The E&D shall be selected based on the following criteria:
  - Experience in work related to what is required in this SAP.
  - Economic capacity to finance internal and external resources that will be required to achieve the operational objective of PREPA for this SAP.
  - Economical proposal for this SAP.
  - Compliance with PREPA's deliverables time requirement for this SAP.

- PREPA expects to have selected the E&D firm on the last week of February, 2020.
- For Phase 3 PREPA expect to have contracted the E&D firm on the first week of March, 2020.

SECOND STEP – Forecast for Phase 4

- Included is a Forecast of Main Milestones for Phase 4:

Phase 2, 3, and 4	January, 2020				February, 2020				March, 2020				April, 2020				May, 2020				June, 2020			
	S1	S2	S3	S4	S1	S2	S3	S4	S1	S2	S3	S4	S1	S2	S3	S4	S1	S2	S3	S4	S1	S2	S3	S4
Visual Inspection and Report Boilers Units 5 and 6 (Exterior Inspection)		■	■	■	■																			
Preliminary Inspection and Report Structures Units 3 through 6				■	■																			
Inspection of High Energy Piping Supports Units 5 and 6					■	■	■																	
Immediate Repairs to Structures Units 3-6						■	■	■																
Inspection and Report Water and Fuel Tanks						■	■	■	■	■														
Inspection and Report Boilers Interior Units 5 and 6									■	■	■													
Inspection and Report Overhead Structures Cranes Units 5 and 6								■	■	■														
Inspection and Testing Concrete Pedestal Supports Units 5 and 6								■	■	■	■	■	■	■	■									
Underwater Inspection and Report Water Canal Intakes and Outfalls Condensers Units 5 and 6 (To be commissioned by E&D)									■	■	■													
Geotechnical Studies (To be commissioned by E&D)									■	■	■	■	■	■	■	■	■	■	■	■				
Independent Evaluation by E&D Firm									■	■	■	■	■	■	■	■	■	■	■	■				

Cost on Studies

Item	Equipment/Structure Name	Inspection/ Study Description	Status on Inspection/Study	Start Date	Completion Date	Inspection/Study Findings	Engineering Consultant Firm	Cost Amount	Comments
1	Boilers Units 5 & 6	Exterior mechanical inspection of the condition of the boilers	Completed	January 8, 2020	February 11, 2020	Recommendation of Nondestructive Tests	General Electric-Fieldcore (GEF)	$ 60,000.00	Report Delivered by GE to PREPA. Costs are an approximate. Pending GE Invoicing.
2	High Energy Piping Units 5 & 6	Preliminary Visual Inspection of Steam Piping and Equipment and Structural Supports.	Completed	January 27, 2020	February 5, 2020	Pending	GEF/Island Structures Engineering	$ 21,000.00	Report Delivered by GE to PREPA. Costs are an approximate. Pending GE Invoicing.
3	Structures Units 3 & 4	Preliminary Inspection and Steel Structural Elements for Boilers and Auxiliary Equipment	Completed	January 27, 2020	January 31, 2020	Need Repairs	GEF/Island Structures Engineering	$ 20,000.00	Report Delivered by GE to PREPA. Costs are an approximate. Pending GE Invoicing. Next Step: Complete Phase 1 - Inmediate Repairs to permit additional Inspection Work on Unit 5.
4	Structures Units 5 & 6	Preliminary Inspection and Steel Structural Elements for Boilers and Auxiliary Equipment	Completed	January 27, 2020	January 31, 2020	Need Repairs	GEF/Island Structures Engineering	$ 20,000.00	Report Delivered by GE to PREPA. Costs are an approximate. Pending GE Invoicing. Next Step: Complete Phase 1 - Inmediate Repairs to permit additional Inspection Work on Unit 6.
5	Inmediate Repairs Structures Units 4, 5 and 6	Structural Elements Repair Work to Allow Additional Interior Inspection of the Boilers and Other Equipment of the CSPP	On Procurement	February 14, 2020	March 16, 2020	Need Repairs	Enersys	$ 56,563.00	The Start and Completion Dates Shall depend on the Notice to Proceed. Costs are an approximate and shall depend on procurement process between GE and Enersys. (Units 5 and 6 Equipment Building have Inmediate Repairs)

Cost on Studies

Item	Equipment/Structure Name	Inspection/ Study Description	Status on Inspection/ Study	Start Date	Completion Date	Inspection/ Study Findings	Engineering Consultant Firm	Cost Amount	Comments
6	Boilers Units 5 & 6	Interior mechanical inspection of the condition of the boilers	Not Started Pending Repairs on Structures	March 11, 2020	April 11, 2020	Pending	GEF	Pending	Start and Completion Dates Shall are estimated and shall depend on the repairs that must be performed on the structure of the boilers and the GE's Work Plan.
7	Structures Units 1 & 2	Preliminary Inspection and Steel Structural Elements for Boilers and Auxiliary Equipment	Not Started	February 17, 2020	February 21, 2020	Pending	GEF/Island Structures Engineering	$ 20,000.00	Costs are an approximate. Pending GE Invoicing.
8	Phase 2- Structures 5 & 6	More Detail Inspection, Structural Design Work for Repairs Units 5 and 6 (Before Put On Service)	On Course	February 12, 2020	March 12, 2020	Pending	GEF/Island Structures Engineering		This work shall be performed as Recommendation on Preliminary Study for this Structure by the company Island Structure Engineering, PC (GE/Fieldcore)
9	Water and Fuel Tanks Inspection	Visual Inspection and Ultrasonic Inspect API 653	On Course	February 11, 2020	March 30, 2020	Pending	Heisen Global Engineering (HGE)	$ 134,448.00	Start and Completion Dates Shall Depend on the Contract Approval date of the Consultant. Contract 85840. There is going to be a Change Request to add an additional 8 tanks that were not included in the first Contract. An ammendment was approved for the inspection of 8 additional tanks, including all tanks used for the Water Treatment Process. The amount added to the original contract was $48,358 and an extension of 15 days to original schedule time.

Cost on Studies

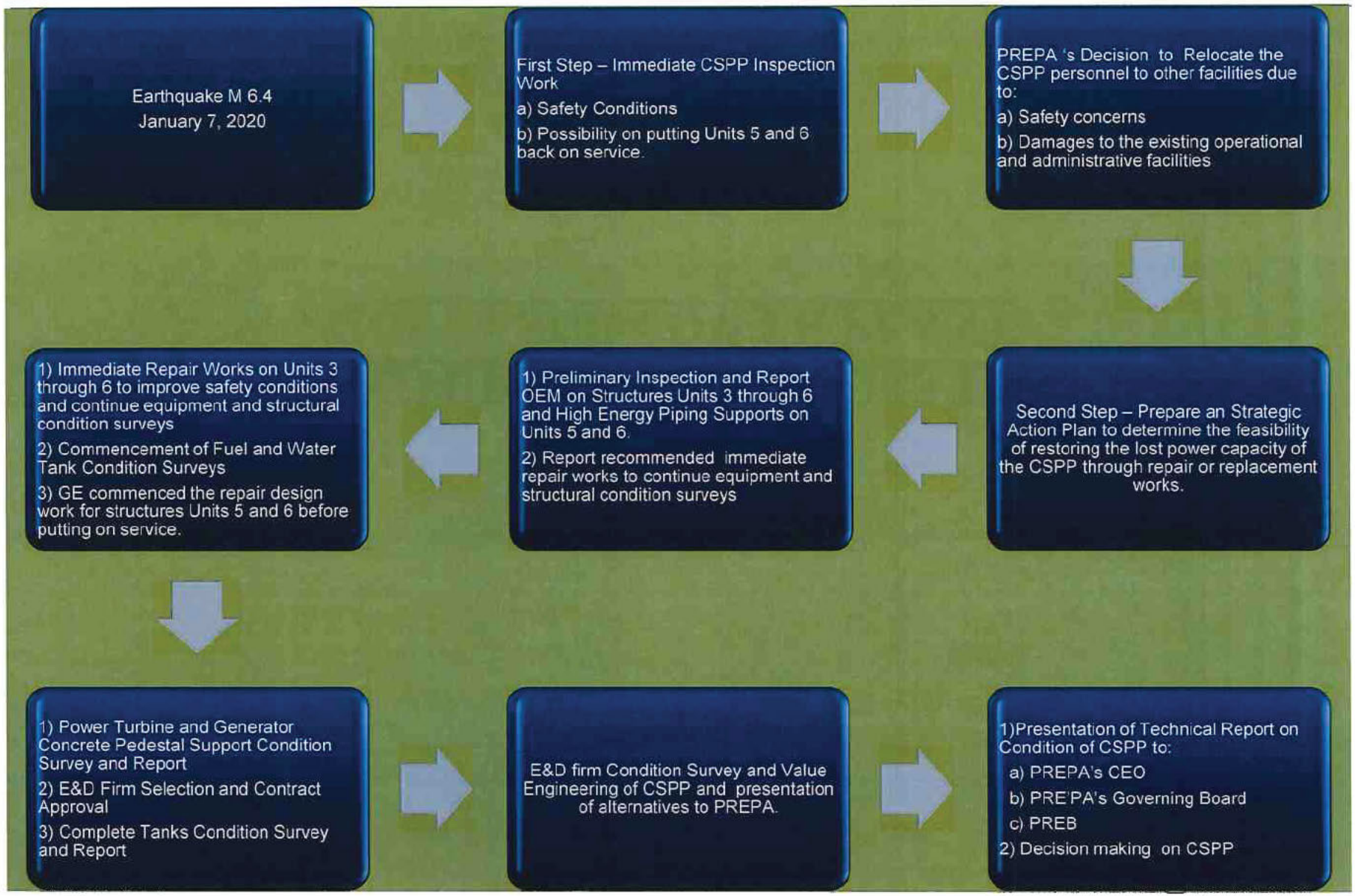
Item	Equipment/Structure Name	Inspection/ Study Description	Status on Inspection/ Study	Start Date	Completion Date	Inspection/ Study Findings	Engineering Consultant Firm	Cost Amount	Comments
10	Units 5-6 Concrete Pedestals for Power Blocks	Condition Survey and Testing for Concrete Pedestals for Power Turbine and Generator Units , 5 and 6	On Procurement	February 25, 2020	April 30, 2020	Pending	Heisen Global Engineering (HGE)	$ 55,160.00	This Studies will be commissionto HGE, PSC. The Start and Completion Dates Shall depend on the Notice to Proceed. The study shall include visual inspection, Concrete Resistance Test, Petrographic Testing.
11	Concrete Water Closed Channel Condenser Unit 5	Underwater Visual Inspection of the Structural Condition of the Closed Channel Into and Exit of Condenser Unit 5	Not Started			Pending	E&D Company Selected by PREPA		This Studies will be commission by E&D Selected by PREPA for Engineering Independent Report
12	Concrete Water Closed Channel Condenser Unit 6	Underwater Visual Inspection of the Structural Condition of the Closed Channel Into and Exit of Condenser Unit 6	Not Started			Pending	E&D Company Selected by PREPA		This Studies will be commission by E&D Selected by PREPA for Engineering Independent Report
13	Concrete Open Channel Sea Water Discharge	Underwater Visual Inspection of the Structural Condition of the Open Channel Sea Water Discharge from Condensers 5 and 6	Not Started			Pending	E&D Company Selected by PREPA		This Studies will be commission by E&D Selected by PREPA for Engineering Independent Report
14	Overhead Cranes Units 5 and 6	Condition Survey Structure for Overhead Cranes Units 5 and 6	Not Started			Pending	E&D Company Selected by PREPA		This Studies will be commission by E&D Selected by PREPA for Engineering Independent Report

Cost on Studies

Item	Equipment/Structure Name	Inspection/ Study Description	Status on Inspection/ Study	Start Date	Completion Date	Inspection/ Study Findings	Engineering Consultant Firm	Cost Amount	Comments
15	Geotechnical Studies	Provide post-earthquake geotechnical evaluation of the foundation support of the different structures in the facility. Provide general recommendations on mitigation of seismic related damage. Provide general recommendations on geotechnical design parameters for the current site conditions, which will allow to adequately perform further structural assessment of the different structures that may had been affected by the recent seismic events and subsequent aftershocks.	Not Started			Pending	E&D Company Selected by PREPA		This Studies will be commission by E&D Selected by PREPA for Engineering Independent Report

Total Cost on Studies $ **387,171.00**

Sequence of Events on PREPA's Response to CSPP After the Earthquake of January 7, 2020



PICTURES OF DAMAGES TO COSTA SUR POWER PLANT

Demineralized Water Reserve Tank (DEMI)

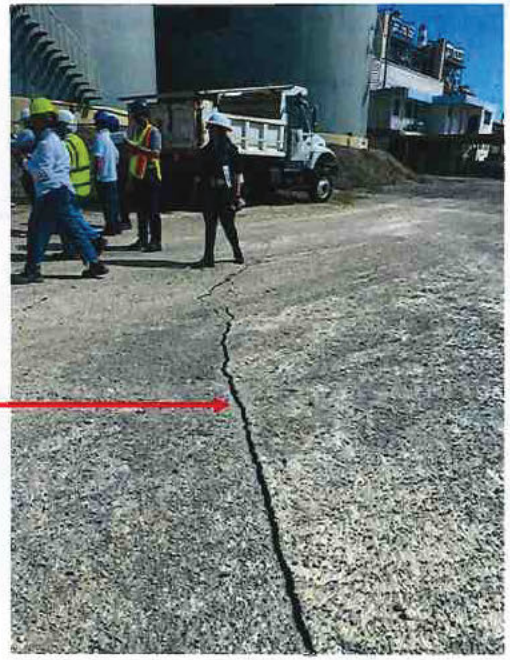
Puerto Rico
Electric Power Authority

Differential settlement of about 2" between the East and West side of tank was observed. An apparent deformation on the West side upper shell level and roof was observed. Water leakage observed from nozzles and flanges.

Demineralized Water Tank (DEMI)

Puerto Rico
Electric Power Authority

Damaged Unit #5 DEMI tank foundation



Ground crack under the Unit #6 DEMI water tank

Damages in administration building (exterior)

Puerto Rico
Electric Power Authority

Front and lateral walls

Damages in laboratory / administration building (interior)

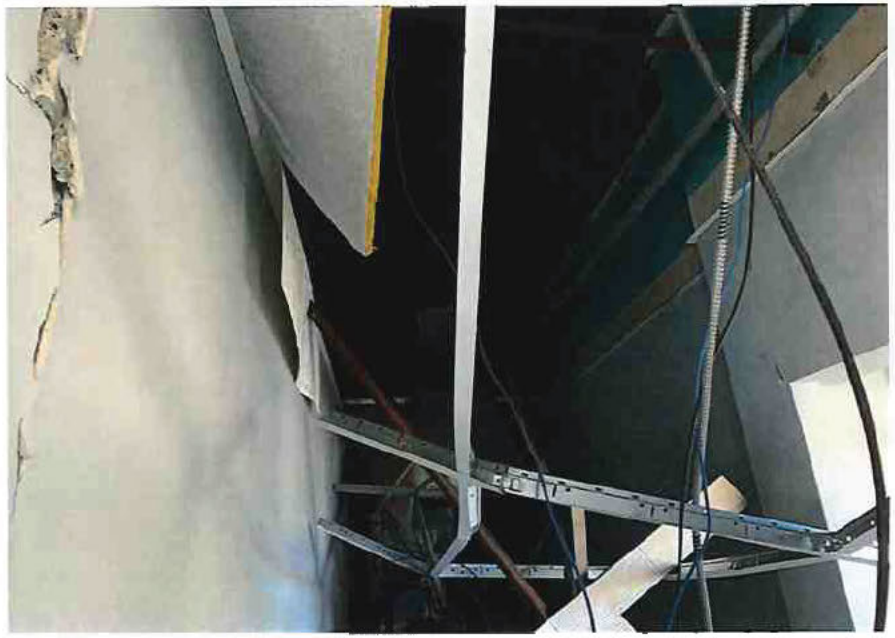
Puerto Rico
Electric Power Authority

Interior 1st floor (LAB)

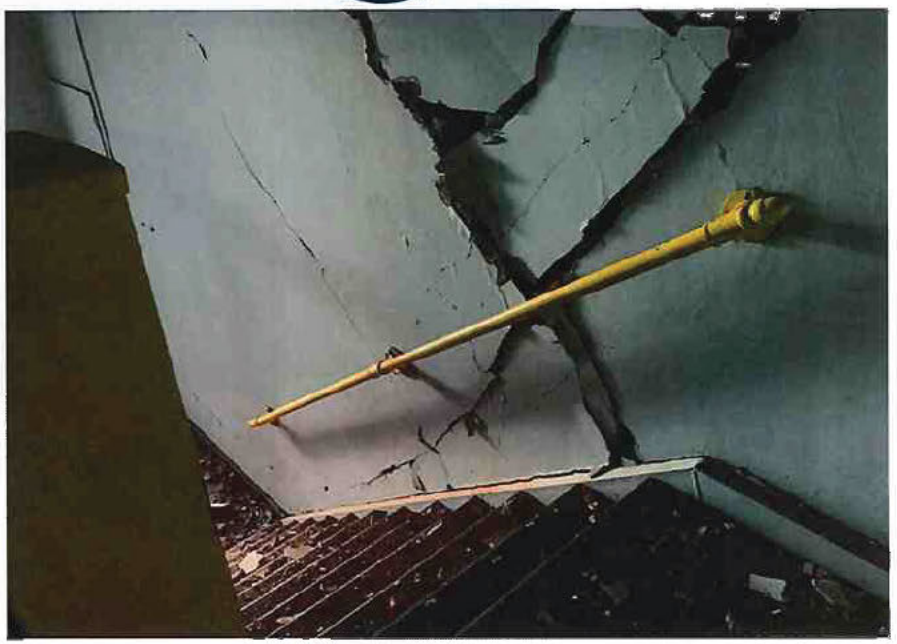
Interior 2nd floor next to elevator

Damages in administration building (interior)

Puerto Rico
Electric Power Authority



Interior 3rd floor



Interior stairs

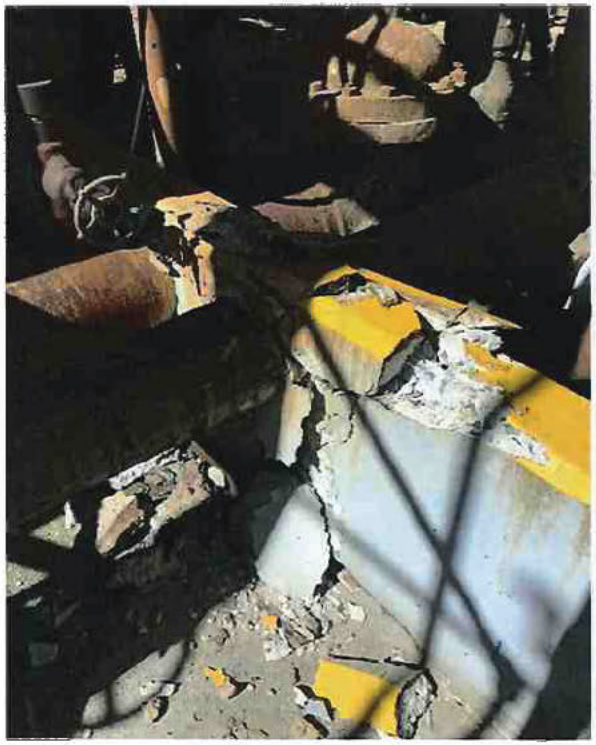
Unit #3 & 4 Boiler structural damage

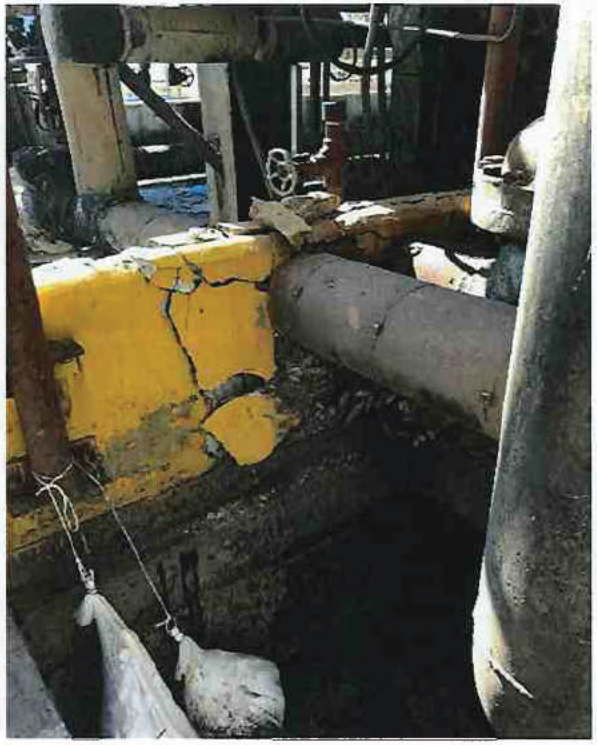
Puerto Rico
Electric Power Authority

Apparent fracture or cut to element.

Unit #6 secondary wall fuel oil heaters (under turbine deck area)

Puerto Rico
Electric Power Authority





Concrete secondary containment was broken at piping sleeve section due to movement or vibration of piping.

Unit #5 Emergency service transformer (under turbine deck ar

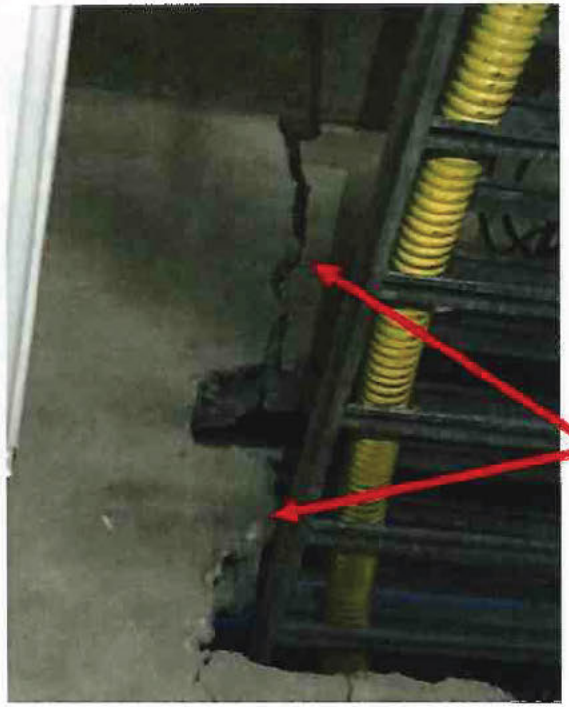
Puerto Rico
Electric Power Authority

Oil was expelled from the transformer. Transformer oil containment has possible internal damage.

