

**Region 2 Enforcement & Compliance Assurance Division
Air Compliance Branch**

Inspection Report

Inspection Date(s): August 5, 2021

Facility Name: PREPA San Juan Steam Power Plant

Facility Address: Mercado Central Avenue, Zona Portuaria Road PR-28, Puerto Nuevo, San Juan

ICIS-Air/RMP ID #: 72 127 00028

Federal Facility: No

NCI: None

Facility size: Major

Planned Activity: FCE

State Referral: Yes

NAICS code: 221112 – Fossil Fuel Electric Power Generation

EPA Lead Inspector: Ralph Lonergan, Enforcement Officer, 212-637-3516

EPA Asst. Inspector: Bryan Lange, ERG Inspector, 919-622-2374

Facility Contact: José A. Santos Jiménez, 787-521-4961, JOSE.SANTOS@prepa.com
Alejandro Castillo, Plant Manager

Information Sources Consulted:

- ICIS-Air (Integrated Compliance Information System)
- ECHO (Enforcement and Compliance History Online)
- TRI (Toxic Release Inventory)
- CEDRI
- Dun & Bradstreet
- Envirofacts
- State Contact
- State Website/Database
- File Review
- Google/Bing/Aerial Photographs/Maps/Diagrams
- Facility Website
- Previous Inspection Reports
- Information Collection Request
- Other
- RMP*Info [Review of RMP] (112r- Only)
- RMP*Comp/MARPLOT [OCA Review] (112r- Only)
- Industry Standards [Sector Review] (112r- Only)

Facility Information

The San Juan Steam Power Plant (SJSPP) is located on the north coast of Puerto Rico in San Juan. SJSPP has the potential to produce a total electrical output of 876 MW. It is connected to the grid with 115 kV transmission lines.

The facility consists of four oil-fired steam electric generating units (i.e., four boilers with steam generators) and two No. 2 fuel oil fired combined cycle combustion turbines each with unfired Heat Recovery Steam Generators (HRSGs). The boiler units SJ7, SJ8, SJ9, SJ10 use No. 6 fuel oil (a.k.a., bunker C fuel) for their operations. In 2004, combined cycles units SJCC5 and SJCC6 were installed. SJCC5 and SJCC6 are dual fired (i.e., natural gas and No. 2 fuel oil).

SJSPP receives No. 6 and No. 2 fuel oil from barges unloaded at the docks in San Juan Bay. Fuel oil is stored in large on-site tanks. Adjacent to SJPP property is a Liquefied natural gas (LNG) terminal facility owned by New Fortress Energy. This facility receives LNG by barges and provides natural gas to the combined cycles units.

SJSPP has six cooling towers. The condensers have a once-through cooling using ocean water.

The facility directly impacts the non-attainment area for PM-10 in the municipality of Guaynabo.



Emission Source Operating Permit

The PREPA San Juan Steam Power Plant (hereafter referred to as San Juan) is authorized to operate a stationary source of air emissions limited to the units and conditions described in Title V Operating Permit PFE-TV-4911-65-1196-0016 issued on May 31, 2005 and expired on May 31, 2010. The renewal application was submitted prior to expiration of the Title V and San Juan operates under a permit shield.

EPA issued a Prevention of Significant Deterioration (PSD) Permit on April 1, 2004, for the construction of combined cycle combustion turbines (SJ5 and SJ6) and further instituted operating restrictions on emissions for units SJ7 through SJ10. The project increased the total electrical output from 400 MW to 876 MW and PREPA installed two 2.5 MW auxiliary diesel generators, two new fixed roof storage tanks and six new cooling towers.

In 2012, San Juan applied for a Plantwide Applicability Limit (PAL) to combust propane on SJ5 and SJ6 and repower the natural gas units. The PAL project has been abandoned.

Inspection Summary

A. Opening Meeting

On August 5, 2021, EPA inspector Ralph Lonergan (hereafter referred to as the Inspector) and Bryan Lange (ERG, EPA Contractor) conducted an on-site inspection at San Juan. The on-site inspection was announced to PREPA in late July such that EPA could consider PREPA's logistical concerns with the proposed inspection schedule. In total, seven PREPA locations were inspected in August and September 2021.

In 2020, the governor signed a contract with LUMA Energy giving that company control of the PREPA electric grid, power distribution, and power transmission. That takeover took place in June 2021. PREPA remains the owner and operator of the utilities.

Mr. José A. Santos, the Environmental Protection & Quality Assurance Division Manager and Alejandro Castillo, the Plant Manager began the inspection with a short presentation about the combustion equipment and normal operations. Mr. Santos was provided a list of documents to compile. Documents had been collected and were available in the conference room.

B. Inspection Notes

The following summarizes the topics discussed during the inspection:

1. Boilers – Normal Operations

The four San Juan oil-fired steam electric generating boiler units operate as follows:

- Units SJ7 and SJ8 are limited use.¹ This operational restriction is the result of the consent decree (CD). They operate certain times of the year or in the event of an emergency. Units SJ7 and SJ8 are frontal fired and each has 9 burners.
- Unit SJ9 has 100 MW capacity, but normally operates at 70 – 90 MW to have spinning reserve. It can ramp up at 3 MW per minute. SJ9 is a tangential fired boiler and has 20 burners.

