

STATEMENT OF BASIS for SHERMAN AVENUE ENERGY CENTER

TITLE V OPERATING PERMIT RENEWAL AND PERMIT MODIFICATION

Program Interest (PI): 75476 / Permit Activity Number: BOP180002

I. FACILITY INFORMATION

Sherman Avenue Energy Center is located at 2600 South Orchard Rd. in Vineland, Cumberland County, NJ, 08360 and consists of an electricity generating facility with the capacity to generate up to 96 MW (typically for peak demand). The facility is owned by Calpine New Jersey Generation, LLC and is operated by Calpine Operating Services Company, Inc.

The facility is classified as a major facility based on its potential to emit 122 tons per year of Nitrogen Oxides (NOx) and 149 tons per year (tpy) of Carbon Monoxide (CO).

This permit allows individual hazardous air pollutants to be emitted at a rate to not exceed: 198 lb/yr of Acetaldehyde, 106 lb/yr of Acrolein, 17 lb/yr of Arsenic, 139 lb/yr of Benzene, 0.48 lb/yr of Beryllium, 47.4 lb/yr of Butadiene (1, 3-), 7.44 lb/yr of Cadmium, 82.6 lb/yr of Ethylbenzene, 0.724 lb/yr of Ethylene dibromide, 2,520 lb/yr of Formaldehyde, 21.6 lb/yr of Lead, 1,223 lb/yr of Manganese, 57.4 lb/yr of Naphthalene, 7.12 lb/yr of Nickel, 62 lb/yr of PAH, 74.8 lb/yr of Propylene Oxide and 0.86 lb/yr of 1,1,2,2 – Tetrachloroethane.

II. AREA ATTAINMENT CLASSIFICATION

The Federal Clean Air Act (CAA) sets National Ambient Air Quality Standards (NAAQS) for six common air pollutants. These commonly found air pollutants (also known as "criteria pollutants") are particulate matter, ground-level ozone, carbon monoxide (CO), sulfur dioxide (SO₂), nitrogen dioxide (NO₂), and lead. The US Environmental Protection Agency (USEPA) also classifies areas as "attainment" or "nonattainment" for each criteria pollutant, based on the magnitude of an area's problem. Nonattainment classifications are used to specify what air pollution reduction measures an area must adopt, and when the area must reach attainment. Currently, the entire State of New Jersey is designated as nonattainment for the 8-hour ozone NAAQS. New Jersey is designated attainment for all other pollutants. For nonattainment classification refer to <https://www.epa.gov/green-book/green-book-national-area-and-county-level-multi-pollutant-information>.

III. BACKGROUND AND HISTORY

The equipment that emits air contaminants from this facility include:

- One General Electric 7EA simple cycle combustion turbine (emission unit U1) which utilizes water injection to control NOx emissions. This turbine has a heat input of 1032 MMBtu/hr and a maximum generating capacity of 96 MW and is permitted to combust natural gas for no more than 2,500 hours per year, or Ultra Low Sulfur Distillate (ULSD) oil for no more than 1,500 hours per year; If both fuels are combusted, the operation on each fuel is decreased to accommodate combustion of the other fuel.
- One four-stroke, natural gas fired natural gas compressor engine (emission unit U2) which utilizes Non-Selective Catalytic Reduction (NSCR) to control NOx emissions. This internal combustion engine has a heat input of 13.6 MMBtu/hr and is permitted to combust natural gas for no more than 2,500 hours per year.

Table 1 - Operating Permit Revision History (located at the end of this document) provides a summary of all the changes that have been incorporated into the operating permit through seven-day notice changes, administrative amendments, minor modifications, or significant modifications since the approval of the initial operating permit or the most recent renewal thereof. Please refer to the attached explanation sheet for the structure and configuration of conditions of approval, included in the Facility Specific Requirements section of this permit.

A Facility-Wide Risk Assessment was conducted, on October 3, 2019, as part of the review of this permit application and health risk was determined to be negligible consistent with NJDEP Technical Manual 1003.