Transformer is derailed or out of supporting base, railing system compromised.

Masonry Walls Compressor Room 5-2 (under turbine deck area)

Puerto Rico
Electric Power Authority



Various vertical/horizontal cracks on masonry walls.

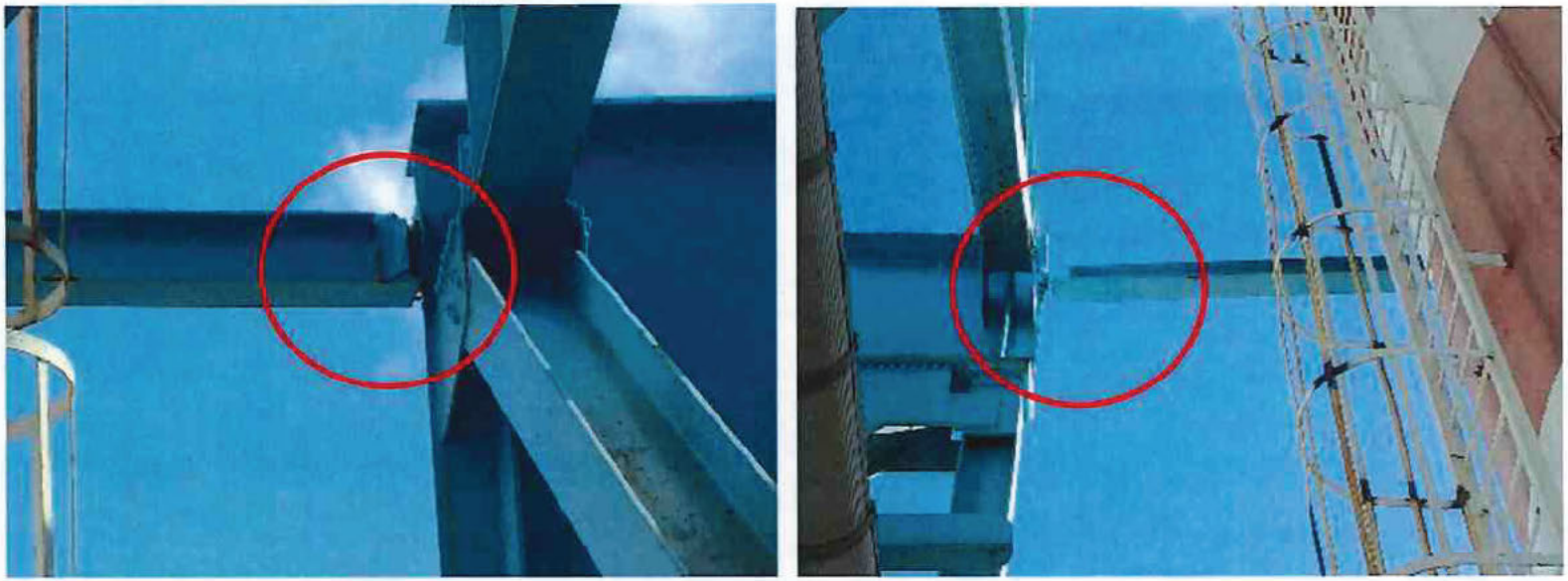
Secondary containment Unit #5 main generator transformer

Puerto Rico
Electric Power Authority

Several cracks on secondary containment's concrete walls.

Unit #5 Boiler structural damage

Puerto Rico
Electric Power Authority



Failed brace for Stacks 5-1 and 5-2. Risks damage to stacks.

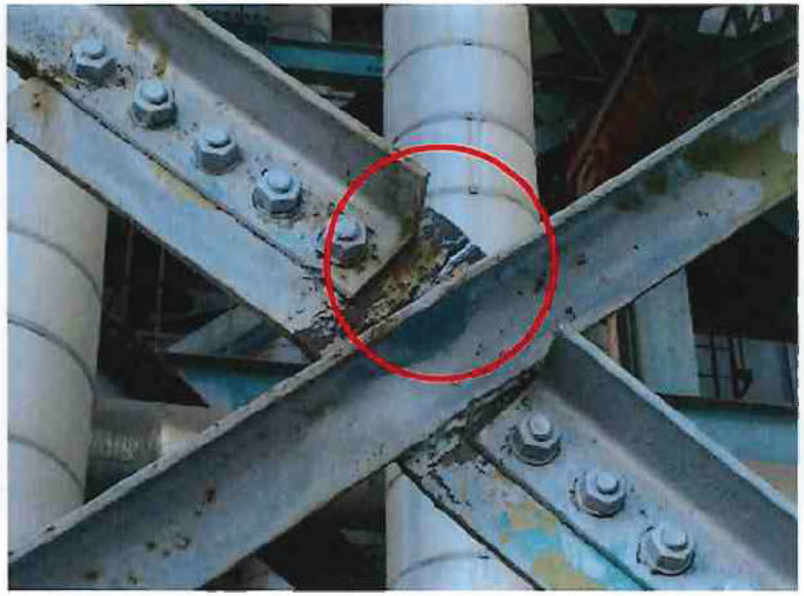
Unit #5 Boiler structural damage

Puerto Rico
Electric Power Authority

Bent WEAR Restraint rod and I-beam. Risk of damage to MS pipe supports and added stress of MS pipe during major wind or seismic event.

Unit #5 Boiler structural damage

Puerto Rico
Electric Power Authority



Deaerator Support Structure. Failed cross-braces. Increased risk of more damage to deaerator support structure during major wind or seismic event.

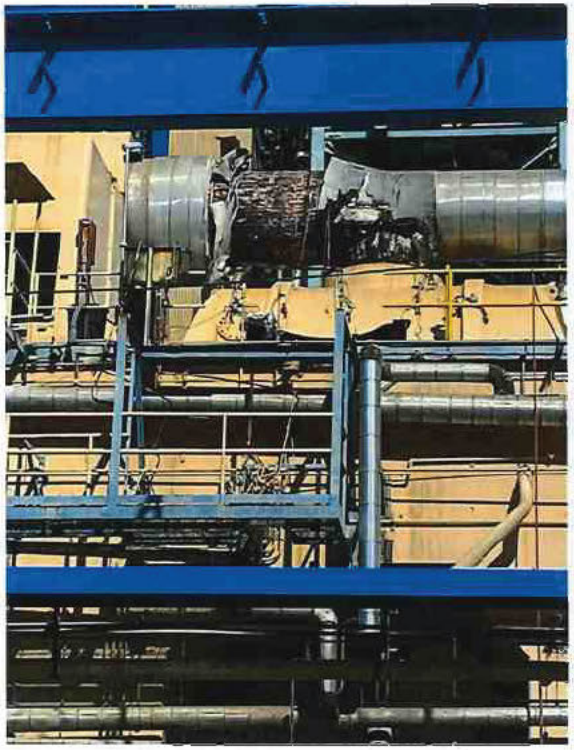
Unit #5 Boiler structural damage

Puerto Rico
Electric Power Authority

Loose, buckled and missing grating is unsafe to plant personnel

Insulation and refractory material compromised

Puerto Rico
Electric Power Authority



Insulation and refractory material compromised and broken down in various pipes, duct walls, conduits and boiler walls.

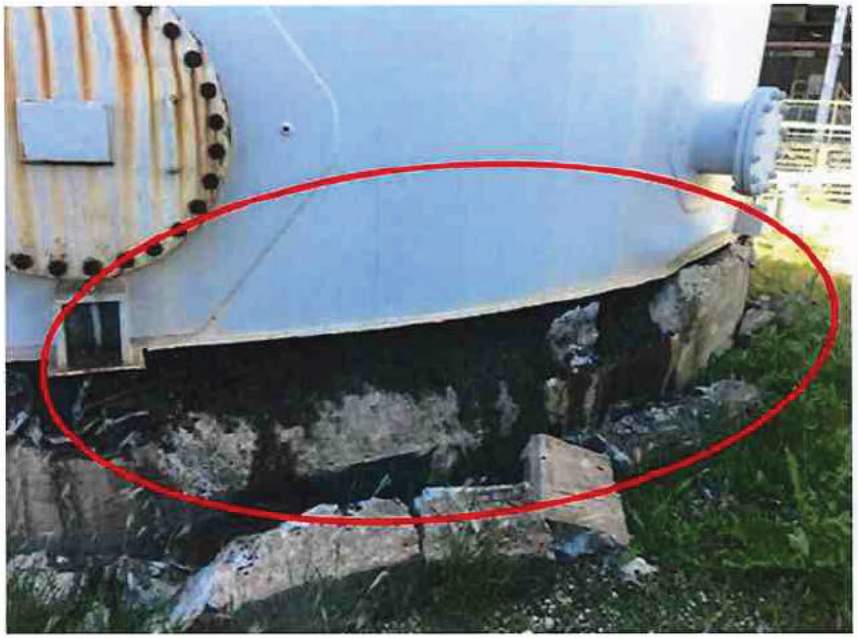
Units 5 & 6 Condensate tank damages

Puerto Rico
Electric Power Authority

Damaged foundation and buckled tank

Units 5 & 6 Condensate tank damages

Puerto Rico
Electric Power Authority



Damaged foundation and buckled tank

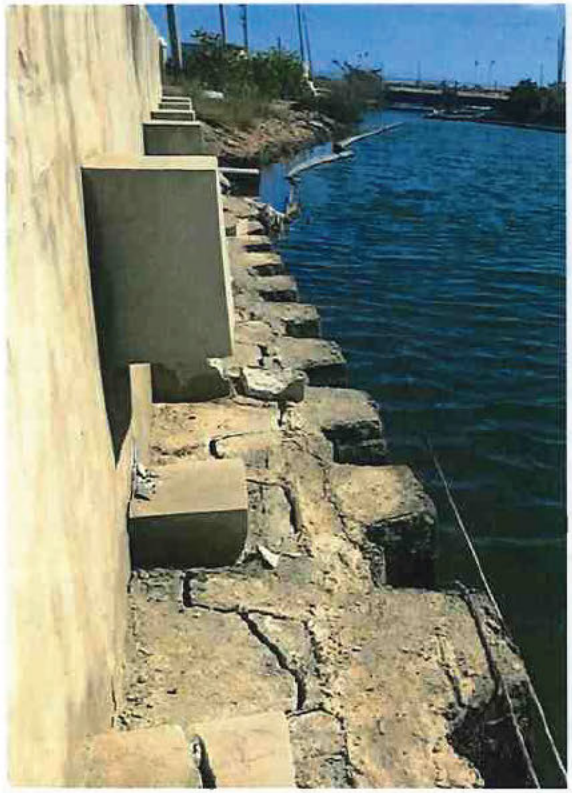
Units 5 & 6 Condensate tank area

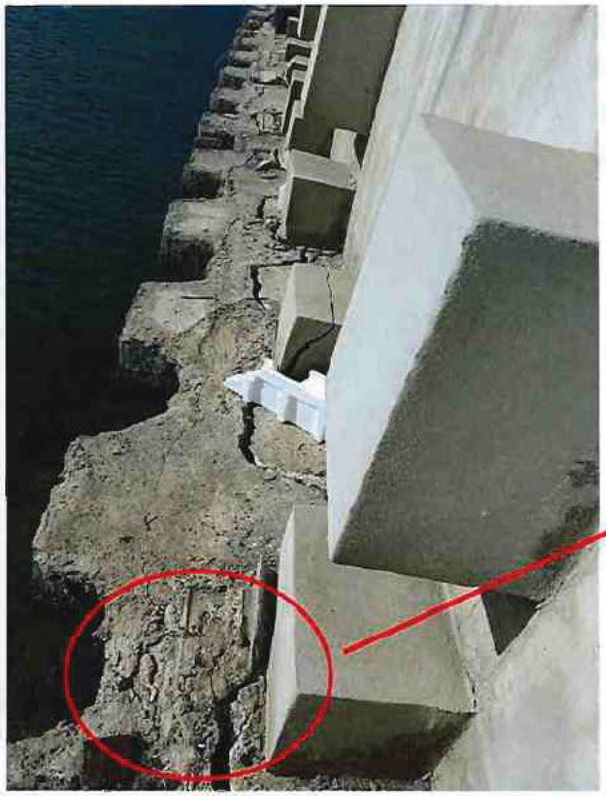
Puerto Rico
Electric Power Authority

Building columns base plates footings anchor bolts up-lifted and damaged

Costa Sur discharge channel structure damaged

Puerto Rico
Electric Power Authority

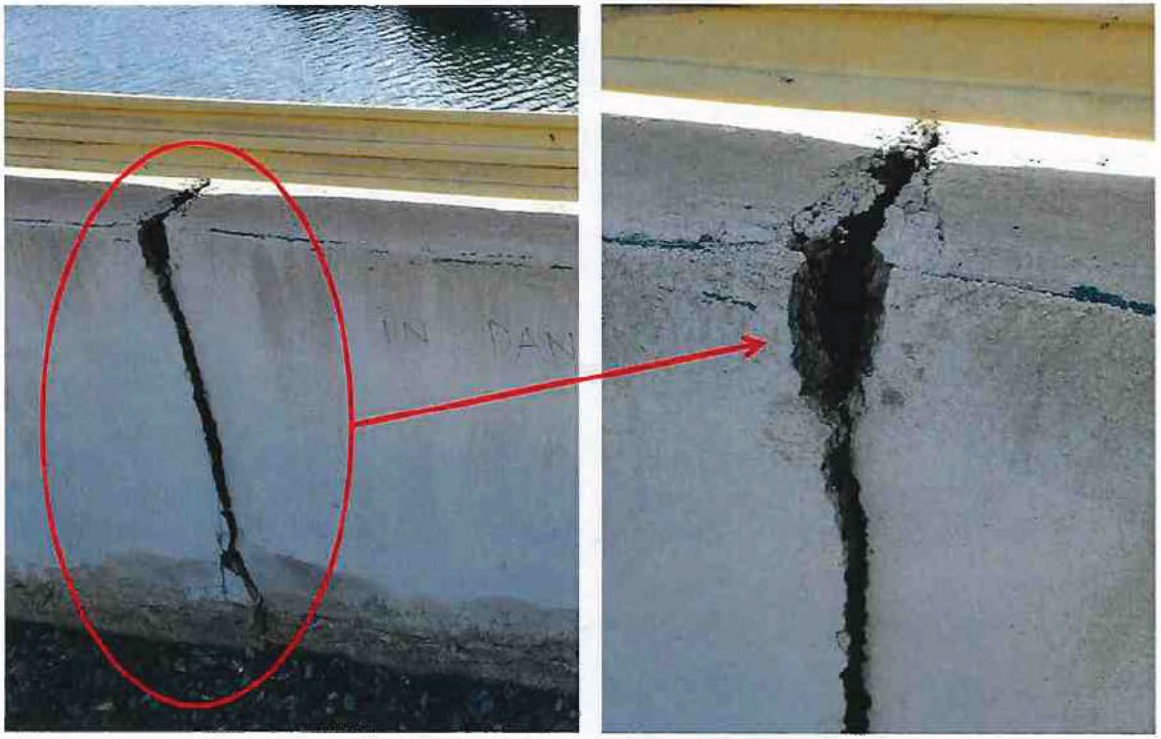




Sheet pile displaced two inches from wall.

Costa Sur discharge channel structure damaged

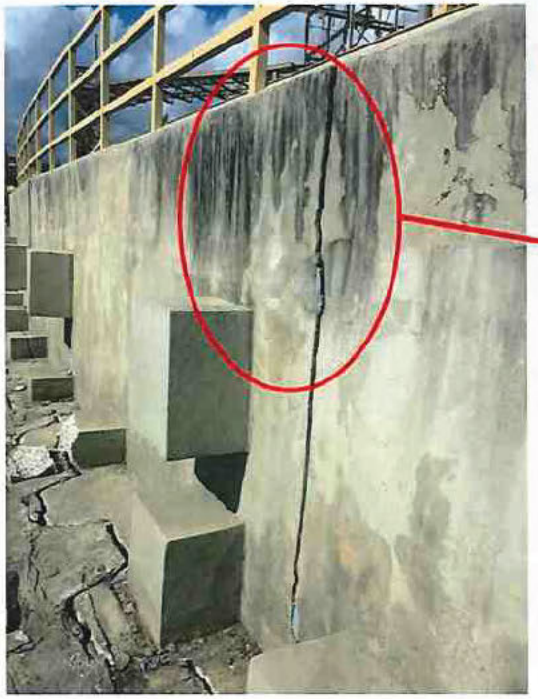
Puerto Rico
Electric Power Authority



20 ft wall segment with structural damage. Structural cracks form top to bottom on cold joints at both ends.

Costa Sur discharge channel structure damaged

Puerto Rico
Electric Power Authority



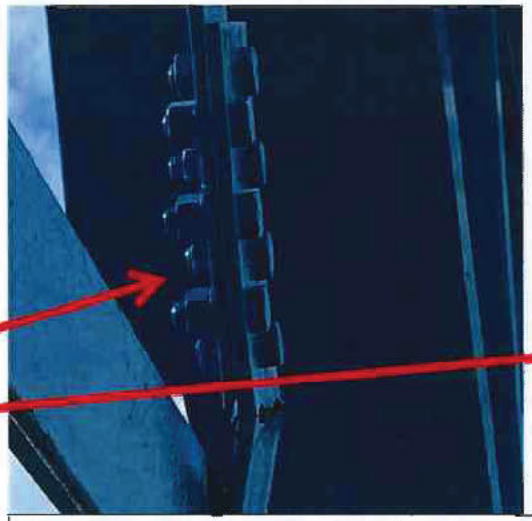
20 ft wall segment with structural damage. Structural cracks form top to bottom on cold joints at both ends.

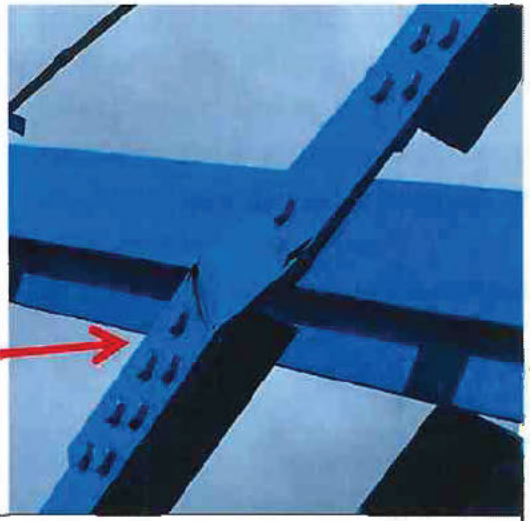
Costa Sur intake channel structure damaged

Puerto Rico
Electric Power Authority

Overhead gantry crane support structural damage

Puerto Rico
Electric Power Authority





Bracing members on the lower level show excessive deformation on the East side of the structure. On the extension overhead crane structure, the bracings (on both sides) of the lower last segments show bending on the bracing plate connections.

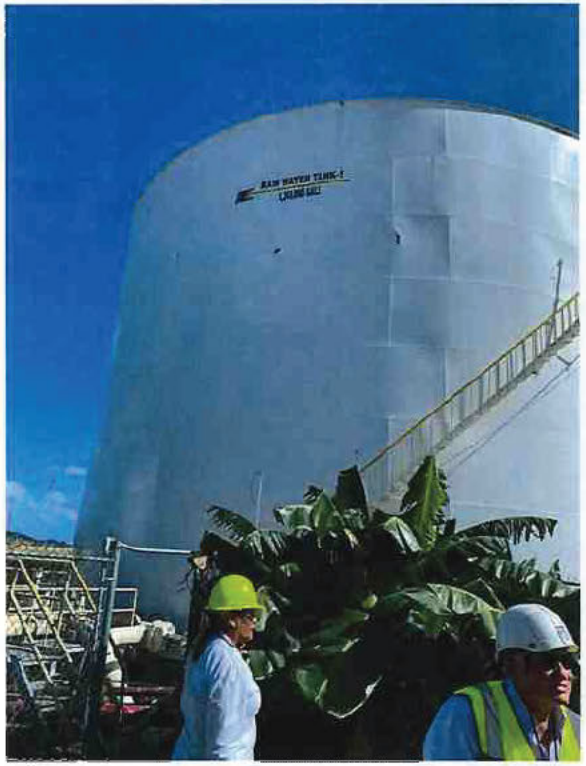
Overhead gantry crane support structural damage

Puerto Rico
Electric Power Authority

Bracing members on the lower level show excessive deformation on the East side of the structure. On the extension overhead crane structure, the bracings (on both sides) of the lower last segments show bending on the bracing plate connections.

