

**ALLEGHENY COUNTY HEALTH DEPARTMENT
AIR QUALITY PROGRAM**

November 17, 2016

SUBJECT: Renewal Title V Operating Permit Application

NRG Energy Center Pittsburgh LLC.
111 South Commons
Pittsburgh, PA 15212

RE: Operating Permit No. 0022
Steam and Chilled Generation Plant

TO: Jayme Graham
Air Quality Program Manager

FROM: Hafeez A. Ajenifuja.
Air Quality Engineer

FACILITY DESCRIPTION:

The NRG Energy Center Pittsburgh, LLC facility is a commercial district heating and cooling plant located in the city of Pittsburgh, Allegheny County. The plant supplies steam for space heating and hospital sterilization and chilled water for refrigeration and summer air conditioning to commercial and institutional sites in that area. The plant is composed of five boilers, which fire natural gas as their primary fuel and have the capacity to fire no. 2 fuel oil with sulfur content of 0.05%, in lieu of natural gas at times of emergency or natural gas curtailment with the exception of boilers 4 & 5 which does not have the capability to fire fuel oil. Boiler 5 will only be use for emergency purpose for a maximum of 500 hours a year and it is physically located on the premises of Allegheny General Hospital. Additional equipment used for chilled water production includes various turbines, chillers and compressors, an 8-cell 30,000 gpm cooling tower and a 2-cell 7,200 gpm cooling tower. The facility also has two (2) oil fired and one natural gas fired emergency generators rated at 350 kW, 250 kW and 250 kW respectively. The three (3) generators operate with a limited operating hour of 500 hrs/yr.

The facility is a major source of nitrogen oxides (NO_x) and carbon monoxide (CO) and minor source of particulate matter (PM), PM₁₀, sulfur dioxide (SO₂), volatile organic compounds (VOCs) and hazardous air pollutants (HAPs) as defined in section 2101.20 of Article XXI.

In a determination lettetr dated July 27, 2006, the facility has requested to withdraw/void the installation permit No. 0022-I002 issued on August 9, 2005 that allows the facility to burn No. 2 fuel oil in boilers 1-3 on a discretionary basis during emergency or natural gas curtailment. Therefore, the facility is currently not allowed to burn No.2 fuel oil in boilers 1-3 except as a backup to natural gas fuel in emergency situations where natural gas is not available or during periods of natural gas curtailment. The facility shall notify the Department with justification of the need to combust no.2 fuel oil before burning the fuel oil.

The Department estimated the fuel oil emissions of boilers 1-3 based on 500 hours each of emergency operations.

PROCESS DESCRIPTION:

This is a Title V renewal application for NRG Energy Center Pittsburgh, LLC located in the City of Pittsburgh, Allegheny County. The original operating permit was issued on April 8, 2002 and the facility's operations and processes are still the same as in the original operating permit.

EMISSION CALCULATION:

Emissions from each of the five (5) boilers and combined emission of all the five (5) boilers firing natural gas are shown below:

Pollutants	Emissions									
	Boilers ^a 1 & 2 92 MMBtu/hr Each		Boiler 3 131.1 MMBtu/hr		Boiler 4 24 MMBtu/hr		Boiler 5 46.08 MMBtu/hr		Combined Emission	
	Lbs/hr	Tons/yr ^b	Lbs/hr	Tons/yr ^b	Lbs/hr	Tons/yr ^b	Lbs/hr	Tons/yr ^b	Lbs/hr	Tons/yr ^b
PM/PM ₁₀	0.74	3.05	1.05	4.38	0.18	0.79	0.34	0.09	3.0	11.74
NO _x	13.34	55.09	19.01	77.3	0.91	4.0	4.61	1.15	51.21	190.85
SO _x	0.06	0.25	0.08	0.35	0.014	0.06	0.03	0.01	0.244	0.9
CO	7.58	31.31	10.8	47.30	3.60	15.77	3.80	0.95	33.36	130.42
VOC	0.50	2.07	0.7	3.07	0.19	0.84	0.25	0.06	2.14	8.4

^a The emission is for each boiler

^b A year is defined as any consecutive 12-month period

Sample Calculation (PM for boiler firing natural gas)

PM: $(0.008 \text{ lb/MMBTU}) * (92 \text{ MMBtu/h}) = 0.74 \text{ lb/hr}$

$(0.74 \text{ lbs/hr}) * (2 \text{ boilers}) = 1.47 \text{ lbs/hr}$

$(0.74 \text{ lb/hr}) * (8260 \text{ hr/yr}) / (2000 \text{ lb/ton}) = 3.06 \text{ tpy}$