¹ This term is defined in NESHAP Subpart UUUUU; it requires a tune-up every 3 years and restricts the annual capacity to 8 percent of its maximum or nameplate heat input.

- Unit SJ10 has a broken turbine, and it is currently out of service. Mr. Santos indicated that, given the non-attainment area status, PREPA has considered removing Unit SJ10 from the permit to get the reduction credit.

PREPA has not made any boiler modifications. In 1997, as part of the CD, the boilers were converted from positive to negative pressure units. This change was not major modification. Mr. Santos explained that maintenance is routine. During outages equipment is replaced like piping, pressure pumps or damaged burners. These actions are documented in CD reporting.

2. Turbines - Normal Operations

San Juan also operates two turbines, SJCC5 and SJCC6 that fire natural gas and No. 2 fuel oil. Each are permitted to use fuel oil for 20% of load. Both units are subject to 40 CFR 60 Subpart GG (Stationary Gas Turbines). SJCC5 is equipped with both an OxCat and Selective Catalytic Reduction (SCR); both SJCC5 and SJCC6 have steam injection.

Units SJCC5 and SJCC6 are dispatched normally at 150 MW and 47 MW for the steam turbine. Normally, from midnight to 6am the load is decreased for these units because system electricity demand also decreases.

According to the definitions included in 40 CFR 63 Subpart YYY (Stationary Gas Turbines), SJCC5 and SJCC6 are diffusion flame gas-fired stationary combustion turbines. The HRSG do not have auxiliary burners, they use the exhaust gases from the turbines. This simplifies their operation.

3. Particulate

Particulate matter (PM) Continuous Emission Monitors (CEMs), manufactured by Teledyne, are installed for all 6 combustion units (boilers and turbines). Performance tests were done in Q4 of 2020. The PM CEMs equipment is inspected quarterly. Concentrations are displayed in the CEMs room as backscatter percent, conversions (which consider factors like relative humidity, oxygen, and the AP42 F-factor) are used to calculate PM in units of lbs/MMBtu.

Consistent with the requirements of the CD, the boilers have been optimized. The optimization included installing low NOx burners and a program which evaluated fuel consumption and excess air requirements. These units burn a high-quality fuel (i.e., 1.5 to 0.5% by weight sulfur). PREPA constantly monitors visible emissions and keeps the air flow in an ideal range, but continuous compliance with CD PM limits can be challenging. The day of the inspection, at 12:49pm, the control room display for SJ9 stack showed a 1-day rolling average of 0.034 lb/MMBtu.

Mr. Santos explained that when the Mercury and Air Toxics Standards (MATS) were issued in 2015, its requirements were consistent with the CD and optimization had already occurred and no additional optimization was triggered. PREPA found that the PM performance of these boiler units was comparable to bunker C fired units located in Hawaii.

Mr. Santos also explained that the oil-fired boilers are stranded assets and are scheduled for retirement. Therefore, there are no additional improvements that are cost effective. Adding precipitators would be expensive and require the relocation of some buildings. Operationally if PREPA increased the air flow, the temperature on the superheater boiler elements will be lower which causes white plume opacity.

4. Parametric monitoring and pollution control

All boilers have continuous opacity monitoring systems (COMS), Nitrogen Oxides (NOx) and Oxygen (O₂) continuous emission monitors (CEMs).

SJCC5 and SJCC6 have COMS, CO, NO_x, and O₂ CEMs. The performance tests for the SCR and OxCat were done in June of 2021, but PREPA does not have the final reports yet because of a billing problem. Preliminary results show compliance with NO_x and CO reductions. Formaldehyde, volatile organic compounds, and PM_{2.5} and PM₁₀ were tested, and emission results were consistent with the factors the manufactures provided. There are vendor guarantees for formaldehyde, NO_x, and CO.

5. Spare parts inventory

The CD requires a minimum number of operational spare parts (i.e., CEMs parts are not included). Mr. Santos noted that each PREPA facility has a machine shop that can make replacement components and each PREPA location can share its part inventory. Equipment that routinely fails includes burner guns and burner tips. When a burner tip fails, it is not be replaced until the next scheduled outage. Spare parts for other equipment that fails regularly is stored on-site (e.g., fuel pump impellers, thermocouples). According to Mr. Santos, the CD spare parts program is expensive because some boiler components are expensive. For example, Mr. Santos stated that burner tips are \$1,000 each and because the units have 20 burners, they have at least 20 burner tips on-hand or \$20,000 in equipment. Other burner components (e.g., plugs) also cost approximately \$1,000. Mr. Santos said that a conservative estimate of the value our burner spare part inventory is \$100,000. Mr. Santos would need to talk to maintenance staff before he could provide more reasonable inventory counts.