Raw Water Storage Tank

Puerto Rico
Electric Power Authority



Foundation damage with differential settlement

Major crack under gas metering station area

Puerto Rico
Electric Power Authority

Major crack under gas metering station area

Puerto Rico
Electric Power Authority

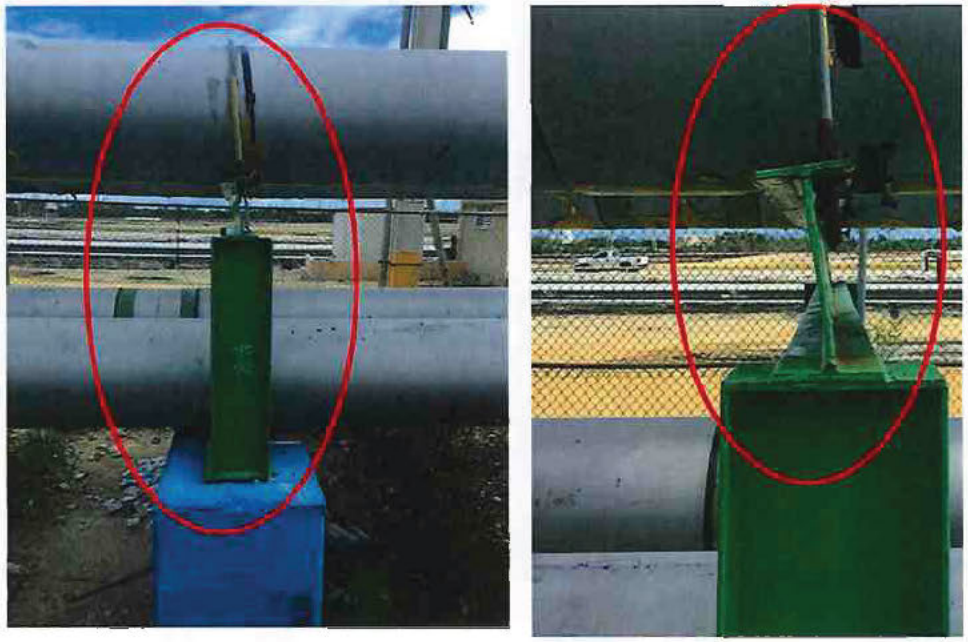
Gas pipeline structural support damage

Puerto Rico
Electric Power Authority

Displacement of gas pipeline, bending of top bean, columns and U-bolts

Gas pipeline structural support damage

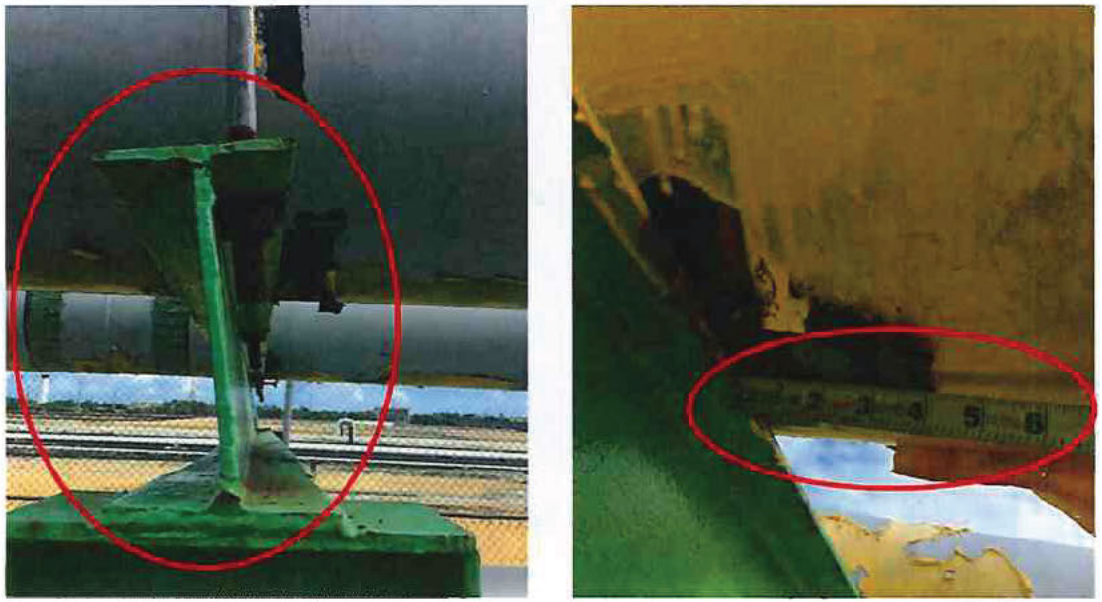
Puerto Rico
Electric Power Authority



Displacement of gas pipeline, bending of top bean, columns and U-bolts

Gas pipeline structural support damage

Puerto Rico
Electric Power Authority



Displacement of gas pipeline, bending of top bean, columns and U-bolts

2 Progress and Status Report on PREPA's Response to Damages at CSPP

Progress & Status Report on PREPA's Response to the Damages at Costa Sur Power Plant due to the Seismic Event that Occurred on January 7, 2020

1 Purpose and Intent

The purpose of this document is to present to the PREPA's Governing Board the status on the execution of the SAP for the condition assessment and decision making regarding the future of the Costa sur Power Plant (CSPP) after the damages caused by the earthquake of January 7, 2020 and any other aftershocks.

2 Seismic Event - January 7, 2020

At 4:24 am of January 7, 2020 a Magnitude 6.4 Earthquake hit the south part of Puerto Rico. The event caused a complete black out of PREPA's electrical system and caused damages to units 5 and 6 of the CSPP, its balance of plant (BOP), water and fuel tanks and different buildings located on the site.

3 Response by PREPA

As a response to the seismic events mentioned above, PREPA have been working on the following steps:

I. Step Num. 1 – as an initial response, just after the earthquake hit PR, PREPA began an inspection of the facilities of the CSPP to determine safety issues and operational capability.

II. Step Num. 2 – Prepare and execute an Strategic Action Plan (SAP) to determine the feasibility of restoring the lost power capacity of the CSPP through repair or replacement works.

Step Num. 1

Just after the earthquake of January 7, 2020 hit the island, PREPA's personnel began an inspection of the facilities of the CSPP. The purpose was to comply with the following purpose:

1. If the work area was safe for the employees.
2. That there had not been an incident of spillage of fuel, oil or any other chemical that could directly affect any natural resources or the live or property of the people of Guayanilla and Peñuelas.
3. If the power plant could once again enter into operations and continue contributing energy to the electrical system of the island.
4. Quantify the preliminary damages that occurred to begin the claim process to the insurance companies, in coordination with any claim that was to be made to the Federal Emergency Management Agency (FEMA).

After studying all the data obtained from these inspections, taking into account the continuous seismic aftershocks, and the priority the safety of the personnel that operates and administers the power plant, PREPA made the difficult decision to close the operations

of this facility and transferred the employees to other PREPA's facilities.

Step Num. 2

To prepare an execute a Strategic Action Plan (SAP) to determine the feasibility of restoring the lost power capacity of the CSPP through repair or replacement works.

The purpose of this step is to require to a qualified Engineering and Design Firm (E&D) all the activities necessary to present an engineering and commercial opinion of whether is feasible to put back into service a more resilient and safe Costa Sur Power Plant.

The SAP was broken into the following 4 phases:

1. Phase 1 - Commissioning by PREPA of Engineering Studies on Three Critical Parts of the Power Plant.
    a) Boilers units 5 and 6 Exterior and Interior Inspection and Report
    b) Boilers and Main Equipment Steel Structure Units 1, 2, 3, 4, 5 and 6
    c) Fuel and Water Tanks (Storage and Service) Inspection and Report
    d) Concrete Pedestals Supports for Power Turbine and Generator Units 5 and 6
2. Phase 2 - (Selection of E&D) – is intended for the selection of a recognized and specialized E&D for the condition assessment survey, value engineering and decision making on the future of CSPP.
3. Phase 3 – (Formalize a Contract between PREPA and E&D) –is intended to comply with all commercial and legal steps necessary to formalize a contract between the E&D and PREPA for execution of all activities require under this SAP.
4. Phase 4 – (Condition Assessment Survey, Value Engineering and Decision Making on the Future of CSPP) – is intended to provide PREPA with a value engineering study in order to make a decision as to repair or replace the plant for restoration of lost generation capacity as noted above. A qualified (E&D) shall perform a condition survey and value engineering study with a recommendation for at least two options including repair or replace to restore 820 MW capacity due to earthquake damages. The two options are:

    a) If the power plant is to be repair, design shall be based on current code and standards to the extent practical.
    b) If a new power plant must be built, it shall be in compliance with all current codes and standards. Also, if this new plant may be built at the same existing site.

Progress & Status on Phase 1

a) Boilers Unit 5 and 6 – The exterior boilers of both units 5 and 6 were inspected by General Electric/Fieldcore (GE). The interior of the boilers has not been inspected due to safety concerns with the findings made by GE during the inspection of the structures of both units 5 and 6. To address this situation PREPA mobilized a contractor to proceed with immediate structural steel repairs recommended by GE and should be completing the repairs during the third week of March 2020.

b) Boilers and Main Equipment Steel Structure Units 1, 2, 3, 4, 5 and 6 – The structures of the units 3, 4, 5 and 6 were inspected by GE and it was determined that there were significant damages and indications of large displacement of structures, equipment and piping. Also, significant damages to lateral bracing systems through out the equipment building, also damages were observed on the isolated members of the lateral bracing systems of the Units 5 and 6 bracing systems, damages to the lateral boiler and steam drum restraints and significant damages to isolated support components o the high energy piping.

   As part of the services requested by PREPA regarding the structure assessment of the units 1 through 6, GE shall provide the following works:

   i. Prepare a summary of structural repairs that required prior to returning units 5 and 6 to service and a summary of structural repairs required for the high-energy piping systems on units 5 and 6.
   ii. Provide a proposal cost estimate and schedule for additional engineering and inspection services that would be required to detail repairs noted on items i., provide recommended periodic inspection of the work and provide a final certification of the work. If approved by PREPA, the execution of all repairs, with inspection and final reports.

   Also, if requested by PREPA regarding the structure required repairs of the units 5 and 6, GE shall provide the following services:

   iii. Prepare a more detailed summary of structural repairs that required for the continued safe operation of units 5 and 6. The extent of these repairs will be determined with an anticipated useful operating life in the range of 5 to 10 years.
   iv. Provide a preliminary Assessment of units 5 and 6 original lateral load design capacity. This will be for informational purposes only, for PREPA's use in evaluating the viability of the units, as designed, for the limited span of 5 to 10 years.

c) Fuel and Water Tanks Condition Survey – PREPA commissioned to Heisen Global Engineering, PSC (HGE) the inspection and structural evaluation of twenty tanks to determine their condition after the seismic event. Preliminary, HGE informed PREPA that both the Condensate Tanks 5 and 6 are going to be declared a total loss, including the ring wall foundation. The full study and report shall be completed on the last week of March 2020.
d) Concrete Pedestals for the Power Turbine and Generator Units 5 and 6 – PREPA is in the procurement phase of an inspection and structural evaluation of the concrete pedestal that serve as support for both the power turbine and generator of each of the units. The study and report shall be completed on April 2020.

All the information obtained on the Phase 1 shall be share with the E&D firm that will perform the condition assessment survey, value engineering and presentation of alternatives for the decision making on the future of the CSPP.

3 Preliminary Report of Immediate Remediation Needs and Repairs Units 3 through 6, CSPP

Puerto Rico Electric Power Authority

South Coast Plant Units 3, 4, 5 & 6

Emergency Structural Inspection and Assessment
Preliminary Report of Immediate Remediation Needs
And Repair Approach
1-30-20

Prepared by:

Island Structures Engineering, PC

319 Sunrise Highway, West Islip, NY 11795

PREPA South Coast Units 3-6
Emergency Structural Inspection and Assessment
Preliminary Report of Immediate Remediation Needs
And Repair Approach
1-30-20

GENERAL:

PRPEA has requested this preliminary site inspection report, in anticipation of receiving a more complete evaluation of conditions and remediation recommendations to be submitted later next week. PREPA has requested this preliminary written report to indicate the extent of necessary remediation efforts that should be performed immediately so that PREPA and others can more safely enter the units to complete more thorough damage assessments.

PURPOSE:

Island Structures Engineering, PC (Island), working together with GE/Fieldcore personnel performed an initial inspection of the PREPA South Coast power generating units 3, 4, 5 and 6, on January 27 and 28, 2020 subsequent to a significant seismic event measuring 6.4 on the Modified Mercali Intensity Scale on January 7, 2020. Several smaller seismic events had occurred just prior to this significant event and numerous additional seismic events measuring in the 3, 4 and 5 range continue to occur at the time of this report. A formal initial assessment report is being developed and is expected to be issued during the week of February 7. Island provided a verbal post-inspection presentation to PREPA staff on January 29 and advised that certain damages should be remediated prior to proceeding further with more detailed inspections and damage assessments.

- Inspect and assess damage from recent seismic events to Units 3, 4, 5 and 6.
- Determine overall structural stability of Units 3 against gross structural collapse or major component structural failure which may pose significant threat to other plant facilities. It is not expected that these units will be placed back in service; however their demolition may not occur for several years. It is expected that personnel access will be limited to these units once stabilized.
- Determine the extent of immediate remediation work that should be performed in order to stabilize Units 5 and 6 to a degree sufficient to permit the further inspection of damages and repair investigations.
- Determine the extent of structural damage to Unit 5 in order for PREPA to evaluate the decision to make needed repairs to expedite its return to service within a few months. The structural assessment is also being supplemented with a similar assessment of the high energy piping systems, the boiler components (both internal and external), and budgetary costs for all the above.
- Determine the extent of structural damage to Unit 6 in order for PREPA to evaluate the decision to make needed repairs to expedite its return to service within the next several months. Due to damages to other process components such as demineralized water storage, boiler components and other required systems, it is currently anticipated that such other work could require considerably longer to return Unit 6 to service than Unit 5.
- This structural evaluation is being performed concurrently with an assessment of the Unit 5 and 6 high energy piping systems and an external boiler assessment. These assessments will be reported on in more detail with the

initial structural assessment. GE/Fieldcore will also be providing budgetary cost and preliminary schedule information for PREPA's use in the decision making as to whether to proceed with Unit 5 and/or Unit 6 repairs.

SCOPE OF ASSESSMENT:

- Units 3-6
- Inspection of critical lateral load resisting systems
- General overall structural inspection of all bracing and framing systems
- Inspection of high energy pipe supports for signs of distress from seismic event
- Unlike prior structural assessments performed by Island, this assessment includes the may bracing systems of the Equipment Building (located between the Boiler Structure and the T-G pedestal area.

EFFECTS OF RECENT SEISMIC EVENT:

- 6.4 on the Modified Mercali Intensity Scale
- Each number on scale is x10
  - 2 to 5 felt but minor damage
  - 5 to 6 slight damage
  - >6 a lot of damage
- Observations
  - Significant damages and indications of large displacement of structures, equipment and piping
  - Significant damages to lateral bracing systems throughout the Equipment Building from the seismic event
  - Significant damages to isolated members of the lateral bracing systems of the Unit 5 and Unit 6 bracing systems
  - Significant damages to the lateral boiler and steam drum restraints.
  - Significant damages to isolated support components of the high energy piping

APPROACH FOR REMEDIATION:

The following preliminary approach to addressing the issues observed was agreed to during the meeting attended by PREPA, Island, GE/FieldCore on January 29, 2020:

PHASE 1: Emergency Efforts to Stabilize Units Against Gross Failure:

- Phase IA: Island will compile the information ascertained during its site visit and inspections on January 27 and 28, 2020.
- Phase 1B: Island will prepare a summary of damages that need to be addressed to mitigate potential collapse failure **prior to performing more extensive assessments**. The summary to be transmitted by Island to PREPA and GE/Fieldcore simultaneously by January 31. GE/Fieldcore is to provide an immediate budget estimate and time frame required to complete these preliminary repairs. PREPA will determine if these repairs will be performed by GE/Fieldcore or by Others. These repairs are critical for the overall structural stability of the units and should be done at once, and prior to allowing additional inspections by personnel. These repairs will be required even in the event that the units are not returned to service, as this overall stability is necessary even for limited efforts required for the safe decommissioning efforts that would be required.

- Phase 1C: Complete repairs as noted above.

PHASE 2: Repairs to Units 5 and 6 required prior to placing units back in service:

- Phase 2A: Island will prepare a summary of structural repairs that are required **prior to returning Unit 5 and/or Unit 6 to service**. This report will be issued by the end of the week of February 7. Island will provide a draft list of repairs to GE/Fieldcore by Feb 4 so that they may establish budgetary cost and schedule information to supplement the report. This report will also be supplemented by a similar list of repairs required for the high-energy piping systems.
- Island 2B: Island will provide GE/Fieldcore a proposal cost estimate for the additional engineering and inspection services that would be required to detail the repairs noted in Phase 2A, provide recommended periodic inspections of the work and provide a final certification of the work, for inclusion by GE/Fieldcore in its budgetary estimate for the Unit 5 and Unit 6 repairs.
- Phase 2C: Upon review and approval by PREPA of the phase 2A & 2B scope, budget and schedule, the repairs will be performed by GE/Fieldcore with oversight by Island as a subconsultant to GE/Fieldcore, with inspection and final reports issued by Island to PREPA.

PHASE 3: Required repairs to Units 5 and 6 that may be completed with the Units in service:

- Phase 3A: Island will prepare a more detailed summary of structural repairs that are required for the continued safe operation of Units 5 & 6. The extent of these repairs will be determined with an anticipated useful operating life in the range of 5 to 10 years. Island will provide a draft list of these repairs to GE/Fieldcore by Feb 4 so that they may also be used to establish their Phase 3C budgetary cost and schedule information to supplement the February 7 report.
- Island 3B: Island will provide GE/Fieldcore a proposal cost estimate for the additional engineering and inspection services that would be required to detail the repairs noted in Phase 3A, provide recommended periodic inspections of the work and provide a final certification of the work, for inclusion by GE/Fieldcore in its budgetary estimate for the Unit 5 and Unit 6 repairs.
- Phase 3C: Upon review and approval by PREPA of the phase 3A & 3B scope, budget and schedule, the repairs will be performed by GE/Fieldcore with oversight by Island as a subconsultant to GE/Fieldcore, with inspection and final reports issued by Island to PREPA.

PHASE 4: Preliminary Assessment of Unit 5 and Unit 6 Original Lateral Load Design Capacity:

- Phase 4A: Island will review the available drawings (and other documentation that may be provided by PREPA) in order to advise PREPA as to the original design capacity of Units 5 & 6 to resist wind and seismic loads. This will be for informational purposes only, for PREPA's use in evaluating the viability of the units, as designed, for the limited life span noted above. Island will include the engineering fee for this effort in its proposal to GE/FieldCore for the other engineering services.

IMMEDIATE REPAIRS REQUIRED FOR OVERALL STRUCTURAL STABILITY:

The following are repairs that should be performed immediately and prior to permitting more extensive personnel access to the Units for the purpose of more detailed damage assessments.

UNIT 3:

- Unit 3 requires no immediate remediation at this time to permit limited access for further damage assessment. Note however, that all of the Unit 3/Unit 4 Equipment Building bracing at the lower level has been buckled. Although the bracing in this condition can still accept tension loading, the overall capacity of the unit to resist lateral loads is severely compromised. Personnel access should be limited and all personnel should vacate this building during periods of high winds and at the first indication of additional seismic activity.

UNIT 4:

- Column line G at column G-9 2/3 at the base level, the main diagonal brace (back to back L5x5x3/8) was previously cut and welded near the base of the column. The repair weld has completely failed (broken). The member must be realigned, the weld surfaces properly prepared and a full penetration bevel weld must be performed. Due to limited access between the vertical legs, a backer bar full penetration weld should be used for these welds. Welding should be performed by a certified welder. (photos 102-2399, 102-2400, 102-2401
- Column line E at column E-11 1/3 at the base level, the main diagonal brace (back to back L8x8x3/4 has buckled the web of the connecting T at the column base. The web of the gusset should be cut where buckled and replaced using a full penetration weld to remaining section of the T. (Photos 120-2403 and 120-2404).
- Note that all of the Unit 3/Unit 4 Equipment Building bracing at the lower level has been buckled. Although the bracing in this condition can still accept tension loading, the overall capacity of the unit to resist lateral loads is severely compromised. Personnel access should be limited and all personnel should vacate this building during periods of high winds and at the first indication of additional seismic activity.

UNIT 5:

- Column line E-5, at column E5-20.00, Level 2 (47'-4") the main diagonal brace (14WF48) has had a section replaced with incomplete splice repairs that must be full penetration welded. The weld ends must be properly prepared and full penetration bevel welds completed. We recommend removal of the temporary erection splice plate(s) after flanges are welded to allow for the proper welding of the web. (photo 120-2419 and 120-2420)
- Note that the majority of the Unit 5/Unit 6 Equipment Building bracing at both the lower and upper levels has been buckled. Although the bracing in this condition can still accept tension loading, the overall capacity of the unit to resist lateral loads is severely compromised. Personnel access should be limited and all personnel should vacate this building during periods of high winds and at the first indication of additional seismic activity.
- Note that the majority of the vertical bracing at the back of the DA framing (column line C, which is common to the east side of the Equipment Building has buckled. Note that all of the Unit 3/Unit 4 Equipment Building bracing at the lower level has been buckled. Although the bracing in this condition can still accept tension loading, the overall capacity of the unit to resist lateral loads is severely compromised. Personnel access should be limited and all personnel should vacate this area during periods of high winds and at the first indication of additional seismic activity.

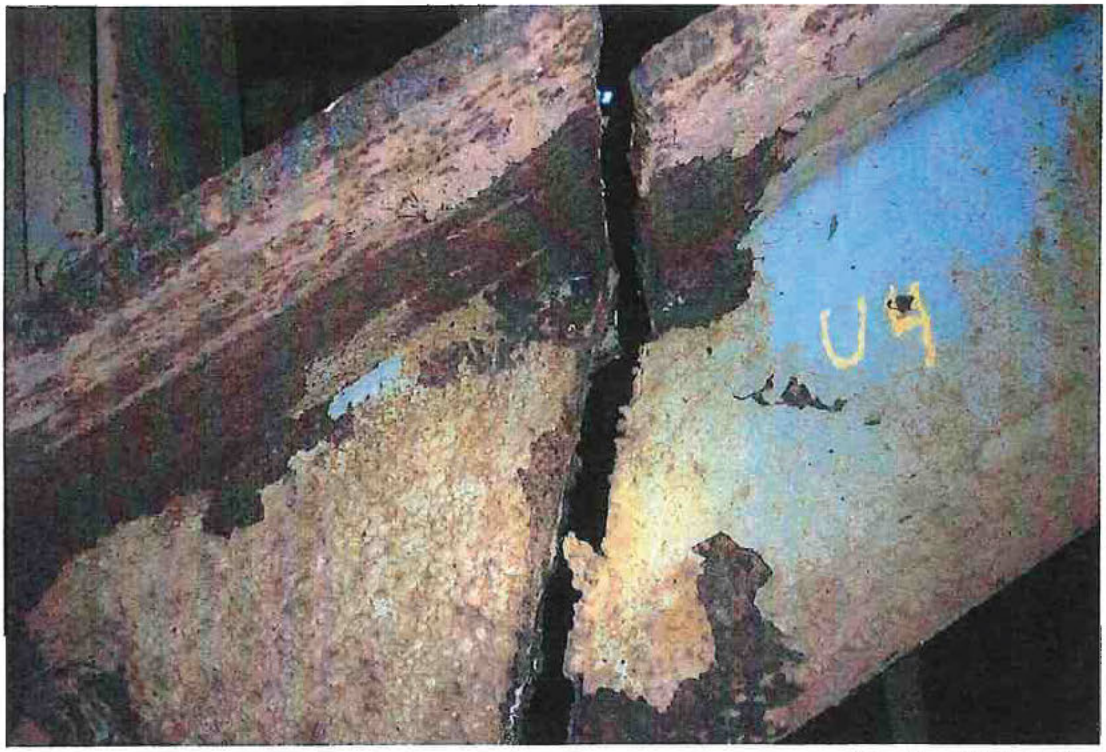
UNIT 6:

- Unit 6 requires no immediate remediation at this time to permit limited access for further damage assessment.
- Note that the majority of the Unit 5/Unit 6 Equipment Building bracing at both the lower and upper levels has been buckled. Although the bracing in this condition can still accept tension loading, the overall capacity of the unit to resist lateral loads is severely compromised.