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This is a Permit Modification with Renewal and includes the following changes:

- 1) Reduce equivalent diameter of turbine emission stack (PT1) from 161 inches to 138 inches
- 2) Remove NSPS Subpart Kb (IS7) as it does not apply
- 3) Remove alternative compliance (calculation) for annual NO_x emission limit (U1, OS Summary)
- 4) Remove natural gas HEDD emission limits from ULSD operating scenarios (U1: OS1 and OS3); Turbine cannot comply with these limits while combusting ULSD so permit does not allow combustion of ULSD on high electric demand days unless natural gas is curtailed
- 5) Remove ULSD sulfur content limits (0.3% & 0.05%) that no longer apply; The current limit (0.0015%) remains in the permit (U1: OS1 and OS3)
- 6) Reduce SO₂ emission limits for the turbine combusting ULSD to reflect the decrease in sulfur content of the fuel oil that is combusted [annual: 3.44 tpy replaces 159 tpy (OS Summary); hourly: 4.59 lb/hr replaces 212 lb/hr (OS1) and 5.4 lb/hr replaces 249.5 lb/hr (OS3)]
- 7) Add 10% opacity limit for ULSD combustion in turbine (U1: OS1 and OS3) which will apply once the aggregate sulfur content of the fuel stored in the fuel storage tanks drops to 15ppm
- 8) Change stack test compliance period for TSP emission limit in U1, OS1 from "each of three tests" to "the average of three tests"
- 9) Create new operating scenario for start-up (SU) and shut down (SD) associated with each of the current steady state operating scenarios; Ozone season combustion of ULSD (OS2), Non-ozone season combustion of ULSD (OS4), Ozone season combustion of NG (OS6) and Non-ozone season combustion of NG (OS8); Rename steady state operating scenarios: OS2 is now OS3, OS3 is now OS5 and OS4 is now OS7
- 10) Modify definition of start-up by adding the language in brackets: Start-up commences with initiation of the combustion of fuel in the combustion turbine and concludes when the turbine reaches steady state operation at 80-100% of design capacity [, or when combustion is ceased prior to obtaining steady state operation (for instance, if start-up is abandoned due to equipment malfunction)]
- 11) Include SU/SD specific emission limits in SU/SD operating scenarios. NO_x = N.J.A.C.7:27-19 RACT limit, CO and VOC = N.J.A.C.7:27-16 RACT limits, SO₂, TSP, PM-10 and PM-2.5 = steady state emission limits
- 12) Exempt turbine from all stack testing if operated as a "peaking turbine" and is complying with the annual periodic emission monitoring requirement
- 13) Require protocol submittal within 30 days and stack test performance within 1 year of triggering the need for a stack test, in the following situations:
 - If turbine exceeds "peaking unit" capacity during the last 30 months of the permit term
 - If turbine combusts fuel oil for more than 500 hrs/yr and is operated as a non-peaking unit
 - If first compressor engine operation, in this permit term, occurs within the last 30 months of the permit term
- 14) Clarify that Formaldehyde emissions are included in the VOC emission limits (U1 & U2)
- 15) Add annual and hourly PM-2.5 emission limits (U1 & U2) that are equal to PM-10 permit limits; Allow PM-10 stack testing to demonstrate compliance with PM-2.5 limits
- 16) Revise list of permitted HAPs (U1 & U2) to include all HAPs that have a potential to emit that is above the 2018 reporting thresholds at N.J.A.C. 7:27-17 (previous lists were based on pre-2018 reporting thresholds)
- 17) Reduce periodic emission monitoring frequency for compressor engine, from quarterly to annually. The current permit allows the permittee to request this reduction after 8 consecutive quarterly tests have demonstrated compliance with the permitted emission limits. This requirement has been met.
- 18) Define "worst-case" permitted operating conditions, for compressor engine (U2) as "when the turbine is operating at worst-case permitted operating conditions, pursuant to U1 of this permit. However, the heat input to the compressor engine shall not exceed the permitted maximum heat input (U2, OS1)"
- 19) Include CH₄ and N₂O emission limits in permit; Update calculation of GHG emissions to include current emission factors (increase GHG emissions)

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This renewal will also change the allowable emission limits as listed in the following table:

Allowable Emission Limits	Facility's Potential Emissions (tons per year)*									
	VOC (total)	NO _x	CO	SO ₂	TSP (total)	PM ₁₀ (total)	PM _{2.5} (total)	Pb	HAPs (total)	CO ₂ e (total)
Current Permit	19.8	122	149	159	10.6	15.4	15.4	0.0108	2.04	144,794
Proposed Permit	19.8	122	149	3.44	10.6	15.4	15.4	0.0108	2.29	155,046
Change (+ / -)	0	0	0	-157	0	0	0	0	+0.25	+10,252 **

VOC Volatile Organic Compounds

NO_x Nitrogen Oxides

CO Carbon Monoxide

SO₂ Sulfur Dioxide

TSP Total Suspended Particulates

PM₁₀

Particulates under 10 microns

PM_{2.5}

Particulates under 2.5 microns

Pb

Lead

HAPs

Hazardous Air Pollutants

CO₂e

Carbon Dioxide equivalent

* Other Any other air contaminant regulated under the Federal Clean Air Act. This modification includes emissions limits for Nitrous Oxide (N₂O) and methane (CH₄) which were not previously included in the operating permit. Potential emission of these pollutants is not changing.