Mr. Santos gave a tour of the spare parts warehouse and showed the inspectors the boiler burner spare parts.

6. Routine maintenance

SJSPP uses soot blowing (i.e., high-pressure super-heated steam used to remove accumulated particulate inside the boiler) to comply with requirements of the CD. Although the CD requires that soot is blown twice a day, SJSPP does it three times (once per shift) to reduce the PM emissions and the shorten the duration of each event. Soot blowers are located on either side of the boiler and at different levels. Each elevation is cleaned once per week. Collectively, SJSPP soot blows approximately 3-hours per day.

Mr. Santos indicated that soot blowing raises the opacity by approximately five percent. The inspectors observed COMS emissions during the most recent soot blowing and event and the highest observed opacity was 12 percent.

Environmental outages and tune-ups occur on an 18-month cycle. Mr. Santos indicated the water wash was a critical part of each environmental outage. The air heater and the boiler walls are pressure washed to remove particulate that accumulates with high humidity. This wash improves performance and heat transfer and can reduce opacity. Poor heat transfer increases the required fuel.

The inspectors reviewed a collection of preventive maintenance reports and maintenance work orders.

7. Emergency engines and Fuel Storage

PREPA provided paper evidence that each of their nine-emergency generator operates annually less than 500 hours. The inspectors verified that hour counters for two generators matched the paper records.

EPA visually looked for evidence of leaks from each storage tanks and secondary containment areas. No leaks were observed.

Closing Meeting


After the conclusion of the inspection, Mr. Lonergan expressed gratitude for all the assistance provided during the inspection and all the cooperation to provide the information needed to complete the inspection. Below is a comprehensive summary of documents that were reviewed during the inspection:

1. Visible emissions observation of SJCC5 on June 1, 2021 at "Metal Stack - Gray 5 Stack" exhaust from combined cycle diesel fuel. The highest measurement 5%. Observer Ricardo Arroyo.
2. Visible emissions observation of SJCC5 on July 23, 2021 at "Metal Stack - Gray 5 Stack" exhaust from combined cycle diesel fuel. Unable to read due to weather conditions. Observer Ricardo Arroyo.
3. Visible emissions certification cards for three staff including Ricardo Arroyo.
4. Fuel analysis for LNG from Shell Gas Supply Trinidad Limited; May 2021. Sulfur content is 0.7212 mg/Nm³.
5. Delivery record for one cargo tank of aqueous ammonia 18-19%. The ammonia is used by the SCR. Received July 20, 2021.
6. Typical work order. Record for two-days of soot blowing for Unit SJ9 (December 20 and 21, 2021). Three blowing events occurred each day.
7. Typical work order. Record for burner inspection (i.e., elevations 1 and 2 for Unit SJ9 (December 17, 2020). Specific steps include A. Replace burners on this level with replacement burners. B. Refer the removed burners to the mechanics section for comparison. C. Inspect flame characteristics of each burner.
8. Environmental activity report for Unit SJ9 covering January through May 2021. Specific activities include A. Boiler wash began on January 4, 2021 (e.g., all the slag from the furnace hopper was removed and disposed of and thrown in containers for this purpose). B. Air preheater component replacement (e.g., T-bar and curve angle were inspected. New T-bar was installed in the hot side of the rotor).
9. Typical preventive maintenance report for Unit SJ7 covering August 7, 2016 through October 17, 2016. Maintenance activities included a fuel gas handling inspection e.g., steam admission valve: "ok".
10. Typical daily system operations checklist for SJ9, SJCC5, and SJCC6 on August 4, 2021 (2:05pm). Space to record many parameters e.g., instrument air pressure.
11. Emergency generator operation records show total run time hours in 2019 and 2020 for the following nine generators: units 5 (GE-AUX-SJ5), unit 6 (GE-AUX-SJ6), 7 & 8 (GE-AUX-SJ1), 9 & 10 (GE-AUX-SJ2), the chamber room (GE-CCAM-SJ), the gas insulated switchgear (GE-GIS-SJ1), the north general mechanical workshop (GE-TMGN-SJ), warehouse 019 (GE-ALM-019-SJ), and motor pump fire protection (GE-B1-SJ1).
12. Control room display showing parametric and CEM monitor for SJ9 and SJ10. PM was elevated in the SJ9 stack e.g., 1-day rolling average of 0.034 lb/MMBtu.
13. CEM room display showing CT5 NO_x monitor inlet display was 26.0 ppm and stack concentrations were 4.4 ppm (with 14% oxygen). CO and opacity had negative readings -0.2 and -0.7.


The inspector concluded the inspection closing meeting on August 5, 2021 at around 2 PM.

Inspection Report Sign-off

Lead Inspector's Name: Ralph Lonergan

 Digitally signed by Lonergan, Ralph
Date: 2021.10.04 09:15:24 -04'00'

Assisting Inspector's Name: Bryan Lange

 Digitally signed by Bryan Lange
Date: 2021.10.01 15:10:34
-04'00'

Supervisor's Name: Harish Patel