Personnel access should be limited and all personnel should vacate this building during periods of high winds and at the first indication of additional seismic activity.

- Note that the majority of the vertical bracing at the back of the DA framing (column line C, which is common to the east side of the Equipment Building has buckled. Note that all of the Unit 3/Unit 4 Equipment Building bracing at the lower level has been buckled. Although the bracing in this condition can still accept tension loading, the overall capacity of the unit to resist lateral loads is severely compromised. Personnel access should be limited and all personnel should vacate this area during periods of high winds and at the first indication of additional seismic activity.

PHOTOS



120-2399

120-2400

120-2420

120-2401

120-2404

120-2419

120-2403

4 High Energy Piping Post Seismic Even Initial Assessment Report

Puerto Rico Electric Power Authority
South Coast Steam Plant Units 5 & 6
High Energy Piping Post Seismic Event
Initial Assessment Report

Prepared by:

ISLAND STRUCTURES ENGINEERING, PC

319 SUNRISE HIGHWAY
WEST ISLIP, NY 11795

February 6, 2020

Puerto Rico Electric Power Authority
South Coast Steam Plant Units 5 & 6
High Energy Piping Post Seismic Event
Initial Assessment Report

Prepared for:

Puerto Rico Electric Power Authority

San Juan, PR 00936

Prepared by:

Island Structures Engineering, PC

319 Sunrise Highway
West Islip, NY 11795

INDEX

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Report Updates

Island has no responsibility to update this report for any changes occurring subsequent to the issuance of this report.

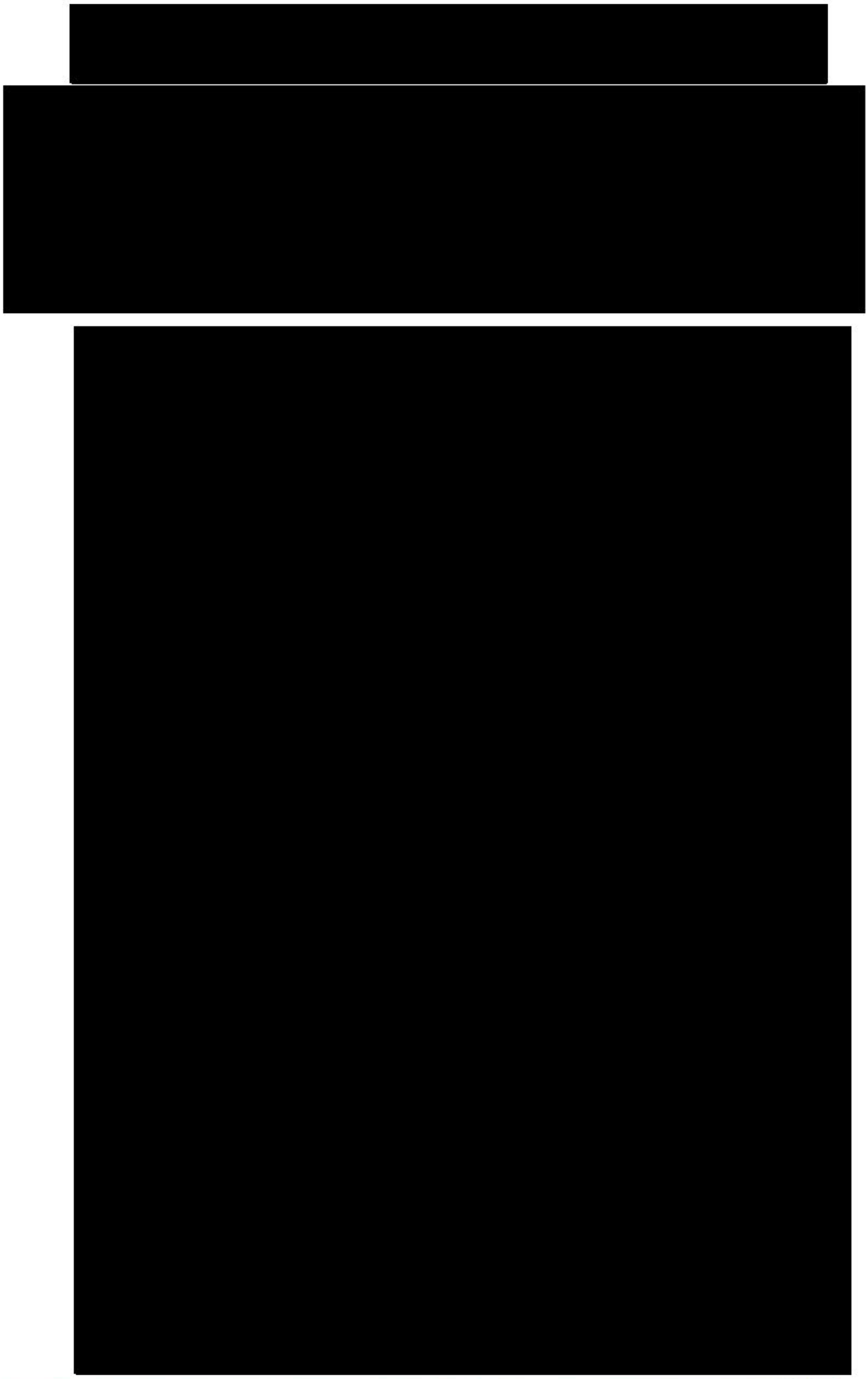
I. GENERAL OVERVIEW

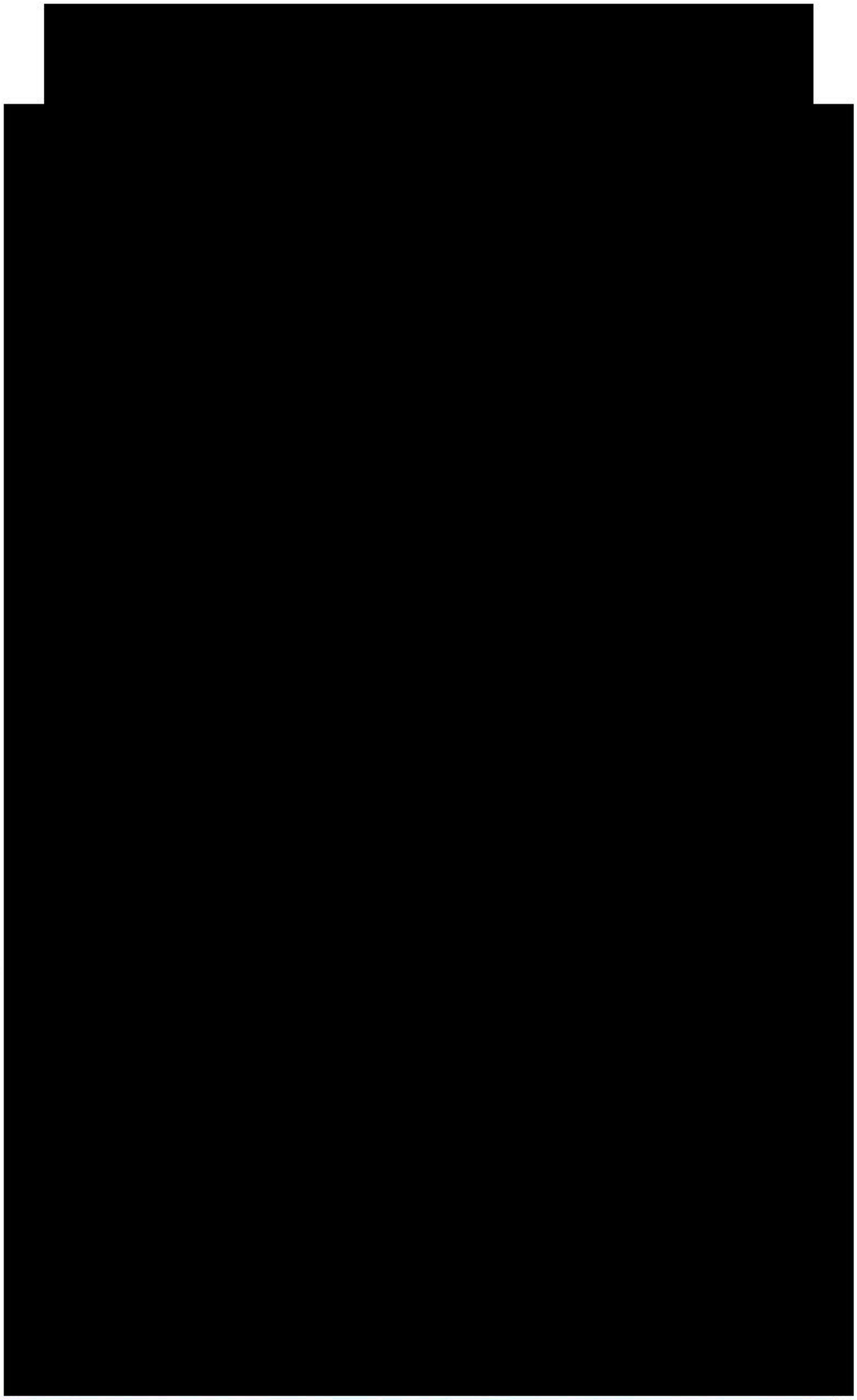
Island Structures Engineering, PC (Island), working together with GE/Fieldcore personnel performed an initial inspection of the PREPA South Coast Power Generating Units 5 and 6, on January 27 and 28, 2020 subsequent to a significant seismic event measuring 6.4 on the Modified Mercali Intensity Scale on January 7, 2020. Several smaller seismic events had occurred just prior to this significant event and numerous additional seismic events measuring in the 3 to 5 range continue to occur at the time of this report. This formal initial assessment report was requested by PREPA in order to expedite the decision-making process as to whether to proceed with repairs to these units. PREPA requested it be issued during the week of February 7. Island provided a verbal post-inspection presentation to PREPA staff on January 29 and advised them of certain structural damages that should be remediated prior to proceeding further with more detailed inspections and damage assessments. Island also provided an Emergency Structural Inspection and Assessment Preliminary Report of Immediate Remediation Needs and Repair Approach on January 30, 2020.

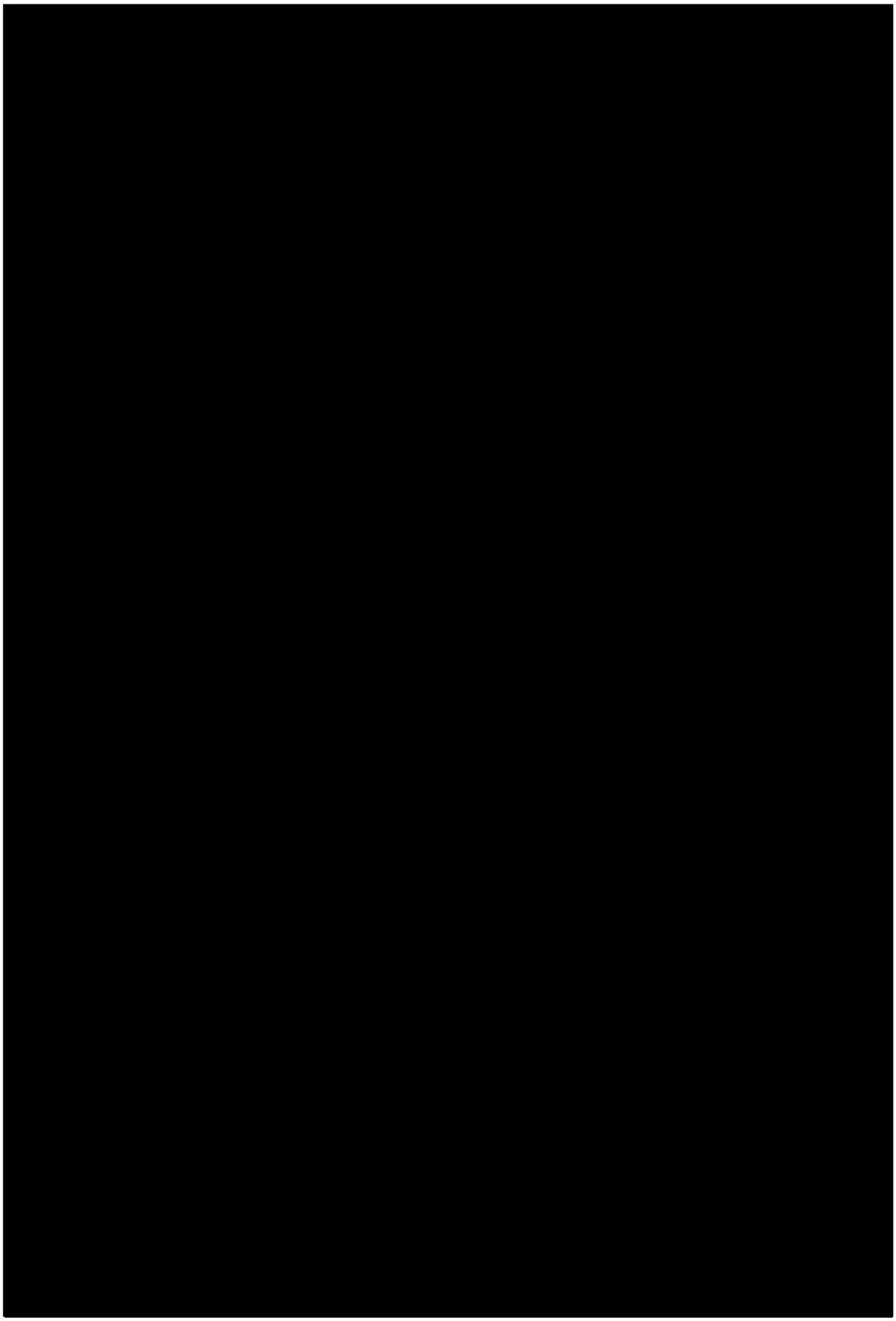
II. OBJECTIVES

The following general objectives were provided by PREPA to Island for the inspection and remediation plan development effort related to High Energy Piping:

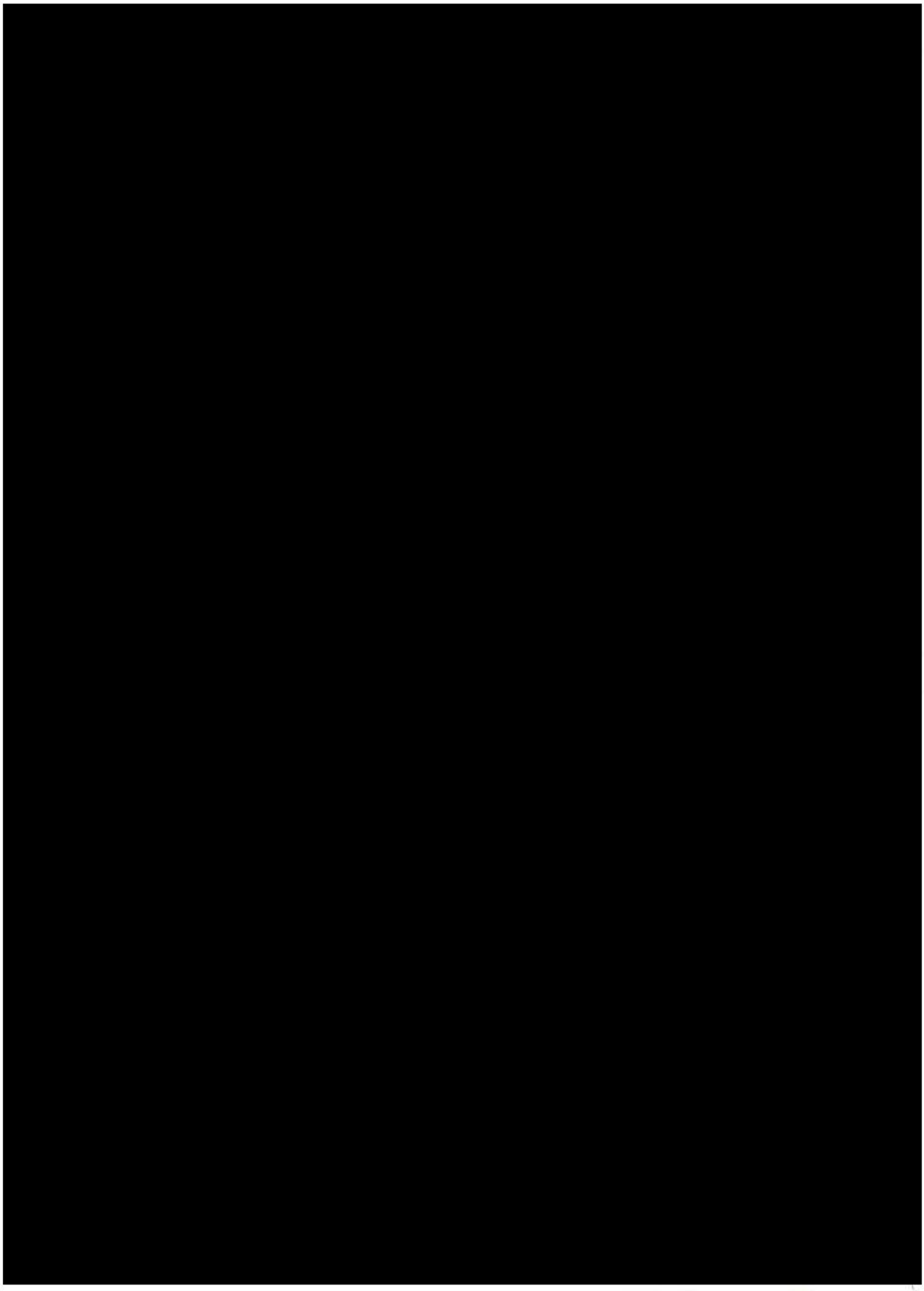
A. Inspect and assess Units 5 and 6 High Energy piping damage from recent seismic events.
B. Determine the extent of damage to Unit 5 in order for PREPA to evaluate the decision to make needed repairs to expedite its return to service within a few months. The High Energy piping assessment is also being supplemented with a similar assessment of the structures, the boiler components (both internal and external), and budgetary costs for all the above.
C. Determine the extent of piping damage to Unit 6 in order for PREPA to evaluate the decision to make needed repairs to expedite its return to service within the next several months. Due to pre-earthquake upgrades to process components such as demineralized water storage, boiler components and other required systems, it is currently anticipated that such other work could require considerably longer returning Unit 6 to service than Unit 5.
D. This piping evaluation is being performed concurrently with an assessment of the Unit 5 and 6 structures and an external boiler assessment. GE/FieldCore will also be providing budgetary cost and preliminary schedule information for PREPA's use in the decision making as to whether to proceed with Unit 5 and/or Unit 6 repairs.

