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7 CITY OF LOS ANGELES, acting by and through
8 THE LOS ANGELES DEPARTMENT OF WATER
AND POWER

9
10 **BEFORE THE HEARING BOARD OF THE**
11 **SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT**

12 In the Matter of

Case No. 1263-77

13 CITY OF LOS ANGELES, acting by and through
14 THE LOS ANGELES DEPARTMENT OF
WATER AND POWER,

DECLARATION OF ROBERT PAINTER
FOR CITY OF LOS ANGELES, acting by
and through THE LOS ANGELES
DEPARTMENT OF WATER AND
POWER TO THE HEARING BOARD

15 [Facility I.D. No. 800170]

16
17 Petitioner,

Date: March 23, 2023
Time: Consent Calendar

18 vs.

19 SOUTH COAST AIR QUALITY MANAGEMENT
20 DISTRICT,

21 Respondent.

22
23
24 Petitioner City of Los Angeles, acting by and through the Los Angeles Department of Water and
25 Power ("LADWP" or "Petitioner") hereby submits this Declaration of Robert Painter, Mechanical
26 Engineer, to the Hearing Board in support of the request for regular variance in this matter:

27 1. I currently serve as a Mechanical Engineer for Petitioner and have been employed by Petitioner for
28 approximately 15 years. As part of my duties, I am involved in ensuring our facility's compliance

1 with its Title V permit. I am familiar with the petition for a regular variance in this matter and with
2 the subject equipment.

- 3 2. LADWP is the largest municipal utility in the nation and supplies water and electric services to 3.8
4 million residents and businesses in the City of Los Angeles. As a vertically integrated power system,
5 LADWP both owns and operates the majority of its generation, transmission, and distribution
6 systems. A five-member Board of Water & Power Commissioners is appointed by the Mayor and
7 establishes policy. Together, LADWP and the City of Los Angeles have been at the forefront of
8 California utilities in adopting aggressive clean energy initiatives. To that end, LADWP has set goals
9 to meet renewable energy targets, while at the same time maintaining a reliable and cost-effective
10 power supply for customers. The future of LADWP's energy supply has zero coal, expanded
11 renewables, energy efficiency, clean energy projects, and dramatically reduced fossil fuel emissions.
- 12 3. LADWP's Harbor Generating Station (Harbor) is a natural gas-fired steam electric generating
13 facility located in the City of Wilmington. Harbor currently operates two combined-cycle units (Unit
14 1 and Unit 2), and 5 simple cycle units (Units 10-14). Harbor has a generating capacity of 426
15 megawatts, enough to power approximately 320,000 homes.
- 16 4. Unit 14, which is the subject of this Petition, is a 49 MW natural gas-fired simple cycle combustion
17 turbine equipped with a Selective Catalytic Reduction (SCR) system and a carbon monoxide (CO)
18 oxidation catalyst to control NOx and CO, respectively. Unit 14 was commissioned in 2001, and its
19 emissions are monitored by a Continuous Emissions Monitoring System (CEMS). Unit 14 is listed
20 under Section D of Harbor's Title V Permit to Operate and is a GE Power Systems Model LM6000
21 Enhanced Sprint, Simple Cycle natural gas turbine.
- 22 5. Harbor's five Model LM6000 units were purchased in ~1999 because of their efficiency, flexibility,
23 and faster startup times that meet fluctuating grid conditions and allow LADWP to integrate more
24 renewable energy in its generation mix. Because of its ability to quickly generate power, Unit 14 is
25 usually run as the sun sets to offset the daily tapering off of renewable energy at that time. With Unit
26 14 currently out of service, its continuing inoperability affects the stability of the entire LADWP
27 power system.
- 28 6. Harbor is one of three major coastal power plants (along with Haynes Generating Station and
Scattergood Generating Station) that work together to support 2,839 MW of installed capacity, thus

1 providing approximately 85% of the total generating capacity within the City of Los Angeles and
2 39% of the total generating plant capacity owned by LADWP.