** This increase is due to corrections to calculations. There is no actual change to the CO₂e emissions.

IV. CASE-BY-CASE DETERMINATIONS

No case-by-case determinations were required for this permit action.

V. EMISSION OFFSET REQUIREMENTS

This permit action is not subject to Emission Offset requirements.

VI. BASIS FOR MONITORING AND RECORDKEEPING REQUIREMENTS

The facility's operating permit includes monitoring, recordkeeping and reporting requirements that are sufficient to demonstrate the facility's continued compliance with the applicable requirements consistent with the following:

- Provisions to implement the testing and monitoring requirements of N.J.A.C. 7:27-22.18, the recordkeeping and reporting requirements of N.J.A.C. 7:27-22.19, and all emissions monitoring and analysis procedures or compliance assurance methods required under the applicable requirements, including any procedures and methods promulgated pursuant to 40 CFR 64; and
- Where the applicable requirement does not require direct periodic monitoring of emissions, the Department requires periodic monitoring of surrogate parameters sufficient to yield reliable data from the relevant time period that are representative of the facility's compliance with the permit.

For the combustion turbine (U1):

- The facility monitors the fuel consumption and hours of operation continuously as a surrogate for the long-term (TPY) emissions for VOC, SO₂, TSP, PM-10, PM-2.5 and HAPs.
- The facility monitors the water injection rate (for the water injection system) as a surrogate for the short-term (lb/hr) NO_x emissions.
- The facility performs a combustion process adjustment as a surrogate for the short-term (lb/hr) NO_x and CO emissions.
- The facility monitors the hourly heat input as a surrogate for the short-term (lb/hr) emissions for VOC, SO₂, TSP, PM-10, PM-2.5 and HAPs.

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For the gas compression engine (U2):

- The facility monitors the fuel consumption and hours of operation continuously as a surrogate for the long-term (TPY) emissions for NO_x, CO, VOC, TSP, PM-10, PM-2.5 and HAPs.
- The facility performs a combustion process adjustment as a surrogate for the short-term (lb/hr) NO_x and CO emissions.
- The facility performs periodic emission monitoring for NO_x and CO as a surrogate for the short-term (lb/hr) NO_x and CO emissions.
- NO_x emissions from the engine are controlled by Non-Selective Catalytic Reduction (NSCR). The temperature at the catalyst bed is a surrogate for proper operation of the NSCR system.

3. In some cases, direct periodic monitoring of emissions and/or surrogate parameters is not required due to one or more of the following:

- Equipment size and capacity limitations,
- Subject equipment being permitted at the maximum rated capacity,
- There is no specific state or Federal standard that applies to this piece of equipment,
- Not a pollutant of concern for this piece of equipment,
- Agreements with EPA on the frequency of testing and monitoring for combustion sources.

For the combustion turbine (U1):

- The opacity limitations, during natural gas firing, are not monitored because the fuel combusted is natural gas.

For the gas compression engine (U2):

- The opacity limitations in the permit are not monitored because the engine combusts only natural gas.

VII. APPLICABLE STATE AND FEDERAL RULES

The facility is subject to New Jersey Air Pollution Control Regulations, codified in N.J.A.C. 7:27-1 through 34, as applicable. A complete text of these regulations is available at:

<http://www.nj.gov/dep/aqm/rules27.html>

This modification is also subject to Federal regulations listed below.

40 CFR 60 (NSPS) Subpart A:	Standards of Performance for New Stationary Sources - General Provisions (U1)
40CFR60 (NSPS) Subpart GG:	Standards of Performance for Stationary Gas Turbines (U1)
40CFR72:	Phase II Acid Rain (U1)
40CFR97:	Cross-State Air Pollution Rule (CSAPR) (U1)
40CFR63 (NESHAPS) Subpart ZZZZ:	National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines. (U2)

The Greenhouse Gas (GHG) emissions from this facility are 155,046 TPY CO₂e and there is no GHG emission increase. This renewal and modification is not subject to PSD rules at 40 CFR 52.21.