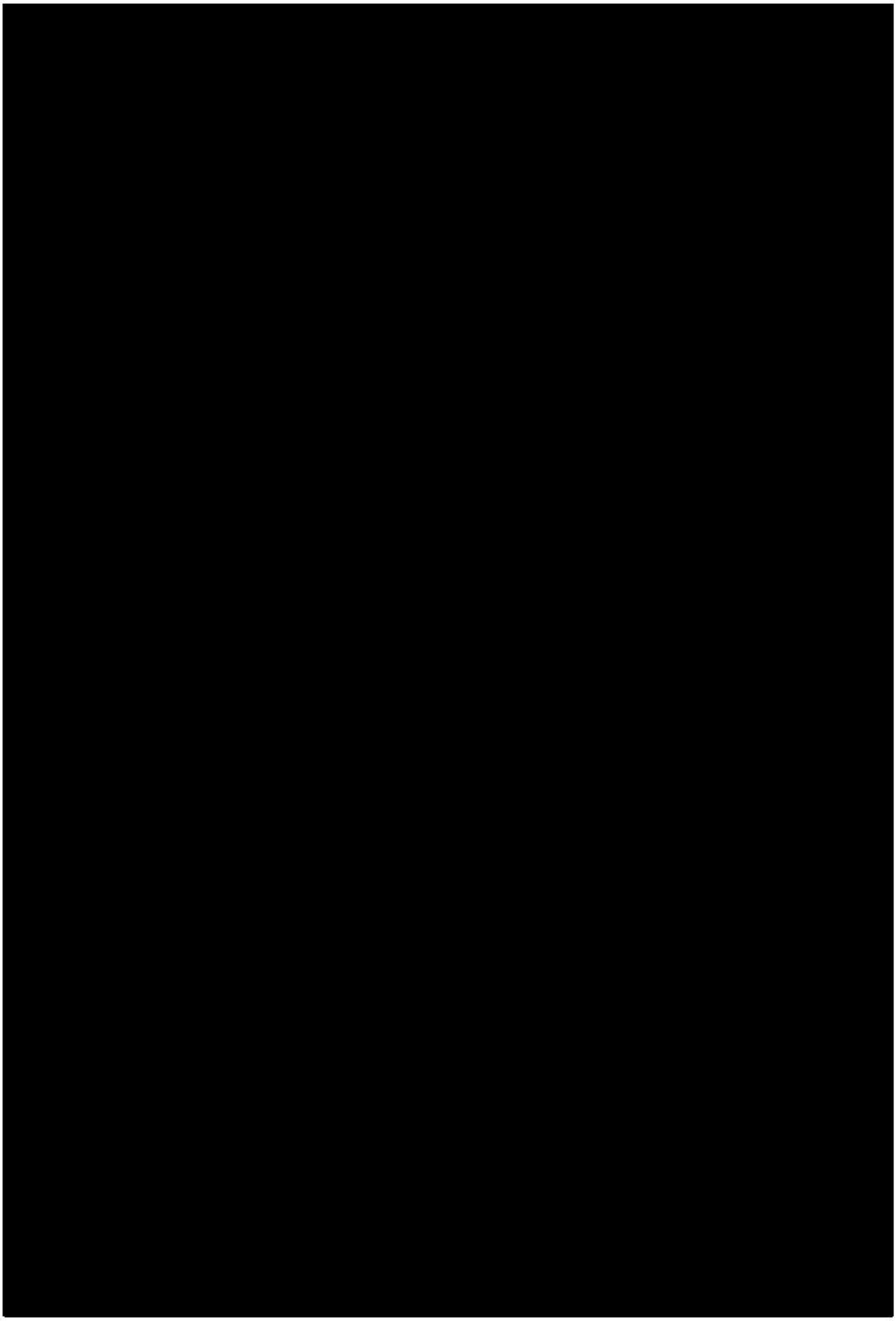


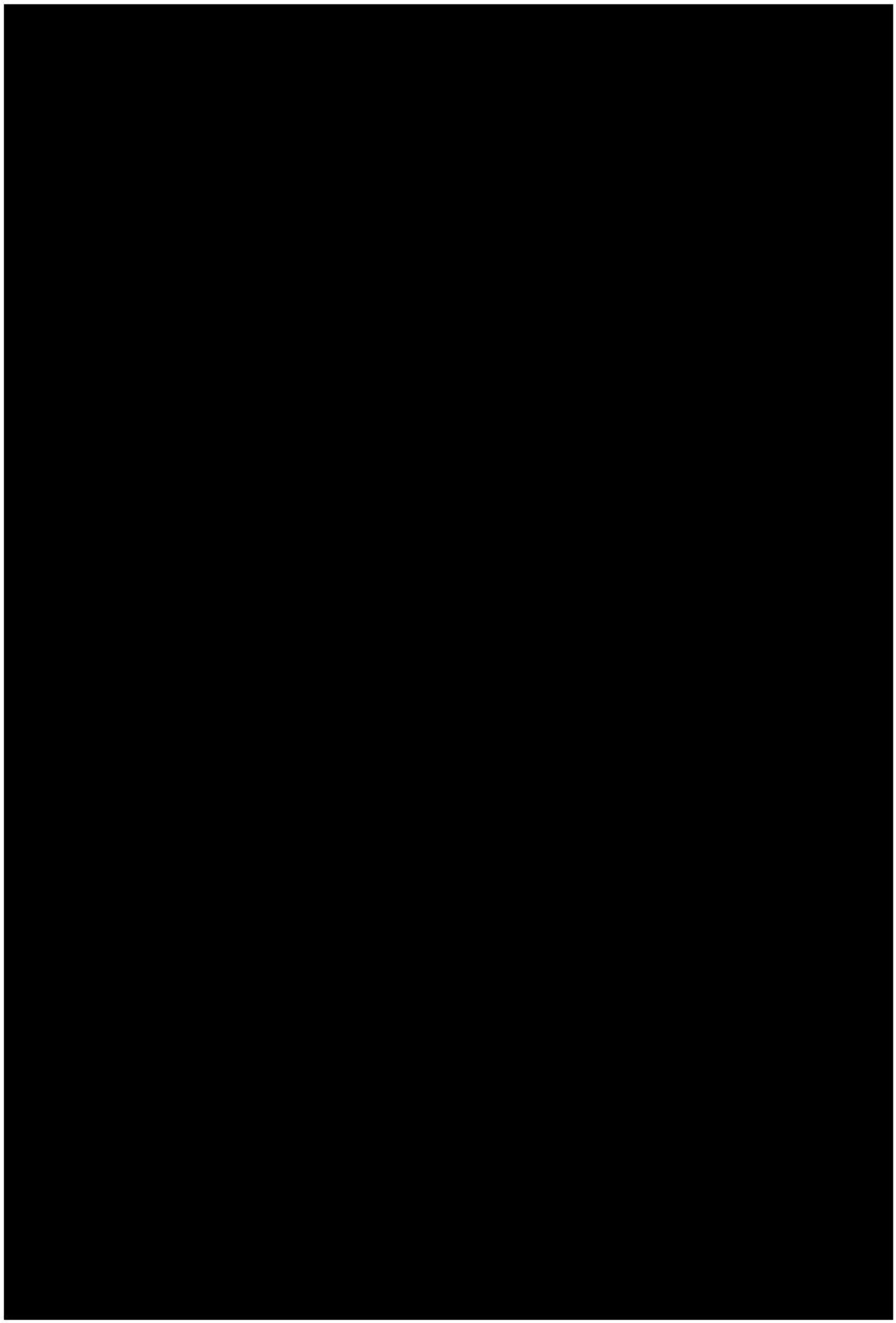


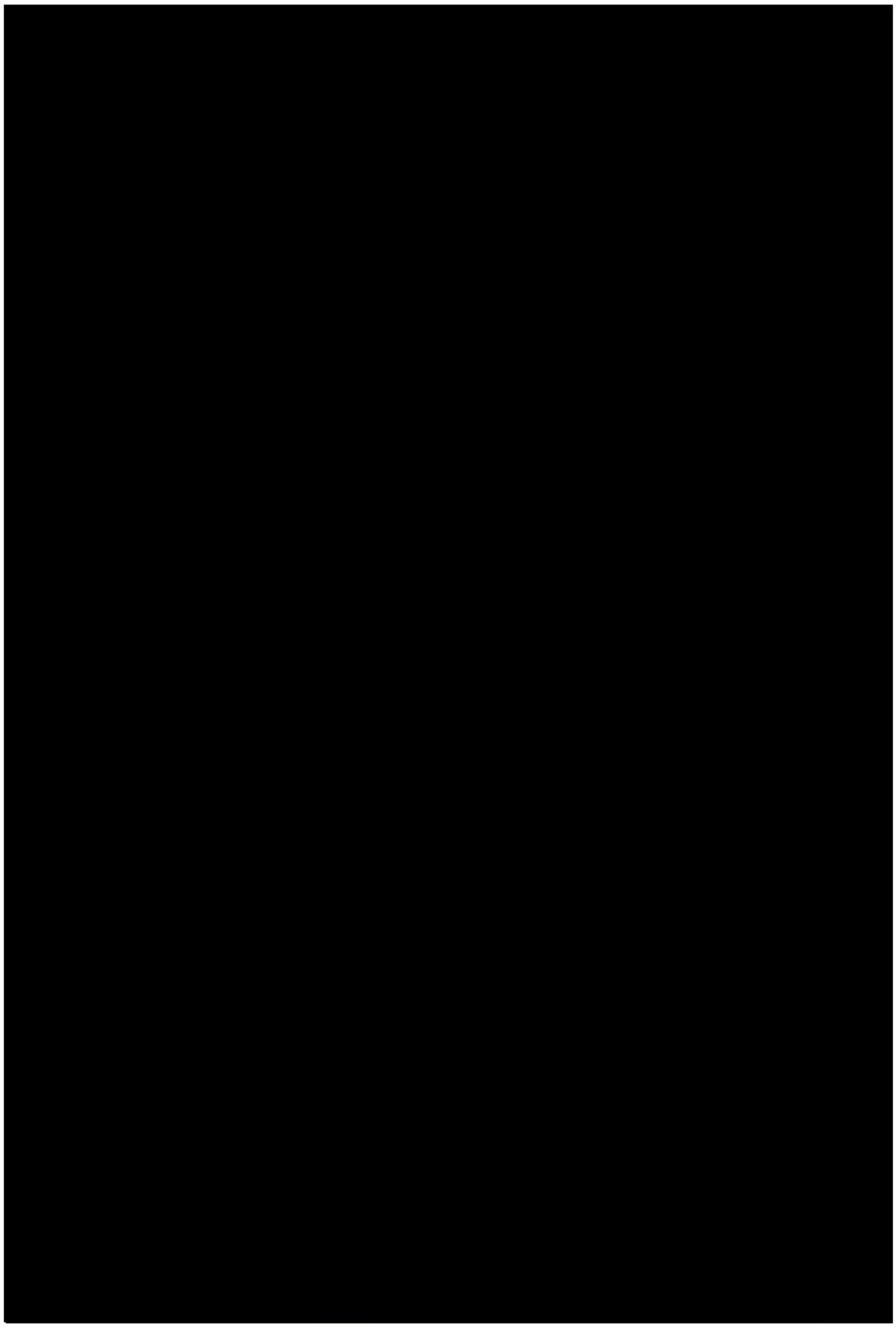


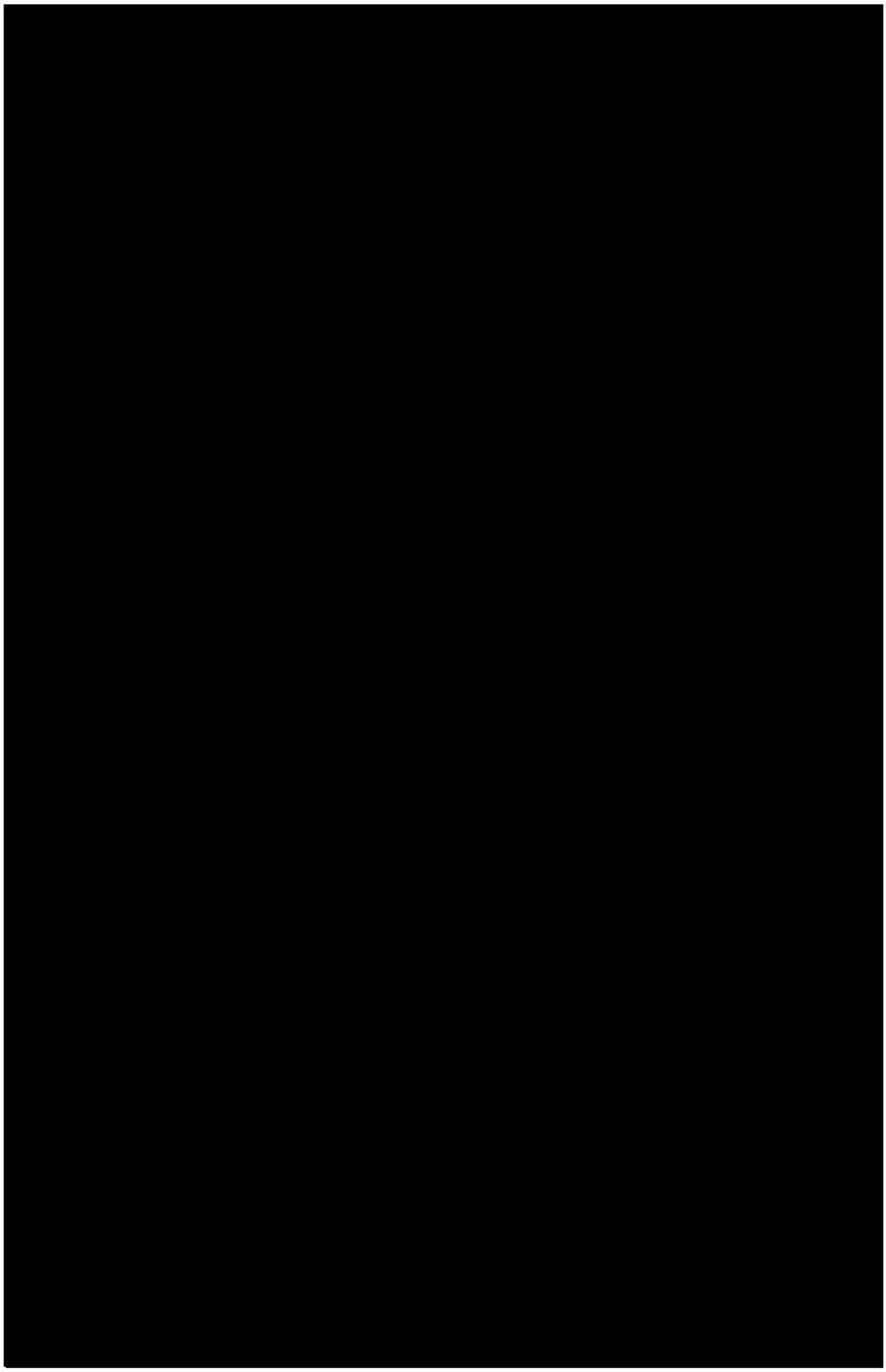
ISLAND STRUCTURES ENGINEERING, PC

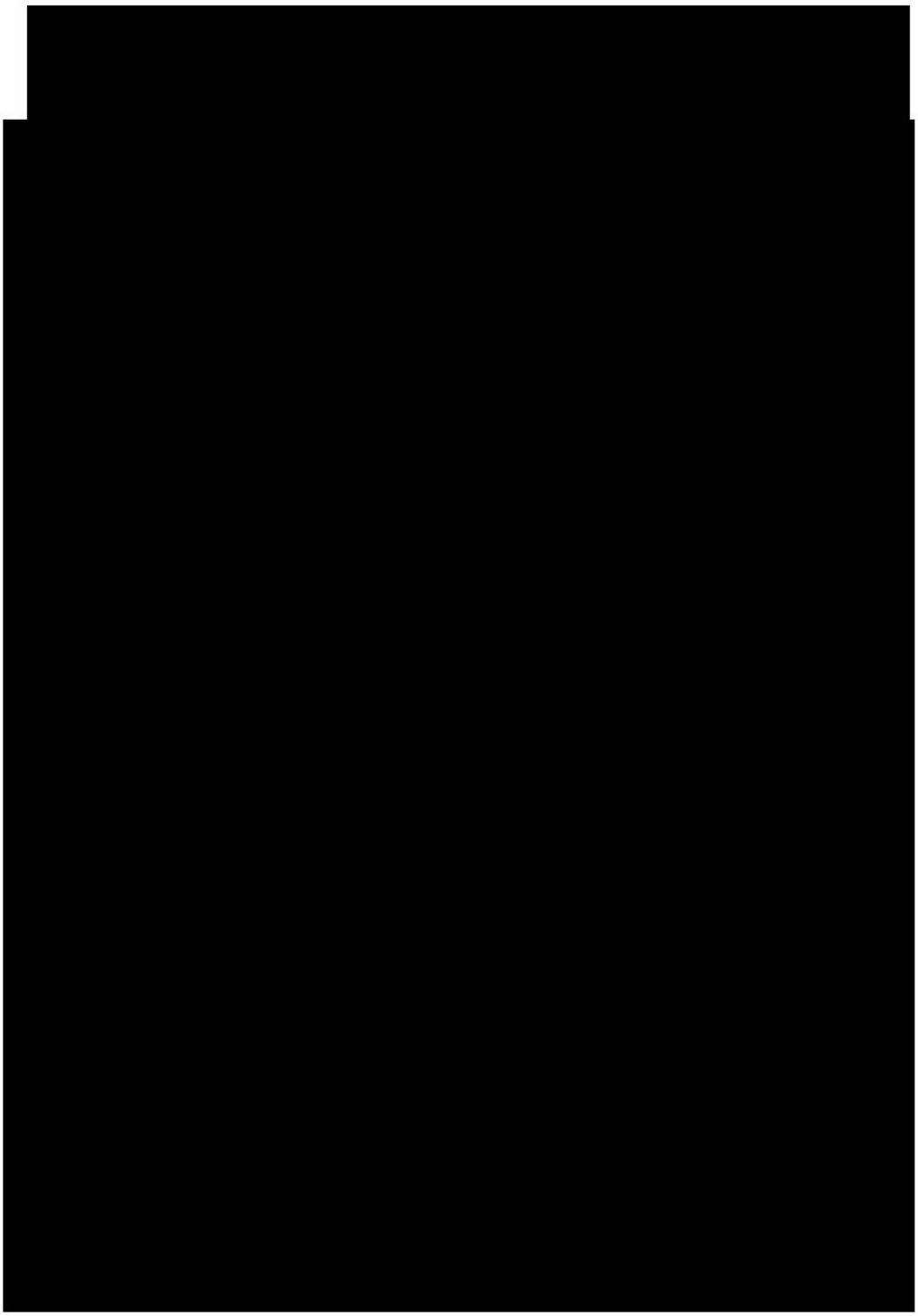


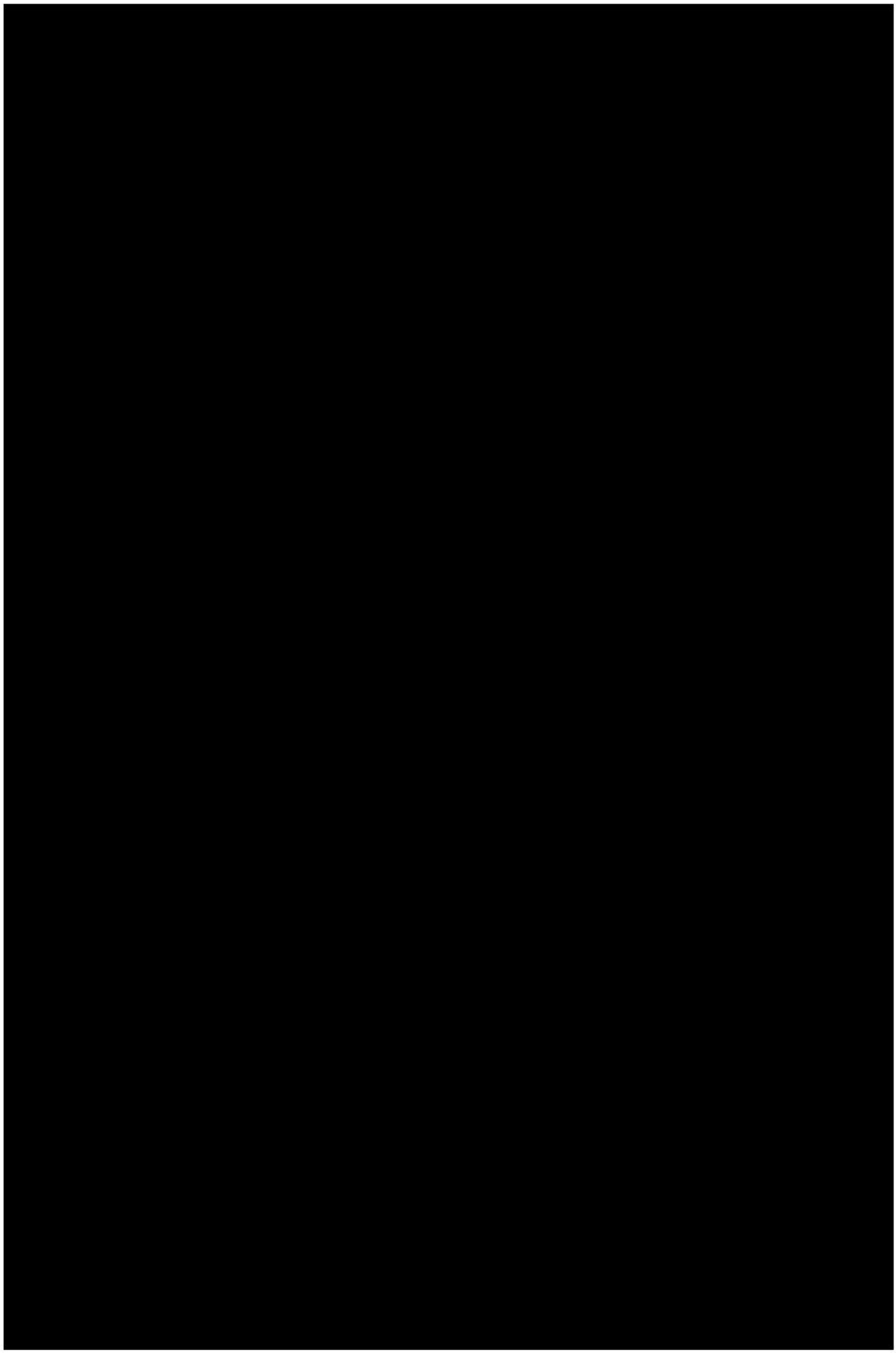












APPENDIX A

PHOTOS OF CONDITIONS

(Photos are included in electronic file link provided to report recipients due to file size)

APPENDIX B

PRELIMINARY SPREAD SHEET SUMMARIES OF REQUIRED REPAIRS (FOR BUDGETARY PRICING)

(Spread sheets are included in electronic file link provided to report recipients due to file size)

APPENDIX C

Drawings
(Drawings are included in electronic file link provided to report recipients due to file size)

APPENDIX D

CONTINUING CONSULTING SERVICES PROPOSAL
(Continuing consulting services proposal is being developed and will be provided separately)

APPENDIX A

PHOTOS OF CONDITIONS

Unit 5 Photos

Photo 1 - U-5 Failed WEAR Restraint Rod End

Photo 2 - U-5 Failed WEAR Rod End and Structure

Photo 3 - Main Steam Crossover Tees (U-6 shown)

Photo 4 - Crossover Tee Weld Repairs (Archive Photo)