- 3 7. For all of these reasons, Unit 14 is a vital component in LADWP's portfolio of in-basin generating
4 facilities because it provides a more flexible and economical way to integrate a diversified energy
5 portfolio while ensuring voltage support and grid reliability.
- 6 8. Unit 14 has scheduled annual maintenance outages. During these scheduled outages, routine repairs
7 and maintenance are performed on Unit 14 equipment, requiring the unit to be offline in order for the
8 work to be done. The last maintenance outage was March 22, 2021 to April 30, 2021. The following
9 activities are typically performed during the scheduled maintenance outages:
- 10 a. Perform offline engine wash.
 - 11 b. Perform borescope inspection of Unit, including the Booster, Supercore, Power Turbine,
12 accessory gear box, inlet plenum.
 - 13 c. Replace oil filters.
 - 14 d. Inspect pumps, fans, motors, coolers, heaters, piping, and valves of auxiliary systems,
15 include lube oil, hydraulic oil, jacking oil, water injection.
 - 16 e. Inspect and replace failed instrumentation components, including probes, sensors,
17 indicators, wiring, etc.
 - 18 f. Inspect and replace failed electrical components, including wiring, fuses, switches, etc.
 - 19 g. Inspect, clean, and repair ammonia air dilution heater and vaporization heaters.
 - 20 h. Inspect SCR and CO catalysts, and make necessary minor repairs.
 - 21 i. Inspect Sprint and NOx water injection systems, and replace gasket and hardware if
22 necessary.
 - 23 j. Inspect air inlet filters, and replace pre-filters.
 - 24 k. Perform generator inspection, including generator cooler, heater, fan, turning gear, oil
25 system, etc. and make necessary repairs.
- 26 9. It is beyond the LADWP's reasonable control to perform the CO Relative Accuracy Test Audit
27 (RATA) by March 31, 2023 due to unexpected failure of Unit 14's supercore and ensuing damage to
28 other parts. (See Exhibit # 1, photo of damaged supercore in Unit 14.) Unit 14 has not been available
to run since it stalled on March 21, 2022, and LADWP has now confirmed with GE Power Systems

1 that comprehensive repairs are required and will not be completed in time to meet the March 31,
2 2023 testing deadline.

3 10. Unit 14's supercore is the main "core" engine of the LM6000 gas turbine and is the most
4 fundamental and necessary part of power generation. The supercore consists of a High Pressure
5 Compressor, the combustor, and the High Pressure Turbine. The supercore's function is to compress
6 inlet air, mix it with fuel gas, combust the air-gas mixture, and finally exhaust the resulting hot gas
7 after combustion. This exhaust hot gas then drives the High Pressure Turbine (HPT) and Low
8 Pressure/Power Turbine (LPT), which in turn forces the Low Pressure Compressor (LPC) in front of
9 the supercore, and High Pressure Compressor (HPC), and drives the generator to make electricity.

10 11. After the March 18, 2022 trouble event and March 21, 2022 stall event, LADWP conducted a
11 borescope inspection of Unit 14 with GE Power Systems representatives. (See Exhibit # 2,
12 Borescope Inspection Report.) After careful research and review, LADWP has determined that Unit
13 14 had a catastrophic event when a stage 4 blade in the high-pressure compressor broke off and
14 caused extensive damage as it disintegrated and traveled downstream into the engine.

15 12. LADWP's determination regarding the catastrophic failure of Unit 14's supercore is supported by
16 the Borescope Inspection Report and visual inspections of the machinery, which have demonstrated
17 that damage can be seen in the HPC starting from stages 3 and downstream, along with impact
18 damage to the High Pressure Turbine and the Power Turbine.

19 13. General Electric's LM6000 gas turbine was designed with a modular supercore or main engine. This
20 means that the supercore part was designed to be removable and replaceable, because the supercore
21 is where inlet air is at its highest pressure point (~575-580psi) and where combustion occurs,
22 therefore it is where the most stress and damage can happen. This modular design was intended to
23 allow for an extracted supercore to be sent off for maintenance, while a spare supercore could be
24 installed and the unit restored back to service. Unfortunately, the damage extended beyond the
25 supercore as the Power Turbine was also damaged. Due to this damage, a supercore swap was not
26 possible and the entire engine needed to be sent to a GE Service Center in Houston for disassembly
27 and repair.

28 14. GE has recently indicated that the full engine will not be completed and delivered back to LADWP
until September 2023. Due to the specialized nature of the repairs needed, LADWP is unable to