VIII. FACILITY'S COMPLIANCE STATUS

The Responsible Official at the facility has certified that the facility currently meets all applicable requirements of the Federal Clean Air Act and the New Jersey Air Pollution Control Act. Based on this certification, the Department's evaluation of the information included in the facility's application, and a review of the facility's compliance status, the Department has concluded that this air pollution control operating permit should be approved.

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The facility has submitted a timely and complete application to renew their operating permit and an application shield is in effect.

This operating permit includes a permit shield, pursuant to the provisions of N.J.A.C. 7:27-22.17. A permit shield provides that compliance with the relevant conditions of the operating permit shall be deemed compliance with the specific applicable requirements that are in effect on the date of issuance of the draft operating permit, and which form the basis for the conditions in the operating permit.

Also, prior to the expiration of the five-year period, the facility will be required to apply for a renewal of this operating permit, at which time the Department will evaluate the facility and issue a public notice with its findings.

IX. EXEMPT ACTIVITIES

The facility's operating permit does not include exempt activities such as office and interior maintenance activities, maintenance shop activities, food preparation facilities, cafeterias and dining rooms, etc. A complete list of exempt activities, as allowed by the Operating Permit rule, can be found at N.J.A.C. 7:27-22.1.

Table 1 - Operating Permit Revision History

Permit Activity Number	Type of Revision	Description of Revision	Final Action Date
BOP190001	Minor Modification	<p>Changes to Permit:</p> <p>1) Update Emission Statements and Fees/Billing contacts to Sarah Deater.</p> <p>2) Incorporate the Regional Greenhouse Gas Initiative (RGGI) requirements, in accordance with N.J.A.C.7:27C3.3, into the operating permit.</p>	4/7/2020
BOP170001	Significant Modification	<p>This is a significant modification application to restrict No. 2 oil burning for U1 to the non-ozone season in cases of Electric Reliability Emergencies issued by the PJM Independent System Operator and if the supply of natural gas is inadequate or a Maximum Generation Alert has been issued by the PJM Independent System Operator.</p> <p>Specific Changes Made to Permit:</p> <ul style="list-style-type: none"> • Restrict the combustion turbine in emission unit U1 from combusting fuel oil during high electric demand days (HEDD), unless natural gas is curtailed; • Update NOx emission limits for the turbine (emission unit U1) to be consistent with NOx RACT (N.J.A.C.7:27-19.5) requirements. • Replace Clean Air Interstate Rule (CAIR) requirements with Cross-State Air Pollution Rule (CSAPR) requirements. 	6/30/2017

FACILITY NAME (FACILITY ID NUMBER)
BOP050001

Activity Number assigned by the Department

**New Jersey Department of Environmental Protection
Facility Specific Requirements**

Emission Unit Number assigned by the Facility

Brief description of emission unit

Emission Unit: U40 Sewage Sludge Incinerators
Operating Scenario: OS Summary

OR OS2 Fluidized Bed Incinerator

OS Summary lists all rules and requirements that apply to an emission unit. An emission unit may contain one or more pieces of equipment and corresponding operating scenarios.

OSX denotes the operating scenario number and lists the rules and requirements that apply to a scenario. An operating scenario represents various ways (or scenarios) a piece of equipment is permitted to operate.

Item Number

Description of applicable requirement

Monitoring method to ensure compliance

Recordkeeping to show facility's compliance

Actions and submittals required for the facility

Ref.#	Applicable Requirement	Monitoring Requirement	Recordkeeping Requirement	Submittal/Action Requirement
3	The permittee shall conduct an annual performance test for each pollutant in Table 2 of 40CFR62 Subpart LLL between 11 and 13 calendar months after the previous performance test or within 60 days of a process change. [40 CFR 62.16000(a)]	Other: Conduct the performance test using the test methods, averaging methods and minimum sampling volumes or durations as specified in 40CFR62 Subpart LLL and according to the testing, monitoring and calibration requirements specified in 40 CFR 62.16015(a). [40 CFR 62.16000(a)].	Other: (1) Maintain records of the results of initial, annual and any subsequent performance tests conducted to determine compliance with the emission limits and standards and/or to establish operating limits, as applicable. [40 CFR 62.16025(e)].	Submit a report: Annually to the Administrator and to the Department. The permittee shall submit an annual compliance report as specified in 40 CFR 62. [40 CFR 62.16000(d)]

Rule citation for applicable requirement

Rule citation for monitoring requirement

Rule citation for recordkeeping requirement

Rule citation for submittal/ action requirement

Explanation Sheet for Facility Specific Requirements