Photo 5 - U-5 Failed Main Steam Annubar Tubing

Photo 6 - U-5 Hot Reheat Hanger HR-13

Photo 7 - U-5 Topped out Cold Reheat Hanger

Photo 8 - U-5 Failed CR Attemperator Spray Hanger

Photo 9 - U-5 Topped out Hanger CR- 15

Photo 10 - U-5 Boiler Feed Hangers BF-1 and BF-2

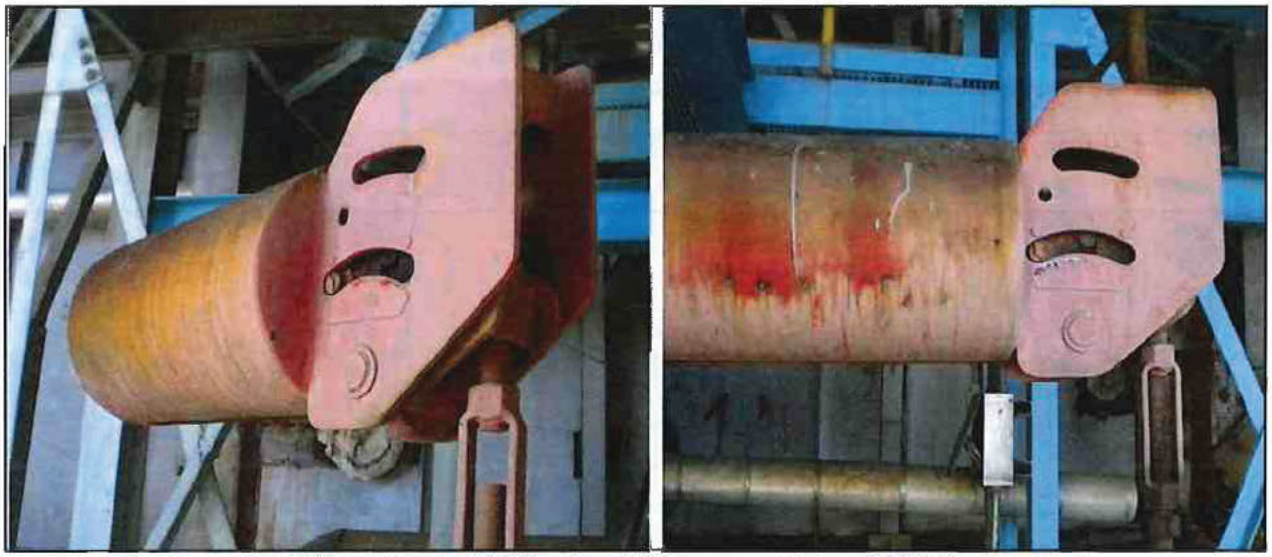


Photo 11 - U-5 Boiler Feed Hangers BF-3 and BF-4

Photo 12 - U-5 Failed L-3 Boiler Feed Guide

Photo 13 - U-5 Failed Guide on the Hot Suction Line

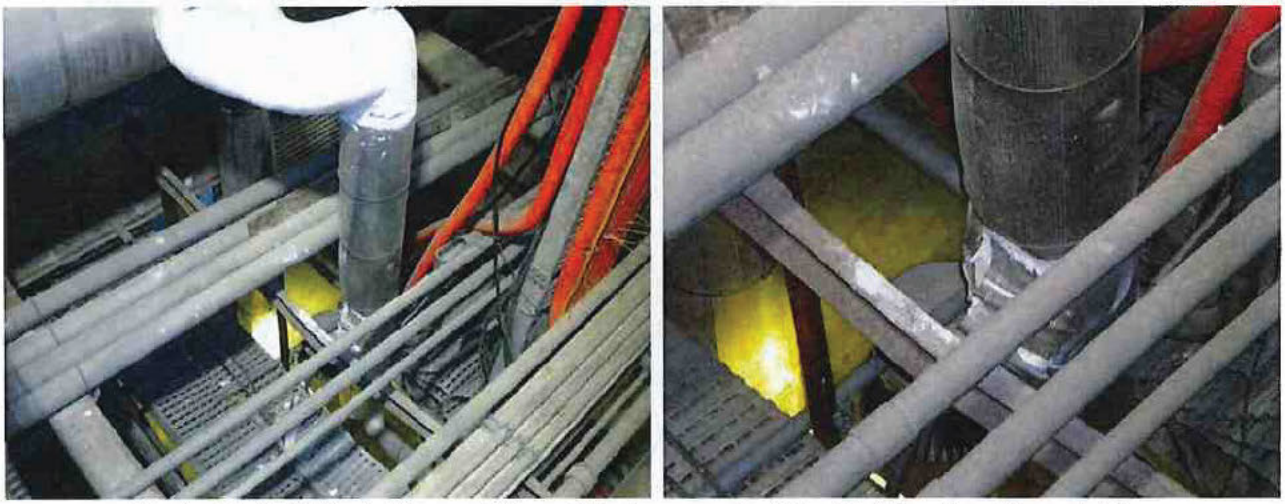


Photo 14- U-5 Bent Channel from Displacement of the Hot Suction Branch Line

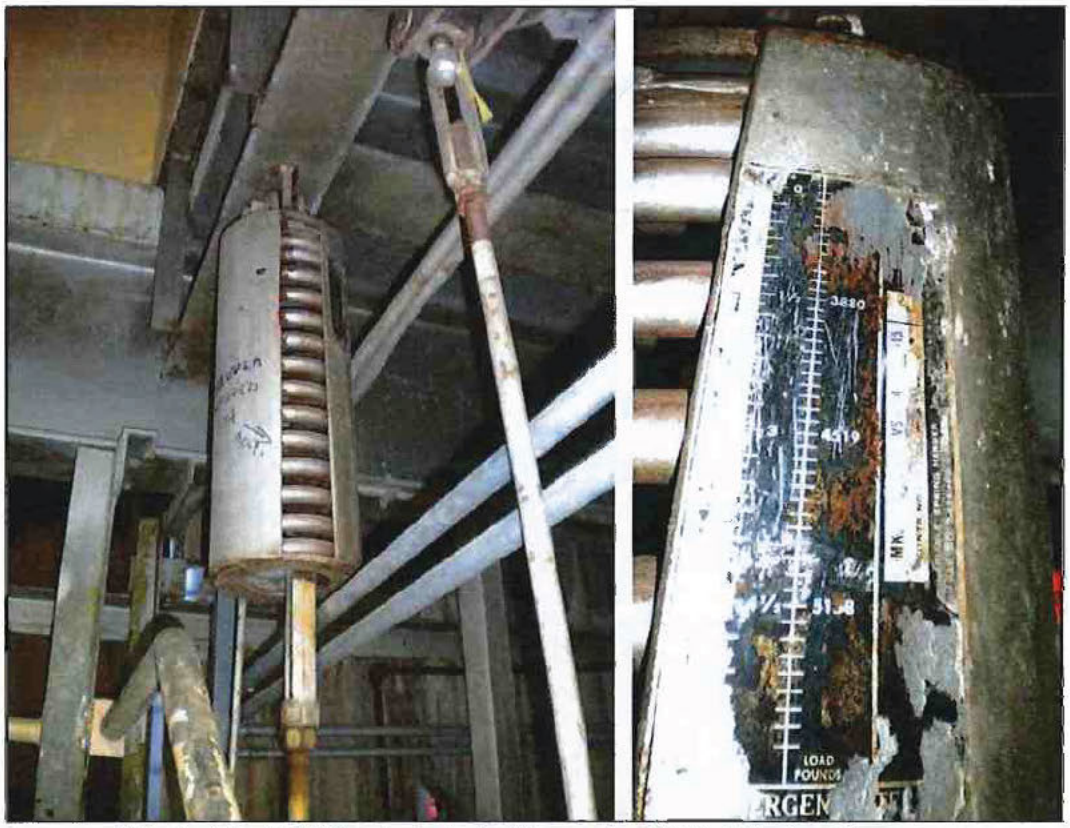


Photo 15 - U-5 Condensate to Deaerator Failed Spring Hanger

Photo 16 - U-5 Condensate Piping to Deaerator

Photo 17 - U-5 Condensate Riser Support

Photo 18 - U-5 Failed Spring Hanger Rod on Blow-down Line

Photo 19 - U-5 Unidentified Line next to Cold Reheat

Photo 20 - U-5 Unidentified Line Support

Unit 6 Photos

Photo 21 - U-6 Failed Steel and WEAR Restraint WR-9

Photo 22 - U-6 Failed WEAR Restraint WR-10

Photo 23 - U-6 Failed Support S-16 Stanchion Clip Angle

Photo 24 - U-6 Dislodged Grating and Bent Grating a the two Main Steam SRV Locations

Photo 25 - U-6 Failed Pressure Tap

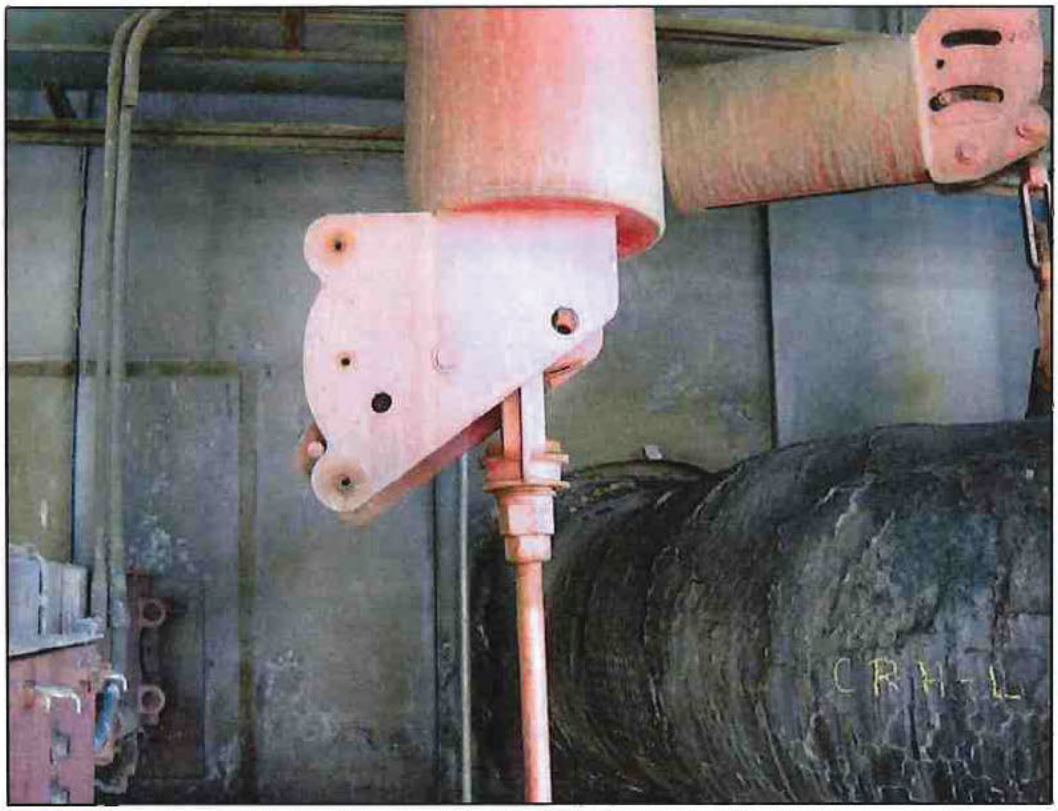


Photo 26 - U-6 Topped Out BF Hanger BF-2

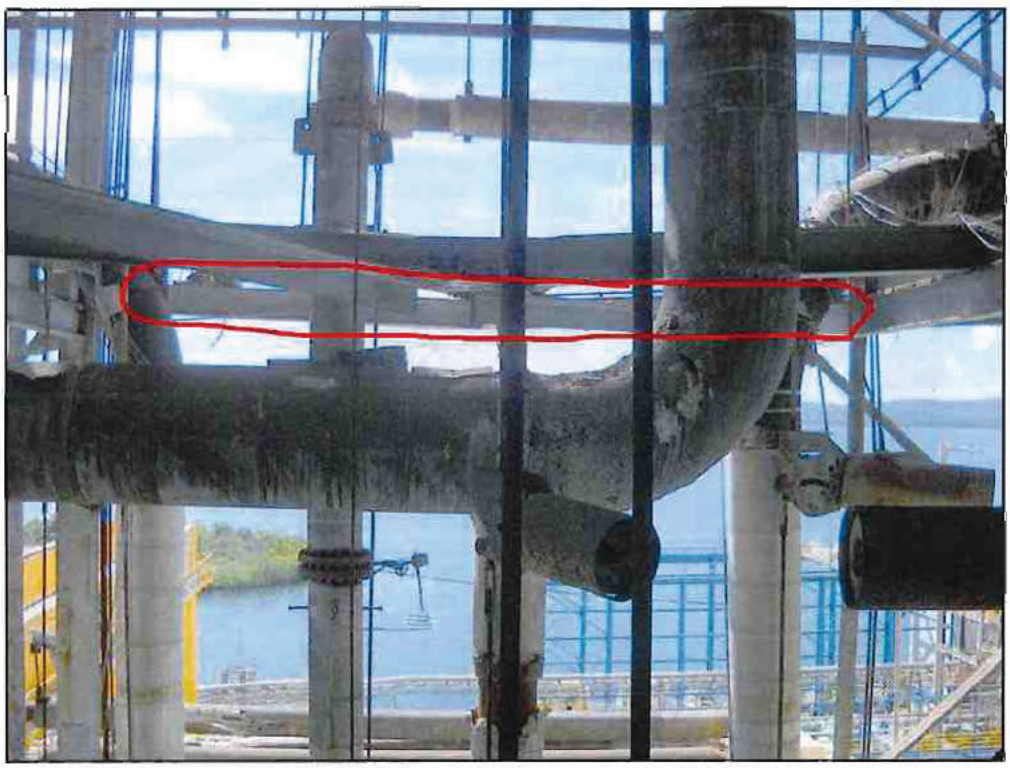


Photo 27 - U-6 Bent Beam that Supports the Hot Suction Riser

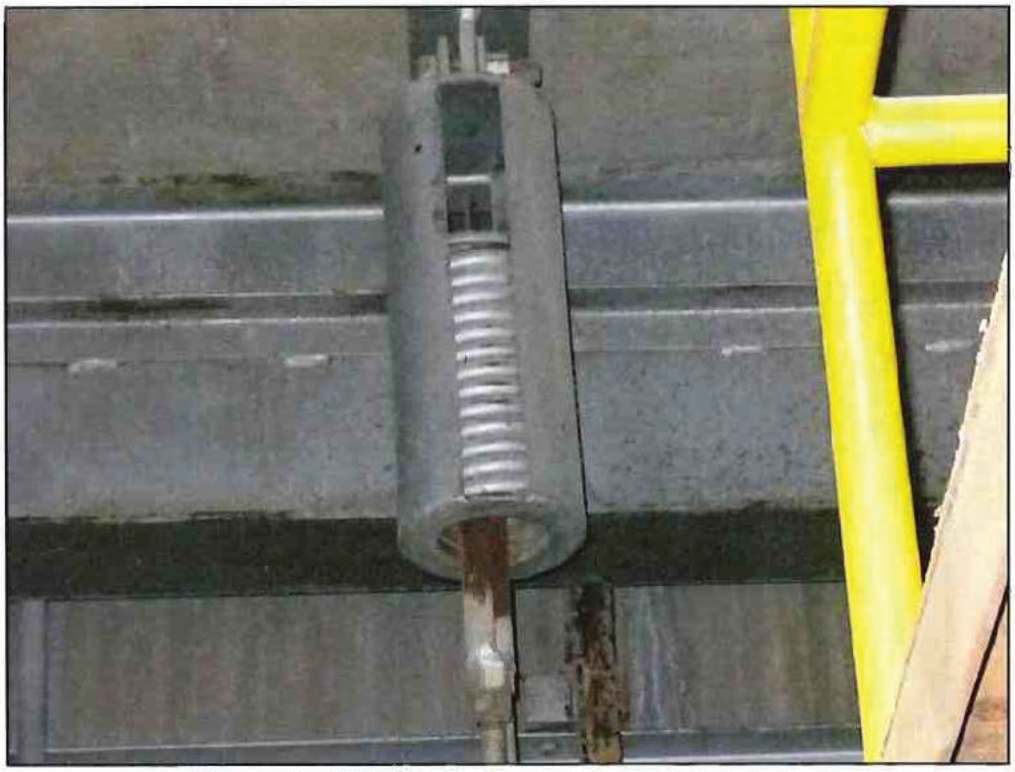


Photo 28 - U-6 Hot Suction Bottomed Out Spring

Photo 29 - U-6 Hot Suction Bottomed Out Spring

Photo 30 - U-6 HP Flash Tank SRV Discharge

Photo 31 - U-6 Failed Heater 5 Drip Elbow Stanchion

Photo 32 - U-6 Failed Condenser PVC Piping

Photo 33 - U-6 Failed Condenser PVC Piping

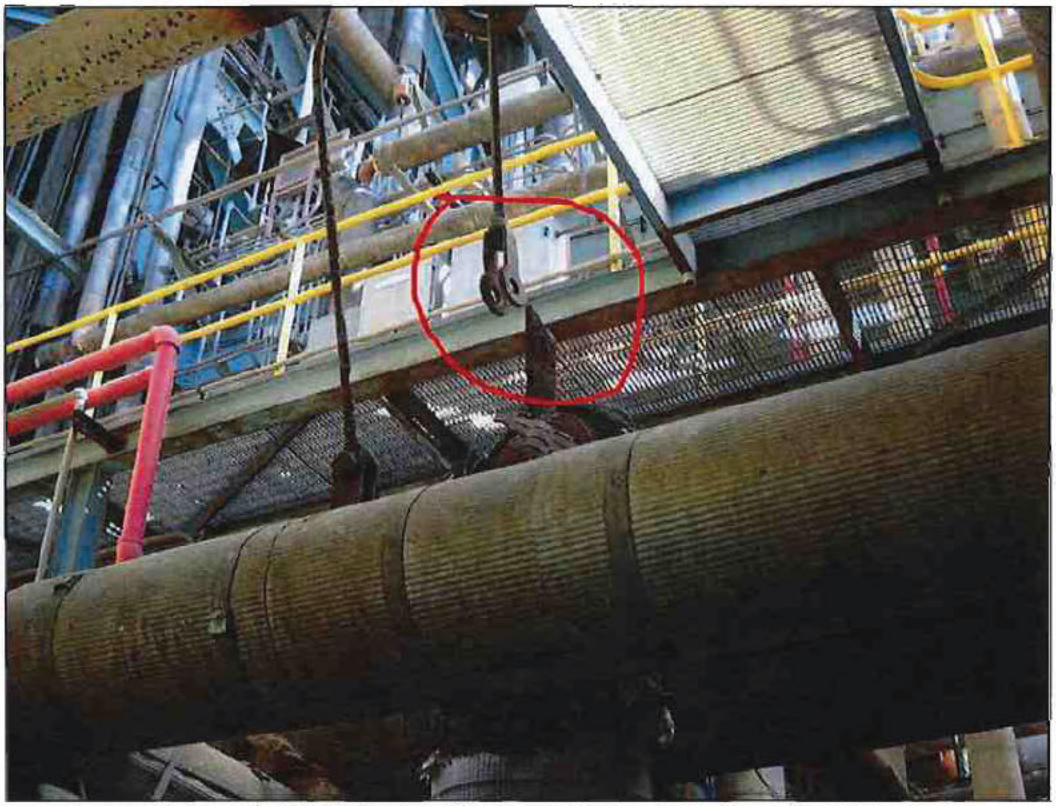


Photo 34 - U-6 Missing Hanger Pin from Unidentified Line

Photo 35 - U-6 Bent Heater 6 Lateral Restraint

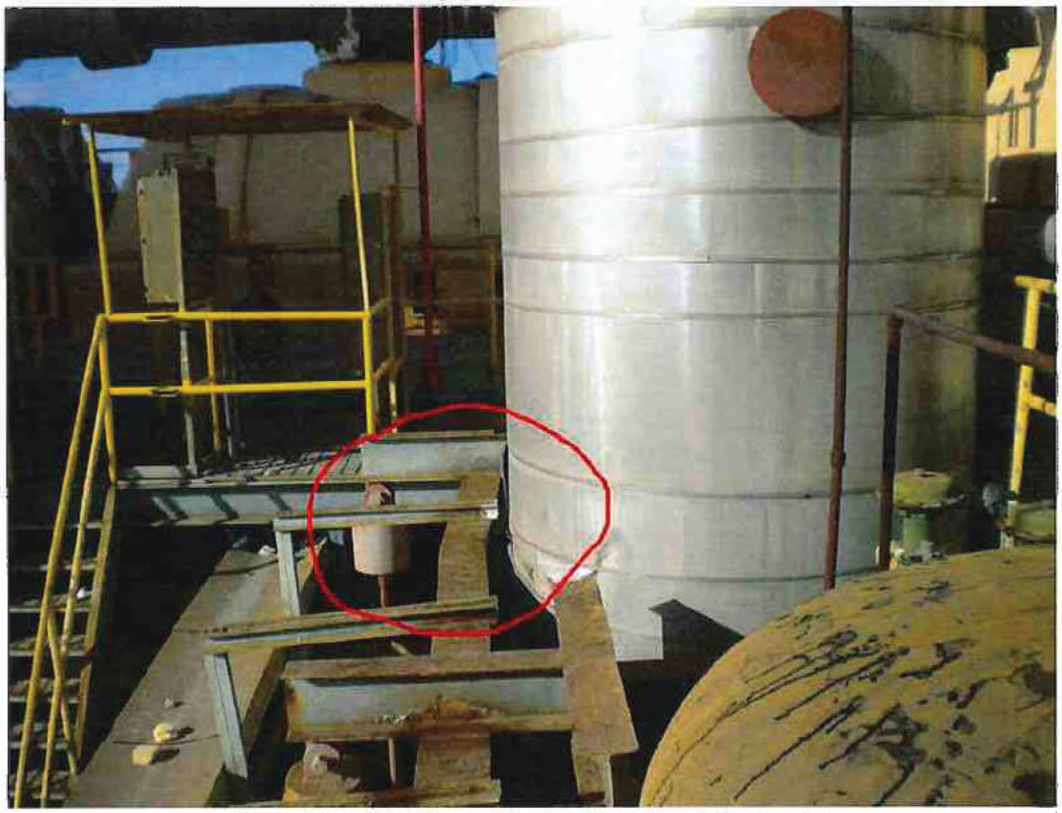


Photo 36 - U-6 Bent Heater 7 Lateral Restraint

Photo 37 - U-6 Heater 7 Typical Support Leg (Right Side)

Photo 38 - U-6 Heater 7 Support Leg Base

Photo 39 - U-6 Heater 7 Structural Support Leg Anchor Bolt

Photo 40 - U-6 Main Steam Control Valve Actuator Assembly
(Archive Photo prior to 2009 Steam Chest Stabilizing Restraint Modification)