- perform the repairs or commission any other company to perform the repairs. LADWP is required to send the parts to a GE Power Systems facility and has to abide by their repair schedule.
15. After the catastrophic event on March 21, 2022, LADWP immediately contacted GE Power Systems. With continuous communications over the next weeks, GE Power Systems notified Harbor management that a replacement engine was not available for 18 months, and the earliest Unit 14 could be repaired was one year, but could not be fully estimated until a complete teardown and inspection occurred to see the extent of damage. Initial estimates from GE was the engine being returned to LADWP for installation in Spring/Summer 2023. Re-estimates now indicate the engine being returned in September 2023.
16. Even after delivery, LADWP will require a minimum of four weeks for installation, alignment and balancing. For these reasons, LADWP determined that Unit 14 could not be reassembled and restarted in time to meet the March 31, 2023 deadline to conduct the CO RATA, as required by the Title V Permit Conditions and Rules listed in Item No. # 9 of the variance petition.
17. After Unit 14 stalled, LADWP immediately halted operations and contacted GE Power System to conduct the borescope inspection. Once GE Power Systems and LADWP determined the nature and extent of the damage, LADWP immediately engaged GE to engage in discussions to repair and/or replace the engine. GE Power Systems formally responded that the repaired engine could not be delivered to Harbor until the earliest date of September, 2023. As a result of the communications from GE Power Systems, Harbor employees contacted the Environmental Affairs Air Quality Group to request support in securing a variance.
18. With a tentative delivery date of September, 2023, LADWP has planned and scheduled for the repairs and installation to begin immediately upon delivery of the repaired supercore. To that end, LADWP has already taken inventory of necessary tools and parts, and also created a working timeline for the repairs. In addition, Harbor employees have received confirmation that a source test contractor can perform the CO RATA following the completion of the repairs by March 31, 2024.
19. Below are the remaining tasks (including but not limited to the installation, repairs, engine restart, and CO RATA testing for Unit 14) that can only commence following the delivery of the repaired supercore and could potentially take more than six weeks to complete:

- a. Install repaired engine. 1 week

- b. Alignment of the engine to the generator. 1 week
- c. Reconnect mechanical, electrical, instrumentation in the Unit 14. ~1 week
- d. Reassembly of the Unit 14 package, including package roof, inlet air ducts, various piping, etc. ~1 week
- e. Harbor Unit 14 Restart
- f. CO RATA Test

20. The permanent inability to operate Unit 14 would result in almost incalculable costs to the residents of the City of Los Angeles. The cost of the unit itself and the ensuing stress on LADWP's ability to generate power would result in hardships to all of LADWP's customers because they would shoulder the burden of paying for all of these costs.

21. Also, LADWP could be subjected to fines and penalties if this variance is not granted. Although Unit 14 is now schedule to be offline for repairs, LADWP is required to operate and maintain the CEMS, pursuant to the AQMD Rules and Title V permit conditions listed in Item # 9 of this petition. Thus, LADWP could be subject to a Notice of Violation for the entire duration that the CO RATA is not successfully performed.

22. LADWP has already terminated Unit 14's operations since March 21, 2022, and it is not possible to curtail operations because the unit is out of service.

23. Even with operations temporarily terminated, LADWP will still require a variance. Since the purpose of this petition is to provide relief from the CO RATA testing due date of March 31, 2024, Unit 14 must have the ability to run again before the CO RATA testing can be conducted.

24. There will be no excess emissions because Unit 14 is not operational and is out of service. During the variance period, LADWP will continue to monitor and record emissions through CEMS, which will be operational during the repair of Unit 14. Compliance will be achieved through relief from the administrative requirement to complete the CO RATA source test by March 31, 2024. If the variance is granted, the CO RATA will be scheduled as soon as is practical following the successful return of Unit 14 to normal operation.

25. Per Condition No. 1, Petitioner shall throughout the variance period until repairs have been completed and Unit 14 has been started, maintain and operate the fuel meter for the disconnected or

opened fuel feed lines to the unit; and keep on site associated fuel records showing no fuel flow to the unit.

26. Per Condition No. 2, Petitioner shall notify Inspector Paolo Longoni (plongoni@aqmd.gov) within 24 hours, or no later than the following business day, of receipt of the repaired supercore; completion of repairs to Unit 14; and startup of Unit 14.

27. Per Condition No. 3, Petitioner shall perform the ammonia source test on or before December 31, 2023 if startup of Unit 14 occurs by November 14, 2023. If startup of Unit 14 occurs after November 14, 2023, Petitioner shall perform the ammonia source test by March 31, 2024 in order to satisfy the 2023 source test requirement only.

28. Per Condition No. 4, Petitioner shall notify Inspector Paolo Longoni (plongoni@aqmd.gov) at least 10 days in advance of the scheduled CO RATA and ammonia source test for Unit 14.

29. Per Condition No. 5, Petitioner shall notify the Clerk of the Hearing Board (clerkofboard@aqmd.gov) in writing and Paolo Longoni by email and by calling 1-800-CUT-SMOG (Attention: Air Quality Inspector Paolo Longoni) to report a Variance Notification within 24 hours, or no later than the following business day, of achieving final compliance after successfully completing the CO RATA and ammonia source test.

30. If the variance in this matter is granted, Petitioner will comply with the conditions set forth in the Order as required by the Hearing Board.

31. Petitioner requests a regular variance, beginning today and continuing to March 31, 2024, to operate Unit 14 at Harbor Generating Station.

32. Operation under the order is not expected to result in a violation of Health and Safety Code Section 41700.

FOR THE LOS ANGELES DEPARTMENT OF WATER AND POWER:

Dated: March 23, 2023

By: _____

Robert Painter
Mechanical Engineer