I. FACILITY INFORMATION

Bayonne Energy Center (BEC) located at 401 Hook Road in Bayonne, Hudson County, NJ 07002 is an electric generating plant nominally rated at 644 megawatts (MW). Bayonne Energy Center is owned and operated by Bayonne Energy Center LLC.

The facility is classified as a major facility based on its potential to emit 153 tons per year of carbon monoxide (CO), 131 tons per year of nitrogen oxides (NOx), 43.7 tons per year of volatile organic compounds, 119 tons per year of Total Suspended Particulates (TSP), 119 tons per year of Particulate Matter less than 10 microns (PM_{10}), 119 tons per year of Particulate Matter less than 2.5 microns ($PM_{2.5}$); and 1,720,151 tons per year of Greenhouse gases as Carbon Dioxide Equivalent (CO2e) to the atmosphere.

This permit allows any individual hazardous air pollutant (HAP) to be emitted at a rate to not exceed: 8.64 pounds per year of acrolein, 42.4 pounds per year of arsenic, 16.9 pounds per year of benzene, 1.19 pounds per year of beryllium,18.5 pounds per year of cadmium, 958 pounds per year of formaldehyde, 53.8 pounds per year of Lead, 3040 pounds per year of manganese, 2.34 pounds per year of naphthalene, 17.7 pounds per year of nickel, 3.38 pounds per year of PAH/POM and 31.4 pounds per year of propylene oxide.

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: ten (10) simple cycle combustion turbines, each nominally rated at 66 MW, firing natural gas as primary fuel with the capability of combusting fuel oil as a back-up fuel. Units 1-8 at Emission Unit U1 began commercial operation in 2012 and Units 9-10 at Emission Unit U4 began commercial operation in 2018. The combustion turbines are Siemens/Rolls Royce Trent 60 wet low emission (WLE) combustion turbine generators (CTGs). The CTGs are equipped with state-of-the-art controls: dry low-NOx burners, selective catalytic reduction (SCR) for NOx emissions control and oxidation catalyst for CO, VOC and organic HAPs emissions control.
The equipment at the facility also includes an emergency generator, a fire pump, and a black start generator.

Health Risk Assessment was conducted as part of the review of this permit application and health risk was determined to be negligible to the Department consistent with NJDEP Technical Manual 1003.

This is a Permit Modification and includes the following changes:

1. Increase the electrical output for CTGs 1 through 8 at emission unit U1, from 64 megawatts (MW) to 66 MW for natural gas firing operating scenarios (OS1-8) with a corresponding increase in maximum heat input rate from 603 MMBtu/hr (HHV) to 643 MMBtu/hr (HHV) without any increase in annual fuel use.
   The facility is not proposing an increase in annual emissions (tons per year) of criteria pollutants NOx, CO, VOC, PM, PM10, PM2.5, SO2, sulfuric acid, and ammonia, however there will be an increase in hourly emissions of some criteria pollutants, and ammonia emissions as follows:

NOx increases from 5.5 pounds per hour (lb/hr) to 5.92 lb/hr
CO increases from 6.76 lb/hr to 7.21 lb/hr
VOC increases from 1.93 lb/hr to 2.06 lb/hr
Ammonia increases from 4.16 lb/hr to 4.38 lb/hr however, the concentration of ammonia (5ppmvd@15% O2) is unchanged.

TSP, PM10, PM2.5 hourly emissions remain the same at 5 lb/hr.