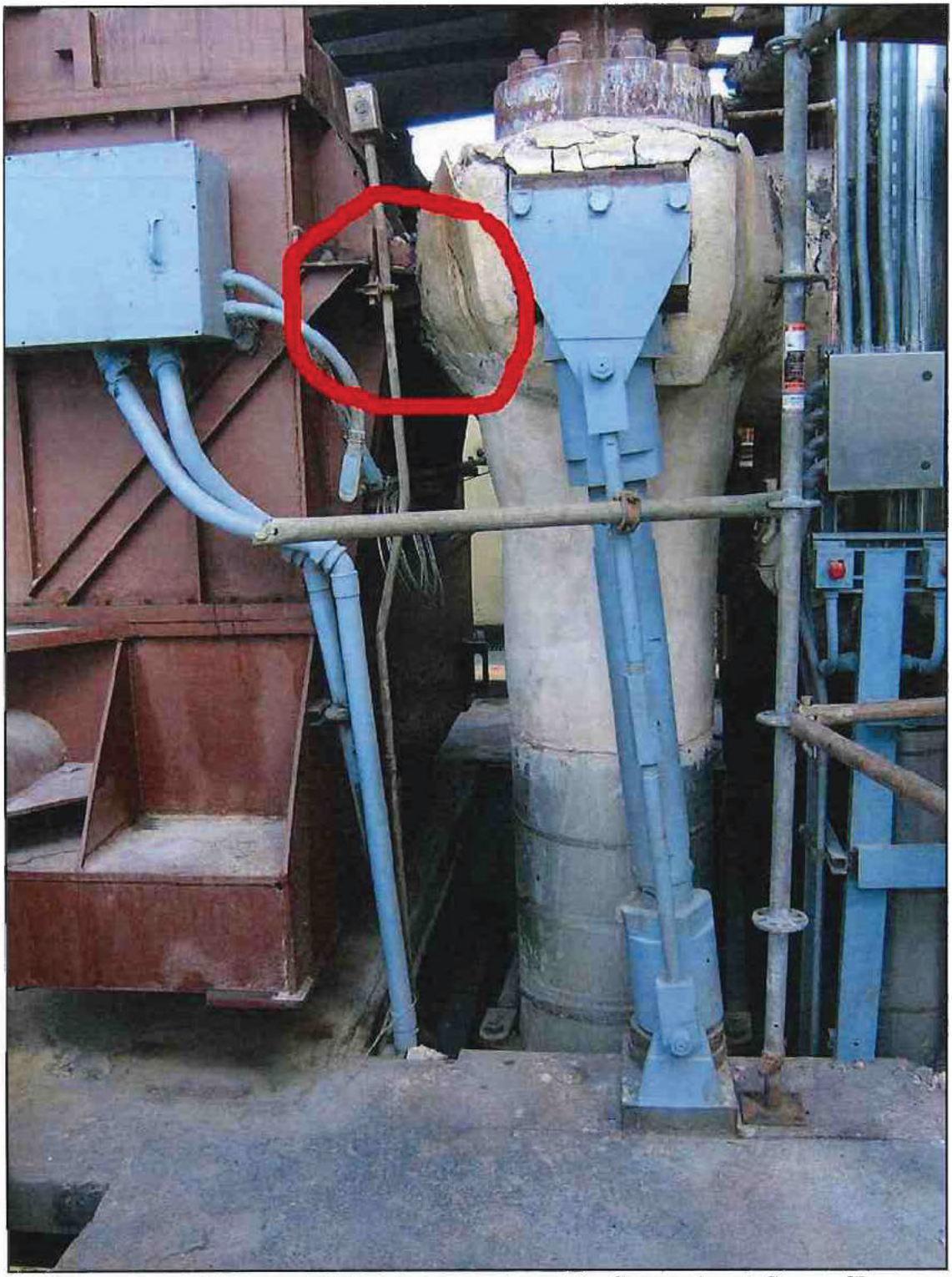


Photo 41 - U-6 MS Control Valve Actuator Assembly Connection to Steam Chest (Archive Photo prior to 2009 Steam Chest Stabilizing Restraint Modification)

Photo 42 - U-6 Failed Control Valve Actuator Assembly Connection

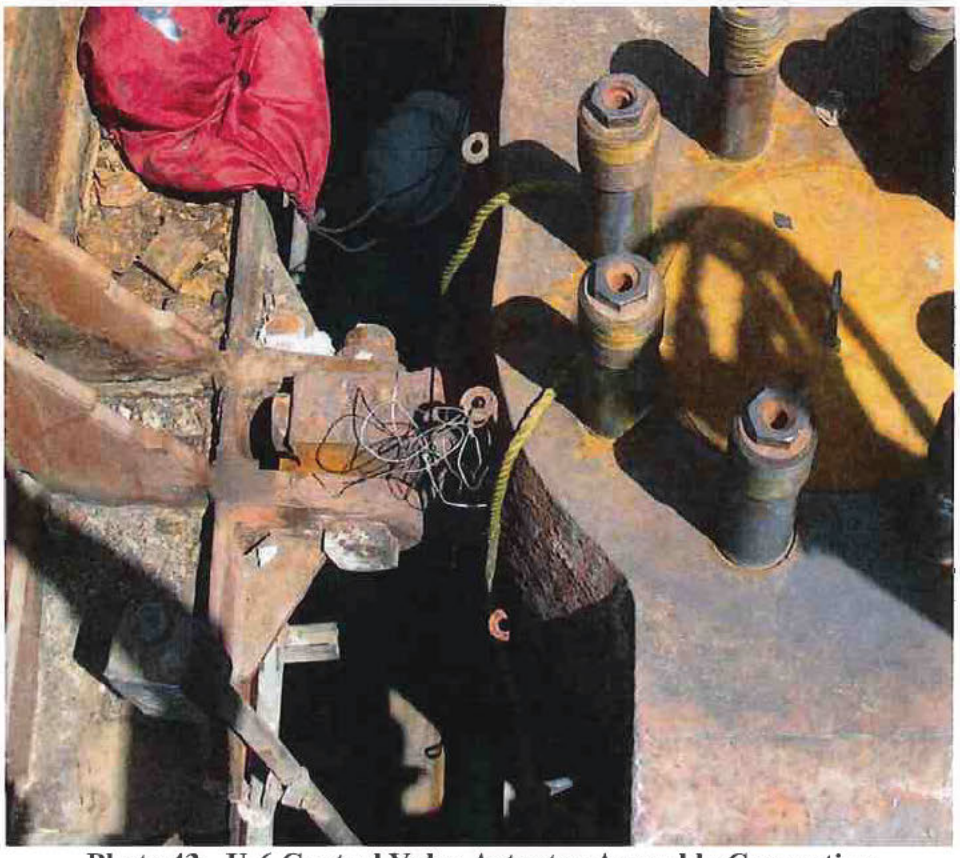


Photo 43 - U-6 Control Valve Actuator Assembly Connection (Achieve Photo from 2009)

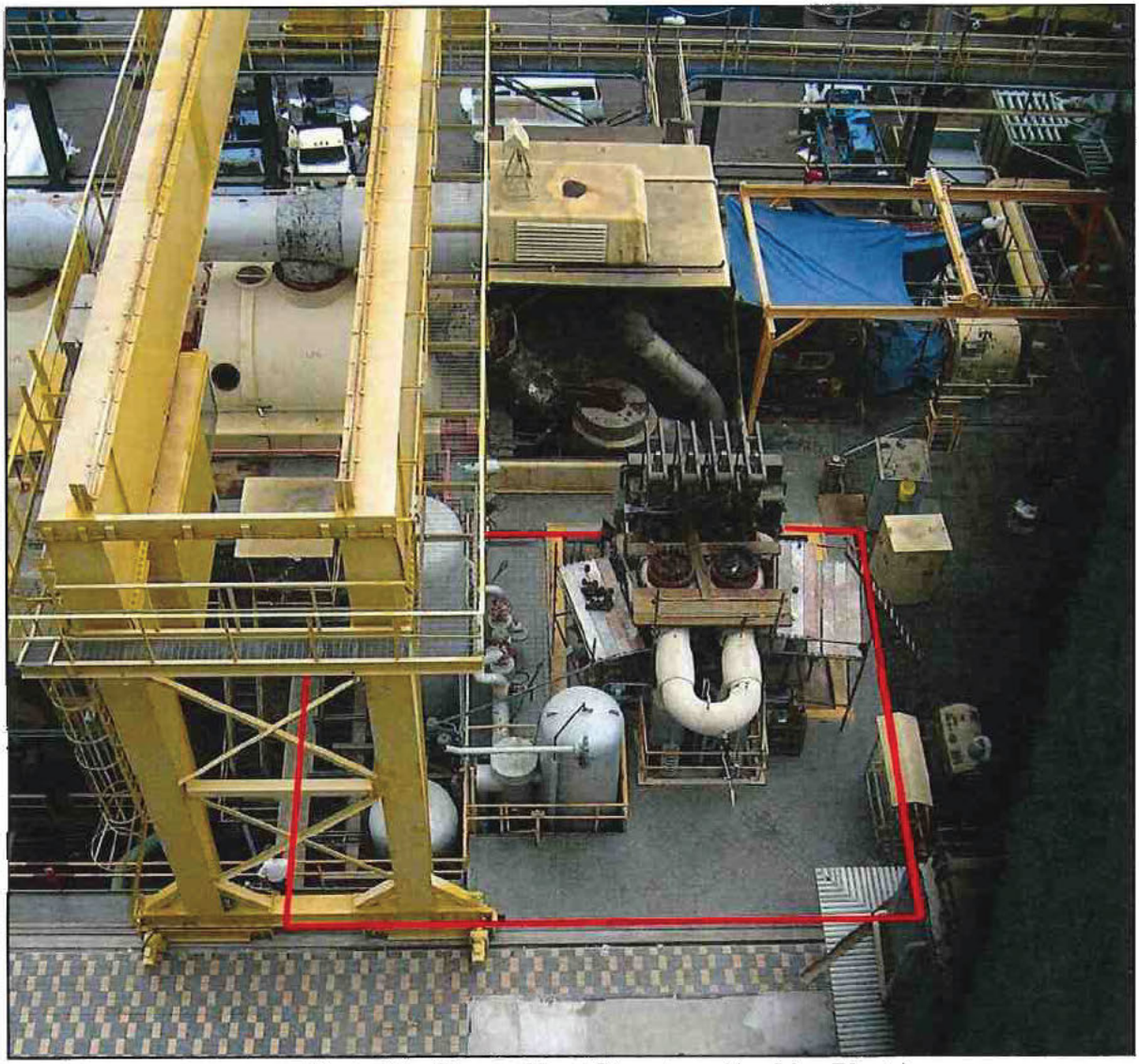


Photo 44 - Steam Chest Structure (Archive Photo)

5 Immediate Repairs – Milestones Units 3 through 6, CSPP

Immediate Repairs - Safety to Continue Interior Inspections	February, 2020				March, 2020				April, 2020			
	Wk1	Wk2	Wk3	Wk4	Wk1	Wk2	Wk3	Wk4	Wk1	Wk2	Wk3	Wk4
1. Coating Sampling for Pb (Presence of Lead)		13-Feb										
2. Pb (Lead) Permit - Environmental Quality Board		14-21 Feb										
3. Scaffolds for Unit 5		15-Feb										
4. Pb (Material with Presence of Lead) Removal in Various Areas of Units			22-25 Feb									
5. Repair Works to Steel Structures				26 Feb-10 Mar								
6. Inspection and Final Report on Immediate Repair Works					10-16 Mar							

Note: Items 4, 5 and 6 will depend on approval of Lead Removal Permit by the Environmental Quality Board.

SOUTH COAST POWER PLANT
MITIGATION WORKS – JANUARY 2020 SEISMIC EVENTS & REPLICAS

I. Phase 1: Boilers Structural Steel Repairs Safety for Entrance
ENERSYS Scope of Supply

a. Unit 1: ends of two steel I beam columns on ground floor – repair welds
b. Unit 2: three columns of induced draft fans platform – concrete and rebar repairs
c. Unit 3: one buckled gusset plate at ground floor (same location as of unit 4)
d. Unit 4: one buckled gusset plate at ground floor and one loose weld at I beam steel column on ground floor
e. Unit 5: both end of bracing at third level – scaffolds are needed.

Schedule & Planning

No.	Task	Planning Execution Date	Contractor	Status
1	Coating sampling for Pb	February 14, 2020	ENERSYS	Completed January 13, Pb positive
2	Scaffolds for Unit 5	February 15,2020	BRANDT	Contractor mobilized 2/14/20
3	Pb Permit - EQB	Filing 2/18/20 & EQB Approval 2/21/20	ENERSYS	Contractor mobilized 2/14/20
4	Pb Removal of elements in units above described	2/21/20 to 2/23/20	ENERSYS	Pending for EQB approval
5	Safety for Entrance Repairs	Two weeks, start date2/24/20; end date 3/9/20	ENERSYS	Contractor mobilized 2/14/20
6	Inspection and Final Report	3/16/20	ENERSYS	

2/18/20: ENERSYS taking Safety Briefing and in mobilization of equipments & materials

6 Preliminary Report on Condition Survey Condensate Tanks 5 and 6

HGE

VISUAL INSPECTION REPORT
Condensate tanks 5 and 6

PROJECT	:	Costa Sur, Tanks Assessment Guayanilla, Puerto Rico
SUBJECT	:	**Structural Visual Inspection Assessment**
Notes By	:	William Caraballo
Revised by	:	Alan Heinsen, MECE, PE
Report Date	:	Thursday, February 21, 2020.

Alan Arthur Heinsen Sotelo Ingeniero Licenciado Lic. 17,302 PE Puerto Rico

Digitally signed by Alan Arthur Heinsen Sotelo
DN: cn=Alan Arthur Heinsen Sotelo, c=US, o=Colegio de Ingenieros y Agrimensores de Puerto Rico, email=aahsens@bloosign.com
Date: 2020.02.21 11:00:03 -04'00'

Project Location:

Picture 1 – Costa Sur Power Plant Aerial View. Direction of seismic wave into Costa Sur

P.O. BOX 190953, SAN JUAN, P.R. 00919-0953 TEL. (787) 528-8911 FAX (787) 765-9764

Due to the recent earthquakes on January 7th, 2020 in the south side of the island (6.4 magnitude at 4:24 am, and 6.0 magnitude at 7:18 am) PREPA requested a visual inspection to verify the vulnerability of the existing tanks in Costa Sur Power Plant. During the site inspection done on February 13, 2020 to the Costa Sur facilities, twenty one tanks are being impacted. The findings of condensate tanks 5 and 6 are as follows.

Figure 1 – Costa Sur Power Plant Location.

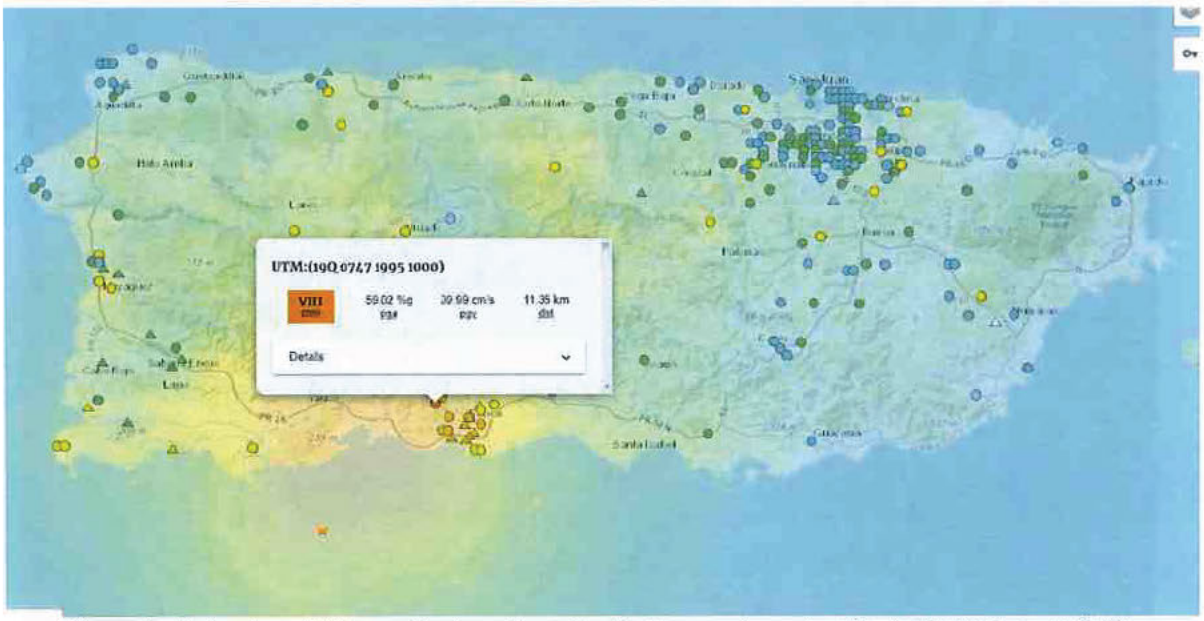
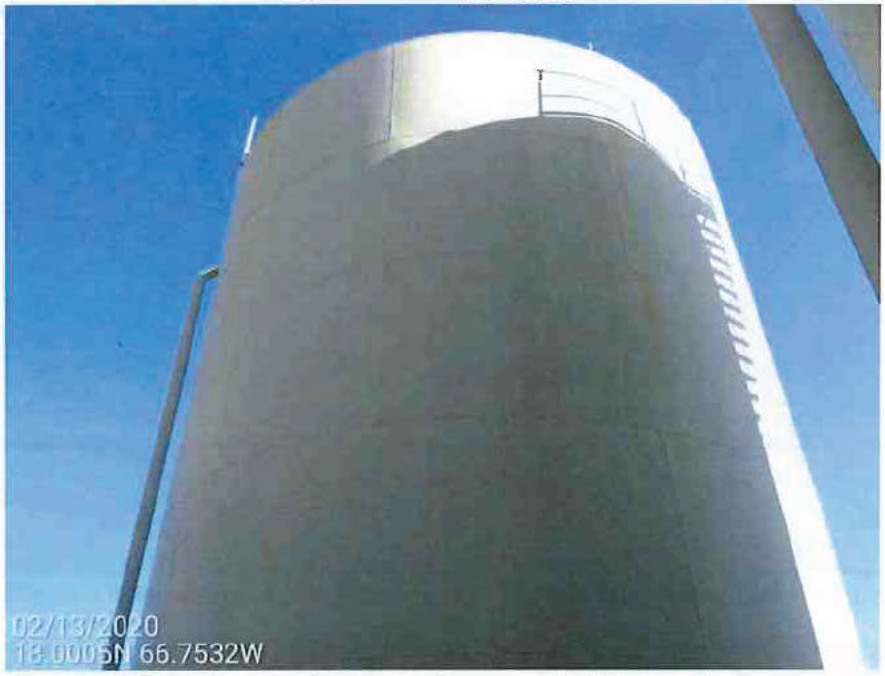


Figure 2 – Epicenter of 6.4 magnitude earthquake. Peak ground acceleration in Costa Sur was 0.59g.

This report shows structural damages received by the January 7th earthquake to the Condensate Tanks 5 & 6.

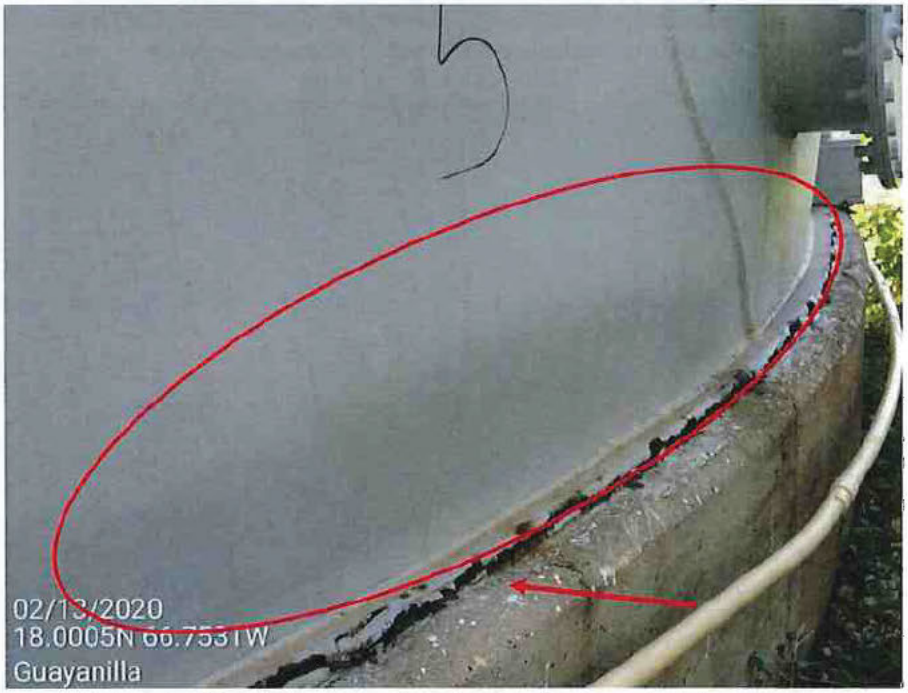
Condensate Tank 5



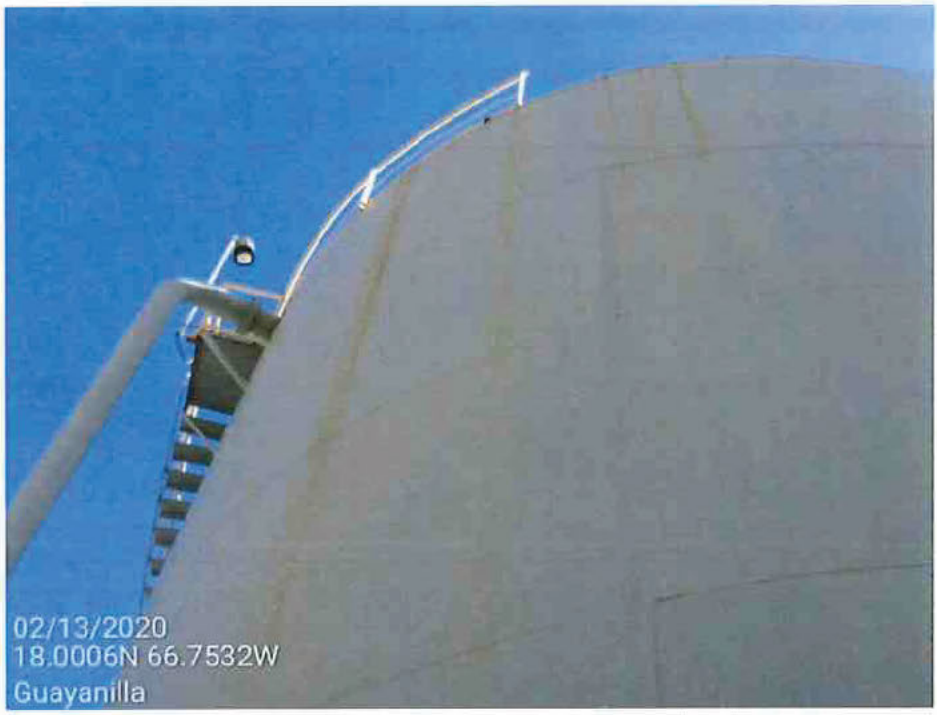
Picture 2 – Condensate Tank 5 shell paint deterioration.