2. Reduce short term SO_2 emissions for 8 U1 turbines from 1.22 lb/hr to 0.77 lb/hr, by using a fuel sulfur content of 0.42 grains per 100 standard cubic feet for natural gas (gr/100 scf), the same sulfur content that was used for calculating SO_2 emissions from U4 turbines. When the facility was originally permitted in 2009, a sulfur content of 0.8 gr/100 SCF was used to calculate SO2 emissions for U1 turbines. In 2015 when the U4 turbines were permitted, the facility used 0.42 gr/100 SCF to calculate their SO2 emissions. The facility is now proposing to use the same sulfur content and lb/hr SO2 emissions for all its 10 turbines without any reduction in annual emissions for SO_2 of the facility.
3. Increase the GHG emissions from the facility from 1,634,281 tpy to 1,720,150 tpy due to an increase in heat input rate of U1 turbines.
4. Add Initial Stack Testing Requirements to U1 for criteria pollutants due to the proposed increase in short term emissions and maximum heat input rate and MWs of each turbine.
5. Change the renewal stack testing requirement for U1 and U4 turbines to conduct renewal stack testing 5 years from the date of the last stack test. The corresponding monitoring and recordkeeping requirements were revised accordingly.
6. Add additional HAPs that are above the N.J.A.C. 7:27-17 reporting thresholds to the permit of permitted HAPs (U1 and U4). These HAPs already existed at the facility but were not included in the permit previously. These are Arsenic, Benzene, Beryllium, Cadmium, Naphthalene, Nickel and Propylene Oxide.
7. Reduce the total emissions of HAPs from the facility from 11.07 tpy to 3.74 tpy. Although the facility is including more HAPs that are above the reporting thresholds the reduction in total HAPs emissions results by applying an oxidation catalyst control efficiency of 90% for organic HAPs during natural gas combustion and 85% control efficiency for organic HAPs during oil combustion. Control efficiency of 90% for these pollutants is from the Sims Roy Aug 21, 2001 memorandum. In addition, for any hour with a turbine startup or shutdown, the facility is using 50% turbine load during first half hour and steady state 100 % load during the rest of hour for startup and shutdown emissions calculations.
8. Include methane and nitrous oxide emissions to U1 and U4 as they are above the 0.05 pound per hour N.J.A.C 7:27-8 reporting thresholds, although they are less than 100 tons per year N.J.A.C 7:27-22 reporting thresholds.
9. In the current permit the pollutant emission summary at Section A has lead (Pb) values (0.0217=-0.022 tpy) from only U1 turbines. The Pb emissions from U4 turbines 0.00523 tpy that were inadvertently omitted, have now been added for a total of 0.0269 tpy Pb from the facility. There is no change in Pb emissions in the compliance plan of the permit.
10. Correct the stack height of U4 turbines from 151 to 153.7 ft.
11. Update of the FC section of the compliance plan.
12. Update Section B, General Provisions and Authority of the Permit Text.

This modification will also change the facility-wide 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_2e (total)
Current Permit	43.7	131	153	25.9	119	119	119	0.0217	11.07	1,634,281
Proposed Permit	43.7	131	153	25.9	119	119	119	0.0269	3.74	1,720,151
Change (+ / -)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	+0.00523	-7.33	85,870

VOC Volatile Organic Compounds
NO_x Nitrogen Oxides
CO Carbon Monoxide
SO_2 Sulfur Dioxide
TSP Total Suspended Particulates
* Other Any other air contaminant regulated under the Federal Clean Air Act.
PM_{10} Particulates under 10 microns
$PM_{2.5}$ Particulates under 2.5 microns
Pb Lead
HAPs Hazardous Air Pollutants
CO_2 e Carbon Dioxide equivalent

IV. CASE-BY-CASE DETERMINATIONS

- State of the Art (SOTA) pursuant to N.J.A.C. 7:27-22.35
- Lowest Achievable Emission Rate (LAER) pursuant to N.J.A.C. 7:27-18.3(b)

The facility submitted an updated LAER Analysis on 10/16/23 for the BEC turbines with an increase in capacity from 64 to 66 MW.
A search of permitted operational dual fuel aeroderivative peaking power generation simple-cycle CTG projects was conducted by facility to identify the most stringent NOx emission limits achieved in practice. The results of the search showed that there are no units identified in the same class/category as the BEC Units with a lower emissions limit than the current BEC Units. LAER for the BEC Units is maintained at 2.5 ppmvdc.
The search showed that there is one facility, the Alaska Gasoline Development Corporation's (AGDC) Liquefaction Plant, which contains a lower emissions rate for a natural fired (single fuel) frame baseload simple cycle combustion turbine. The AGDC turbines are equipped with DLN and SCR and are used for compressing natural gas. In the AGDC permit, CTGs were permitted at 2.0 ppmvdc, however, this has not been demonstrated yet because the units have not been constructed or commissioned.