Picture 3 – Foundation concrete base and shell support ring crushed, due to seismic overturning moment.

Picture 4 – Anchor bolt ripped off from concrete base, due to seismic overturning forces.



Picture 5 – Tank bottom buckled, due to seismic overturning moment.



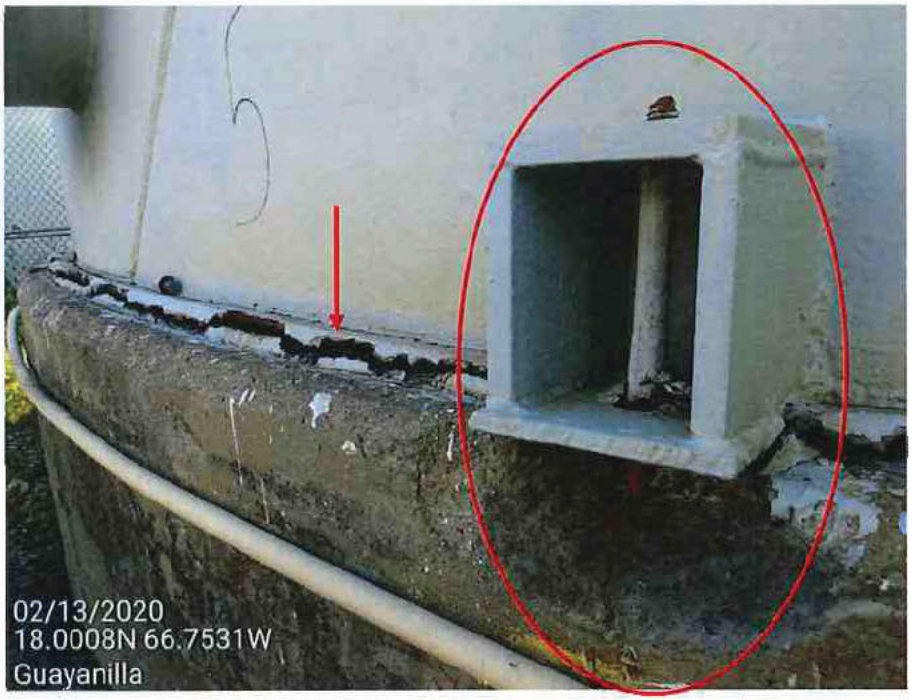
Picture 6 – Condensate Tank 5 shell paint deterioration.

Picture 7 – Tank bottom seal joint cracked.

Picture 8 – Anchor bolt with severe corrosion at bottom and loose anchor bolt nut from anchor chair assembly.

Picture 9 – Anchor bolt center is about 3.25" to 3.5" clear cover, from foundation exterior face.

Picture 10 – Tank bottom seal joint cracked and tank shell have elephant foot buckling areas at first ring, due to seismic overturning moment.



Picture 11 – Tank bottom seal joint cracked and lift from base. Anchor bolt nut and concrete around anchor bolt ripped off, due to seismic overturning moment.

Picture 12 – Tank bottom seal joint cracked.

Picture 13 – Anchor bolt nut failure due to seismic overturning moment.

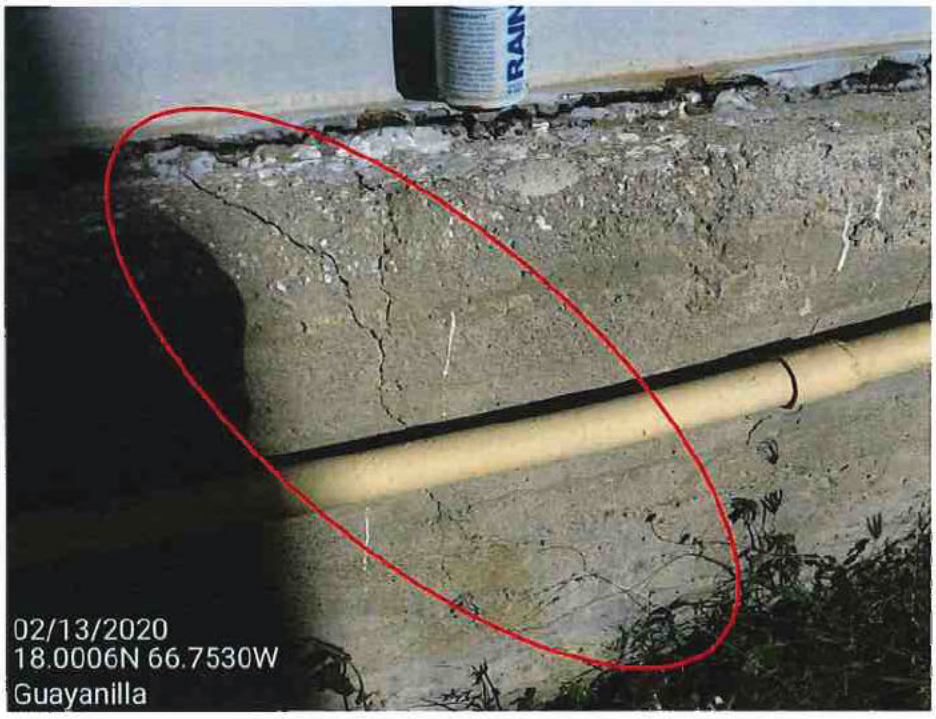
Picture 14 – Anchor bolt center is about 3" to 3.25" clear cover, from foundation exterior face.

Picture 15 – Tank bottom seal joint cracked and tank shell has elephant foot buckling areas at first ring, due to seismic overturning moment.

Picture 16 – Concrete foundation base crushed, due to seismic overturning moment.

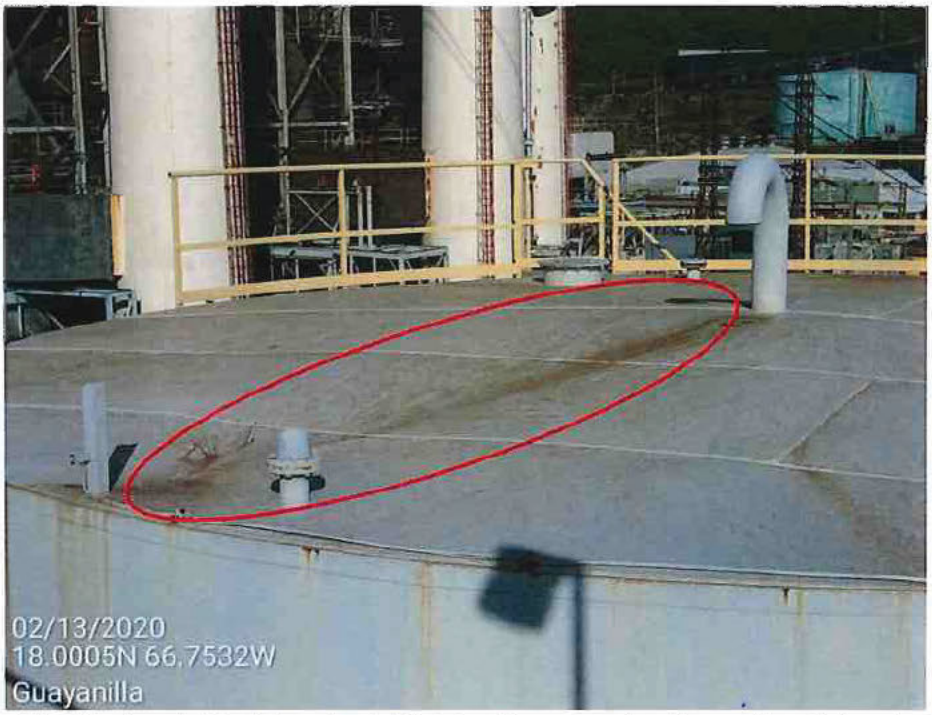
Picture 17 – Concrete foundation base cracked.

Picture 18 – Anchor bolt corrosion signs and loose anchor bolt nut from anchor chair assembly. Anchor appeared to have elongated due to tension forces.



Picture 19 – Concrete foundation base cracked.

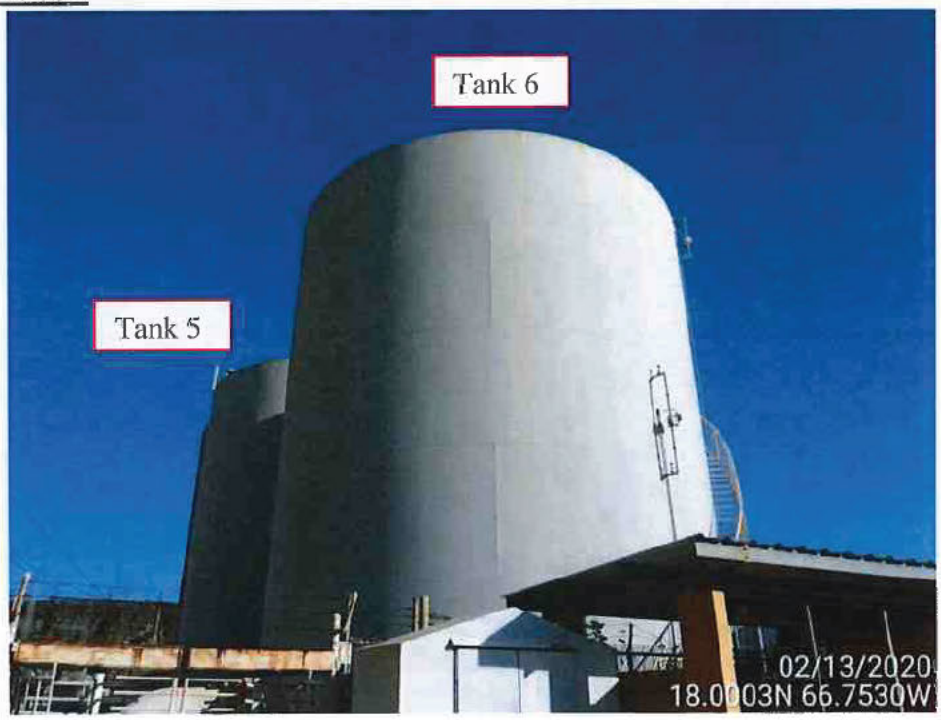
Picture 20 – Tank bottom seal joint cracked, anchor bolt nut ripped off due to seismic overturning moment. Anchor bolt has corrosion.



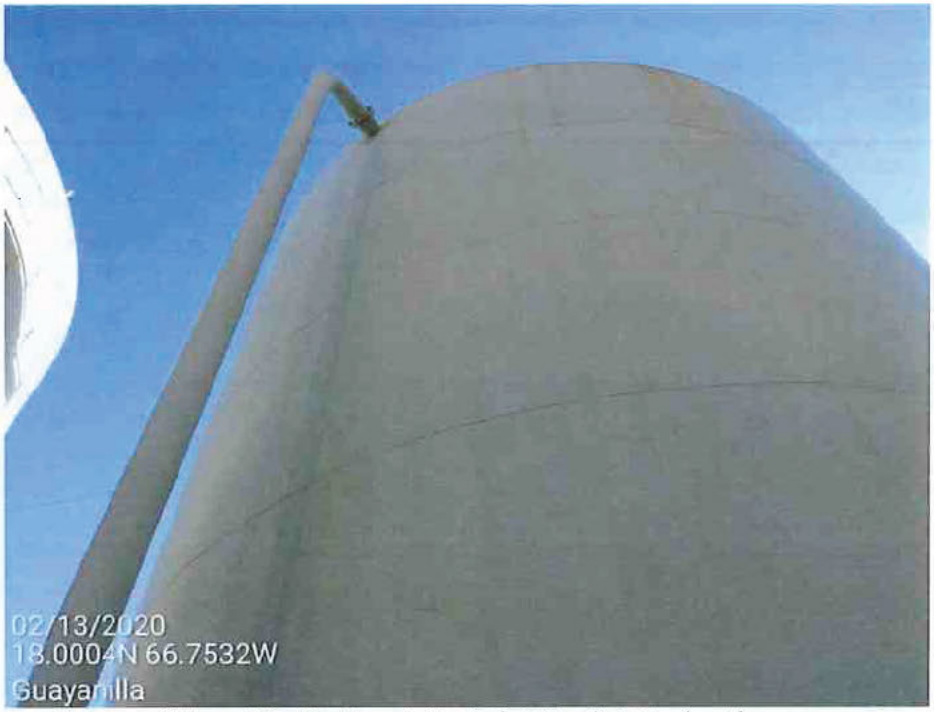
Picture 21 – Condensate Tank 5 roof paint deterioration, corrosion signs and partial roof collapse.

Picture 22 – Condensate Tank 5 roof paint deterioration and corrosion signs.

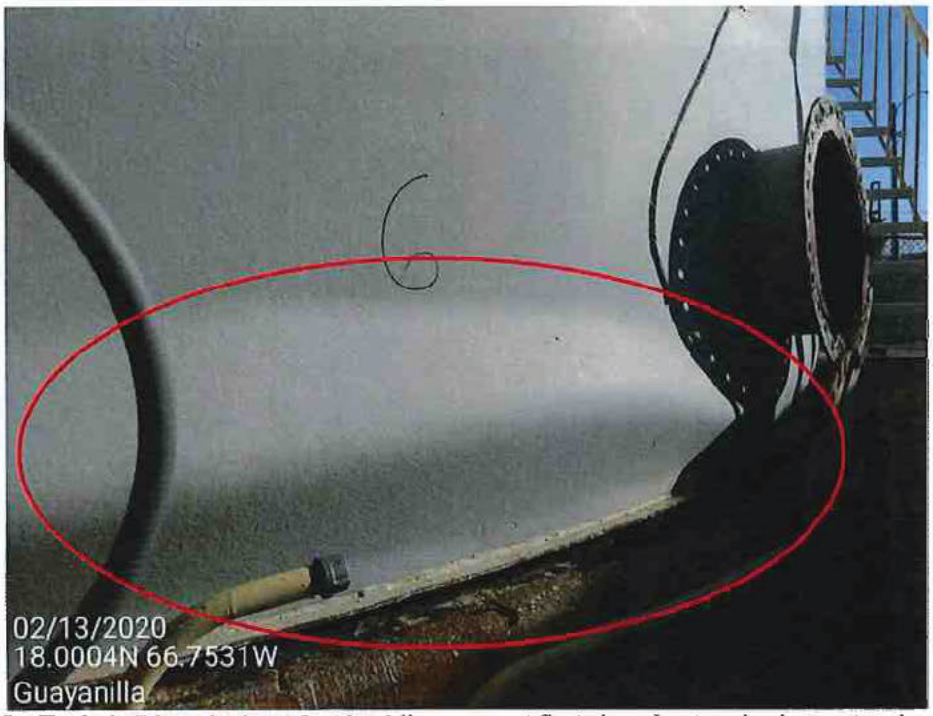
Condensate Tank 6



Picture 23 – Condensate Tank 6 shell paint deterioration.



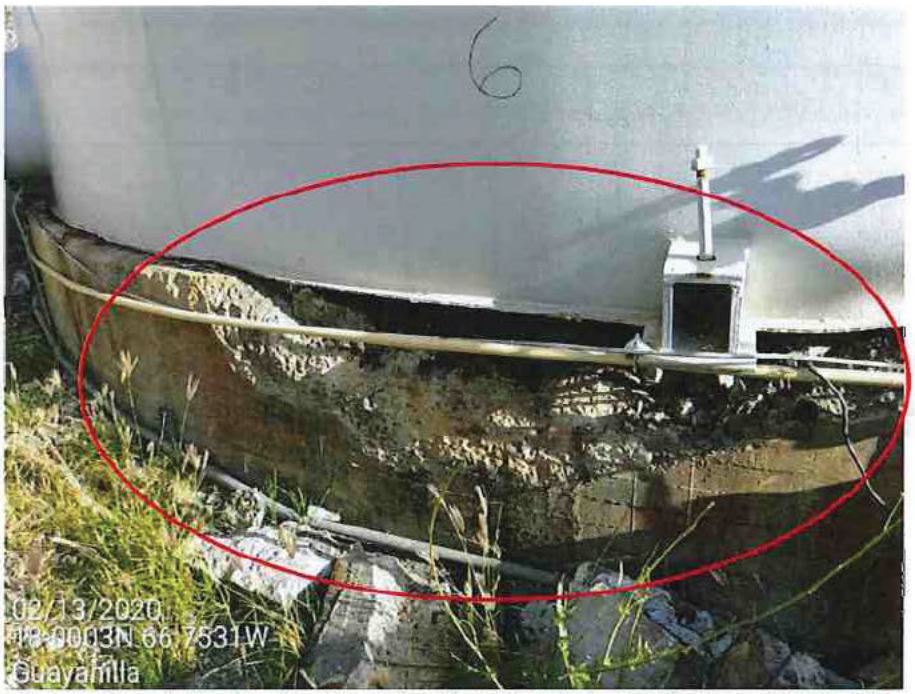
Picture 24 – Condensate Tank 6 shell paint deterioration.



Picture 25 – Tank shell has elephant foot buckling areas at first ring, due to seismic overturning moment.

Picture 26 – Tank shell has buckling at second ring, due to seismic overturning moment.

Picture 27 – Tank floor has corrosion sings and is broken at weld joint with shell.



Picture 28 – Foundation concrete base and shell support ring crushed and anchor bolt ripped off from concrete base, due to seismic overturning moment.

Picture 29 – Foundation concrete base and shell support ring crushed and anchor bolt ripped off from concrete base, due to seismic overturning moment.

Picture 30 – Foundation concrete base crushed and anchor bolt ripped off from concrete base, due to seismic overturning moment.

Picture 31 – Anchor assembly chair top plate measurements.

Picture 32 – Anchor assembly chair top plate measurements.

Picture 33 – Anchor assembly chair top plate measurements.

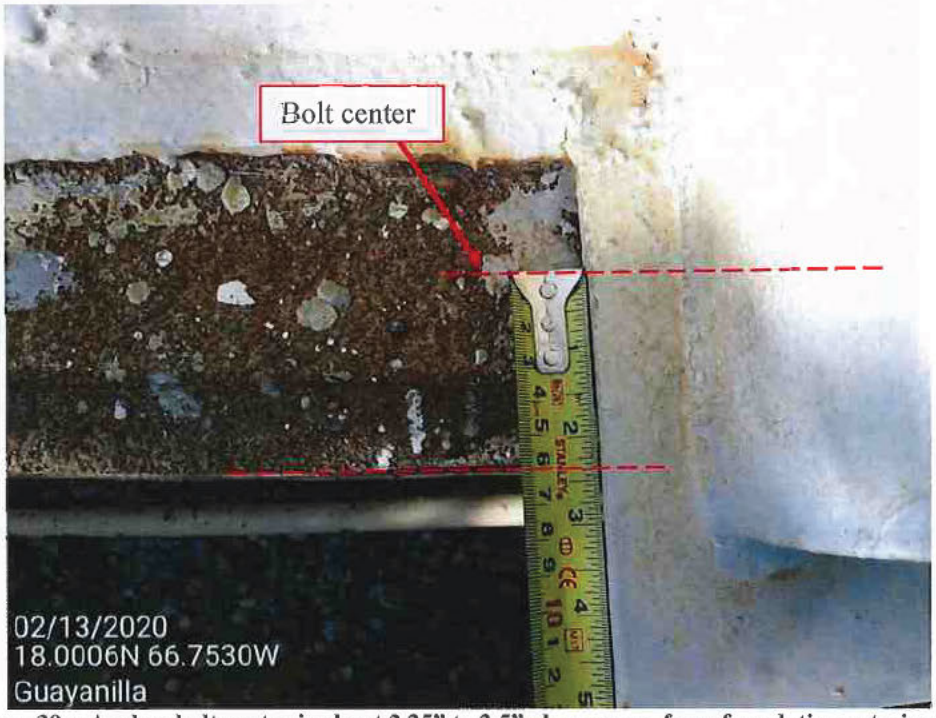
Picture 34 – Foundation concrete shell support ring crushed and tank shell has elephant foot buckling areas at first ring, due to seismic overturning moment.

Picture 35 – Anchor bolt ripped off from concrete base, due to seismic overturning moment.

Picture 36 – Foundation concrete base shell support ring crushed, due to seismic overturning moment.

Picture 37 – Anchor bolt ripped off from concrete base, due to seismic overturning moment.

Picture 38 – Anchor bolt completely bent by tank's anchor chair assembly. It is evident that the tank underwent high tension forces during the seismic event.



Picture 39 – Anchor bolt center is about 2.25" to 2.5" clear cover, from foundation exterior face.

Picture 40 – Foundation concrete ring crushed, due to seismic overturning moment.

Picture 41 – Foundation concrete ring crushed, due to seismic overturning moment.

Picture 42 – Anchor bolt ripped off from concrete base, due to seismic overturning moment.

Picture 43 – Concrete shell support ring measurements (6" deep).

Picture 44 – Concrete shell support ring measurements (6" wide).

Picture 45 – Anchor bolt ripped off and broken at concrete base, due to seismic overturning moment.

Picture 46 – Foundation concrete base is about 36" high.

Picture 47 – Anchor assembly chair bottom plate measurements.

Picture 48 – Condensate Tank 6 roof have paint deterioration, corrosion signs and partial roof collapse.

Picture 49 – Condensate Tank 6 roof have paint deterioration and corrosion signs.

Picture 50 – Condensate Tank 6 roof have paint deterioration and corrosion signs.

GLOBAL
ENGINEERING

Costa Sur Power Plant

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