Also, there are significant differences between the AGDC CTGs compared to the BEC CTGs listed below that warrant the separate and unique class/categories.

• The AGDC CTGs are based load frame (single shaft) single fuel (natural gas) DLN units used for natural gas compression. The BEC CTGs are peaking aeroderivative electrical generation and operated in a fast start load following fashion to accommodate grid reliability requirements. The AGDC CTGs do not represent a viable technology to be interconnected to the Northeastern electric grid as base load single fueled units.

• The AGDC CTGs have an ammonia slip limit of 10 ppmvdc while the BEC CTGs have a significantly tighter ammonia slip limit of 5 ppmvdc. This allows the AGDC CTGs wider compliance margin to control NOx and ammonia slip.

• The AGDC CTGs are rated nominally at 1,113 MMBtu/hour (approximately 114 MW if they were generating power), 75% larger than the BEC CTGs (66 MW).

• The AGDC CTGs are designed with uncontrolled off-engine NOx emissions of 9 ppmvdc, as typical on new frame CTGs. The required SCR efficiency of the AGDC CTGs is approximately 78%, from 9 ppmvdc to 2 ppmvdc. The BEC CTGs are designed with uncontrolled off-engine NOx emissions of 25 ppmvdc, as typical on new dual-fuel aeroderivative CTGs. The required SCR efficiency of the BEC CTGs is approximately 90%, from 25 ppmvdc to 2.5 ppmvdc.

• The AGDC CTGs are single fuel, natural gas, units whereas BEC CTGs are designed to combust both natural gas as the primary fuel, and fuel oil, as a secondary fuel and in times of grid system restoration. The fuel oil requirement dictates the BEC CTGs utilize the WLE combustion system along with SCR to control NOX, fuel oil cannot be fired with AGDC's DLN combustion systems.

• EPA guidance on LAER states that the limit must have "been achieved in practice." Based on the Final Environmental Impact Statement (FEIS) for the AGDC Liquification Plant, the
construction will take place over six to seven years and the project will not be operational until 2030. Therefore, the permit limit of 2.0 ppmvdc cannot be considered as a basis for LAER; the AGDC CTGs have not yet been constructed and the 2.0 ppmvdc has not been achieved in practice.

Hence the current NOx limit of 2.5 ppmvd proposed by BEC for 66 MW CTGs is SOTA and LAER.

This modification is not subject to Emission Offset requirements.

V. 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:

1. 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

2. 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.

   - All the 8 CTGs at emission Unit U1 will monitor NOx, CO, VOC, PM, PM10, PM2.5, and NH_3 for short term emissions by Initial Stack Testing for natural gas burning only. This testing is in addition to renewal stack testing for natural gas and ULSD.
   - Annual emissions of Sulfuric acid, Ammonia, HAPs, Methane and Nitrous oxide will be monitored by calculations using AP-42 emission factors, oxidation catalyst efficiency where applicable, and the maximum permitted heat input rate of the turbines and permitted hours of operation of the turbines.
   - Short term emissions of Sulfuric acid, Ammonia, HAPs, Methane and Nitrous oxide will be monitored by calculations using AP-42 emission factors, oxidation catalyst efficiency where applicable, and the maximum permitted heat input rate of the turbines.

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.

VI. APPLICABLE STATE AND FEDERAL RULES

This modification 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.

NSPS Subpart A:	New Source Performance Standards - General Provisions
NSPS Subpart KKKK	Standards of Performance for Stationary Combustion Turbines

The Greenhouse Gas (GHG) emissions from this facility are 1,720,151 TPY CO2e and there is a GHG emissions increase of 85,870 TPY. This modification is not subject to PSD rules at 40 CFR 52.21.

VII. FACILITY'S COMPLIANCE STATUS

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.

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.

Prior to the expiration of the Operating Permit's five-year term, the facility will be required to apply for a renewal, at which time the Department will evaluate the facility and issue a public notice with its findings.

VIII.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.

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