$(3.06 \text{ tons/yr}) * (2 \text{ boilers}) = 6.12 \text{ tpy}$

Emissions from each of the three (3) boilers firing #2 fuel oil are shown below:

Pollutants	Emissions							
	Boilers 1 92 MMBtu/hr		Boilers 2 92 MMBtu/hr		Boiler 3 131.1 MMBtu/hr		Combined Emission	
	Lbs/hr	Tons/yr ^a	Lbs/hr	Tons/yr ^a	Lbs/hr	Tons/yr ^a	Lbs/hr	Tons/yr ^a
PM/PM ₁₀	1.38	0.35	1.38	0.35	1.97	0.49	4.73	1.19
NO _x	13.25	3.3	13.25	3.3	22.65	5.66	49.15	12.26
SO _x	4.67	1.17	4.67	1.17	7.4	1.90	16.8	4.3
CO	3.31	0.83	3.31	0.83	4.72	1.18	11.34	2.84
VOC	0.19	0.05	0.19	0.05	0.19	0.45	0.57	0.55

^a A year is defined as any consecutive 12-month period

Sample Calculation (SO_x for boiler firing fuel oil)

$$\text{SO}_x: (142\text{lb}/10^3\text{gal} * 0.05) * (92 \text{ MMBtu}/\text{h}) * (\text{gal}/0.140 \text{ MMBtu}) = 4.67 \text{ lb}/\text{hr}$$

$$(4.67 \text{ lb}/\text{hr}) * (500 \text{ hr}/\text{yr}) / (2000 \text{ lb}/\text{ton}) = 1.17 \text{ tpy}$$

Note: The SO_x emission factor was multiply by sulfur content of 0.05%

Emissions from the Emergency Generators and Cooling Towers are shown below:

Pollutants	Emissions									
	Emergency Generators						Main Cooling Tower		No. 6 & 7 Cooling Towers	
	350 kW Oil fired		250 kW Oil fired		250 kW NG fired		lbs/hr	Tons/yr ^a	lbs/hr	Tons/yr ^a
lbs/hr	Tons/yr ^a	lbs/hr	tons/yr ^a	lbs/hr	Tons/yr ^a					
PM/PM ₁₀	0.18	0.04	0.84	0.21	0.06	0.01	0.82	3.6	0.71	3.11
NO _x	9.63	2.41	11.9	2.98	11.83	2.96	NA	NA	NA	NA
SO _x	0.63	0.16	0.78	0.20	0.002	0.004	NA	NA	NA	NA
CO	2.35	0.59	2.57	0.64	10.79	2.70	NA	NA	NA	NA
VOC	0.32	0.08	0.97	0.24	0.35	0.09	NA	NA	NA	NA

^aA year is defined as any consecutive 12-month period

Emission factor for the boilers and emergency generators are shown below:

Pollutants	Emission Factors								
	Emergency Generators			Boilers					
	350 kW Oil fired ^b	250 kW Oil fired	250 kW NG fired ^c	Boilers 1-2		Boiler 3		Boiler 4	Boiler 5
				Firing NG	Firing fuel oil	Firing NG	Firing fuel oil	Firing NG	Firing NG
Lbs/MMBtu	Lbs/MMBtu	Lbs/MMBtu	Lbs/MMBtu	Lbs/MMBtu	Lbs/MMBtu	Lbs/MMBtu	Lbs/MMBtu	Lbs/MMBtu	
PM/PM ₁₀	0.05	0.28 ^a	0.00008	0.008 ^a	0.015 ^a	0.008 ^a	0.015 ^a	0.008 ^a	0.008 ^c
NO _x	2.75	4.41 ^c	4.08	0.145 ^b	0.5112	0.145 ^b	0.1728 ^c	0.038 ^b	0.098 ^c
SO _x	0.18	0.29 ^c	0.0006	0.0006 ^a	0.05 ^c	0.0006 ^c	0.056 ^c	0.0006 ^c	0.0006 ^c
CO	0.67	0.95 ^c	3.72	0.0824 ^c	0.036 ^c	0.0824 ^c	0.036 ^c	0.15 ^b	0.08 ^c
VOC	0.09	0.36 ^c	0.12	0.0054 ^c	0.0024 ^c	0.0054 ^c	0.243 ^c	0.008	0.0054 ^c

^aThe emission factor is from Article XXI

^bThe emission factor is vendor/manufacturers guarantee

^cThe emission factor is from AP-42. The fuel oil SO_x emission factor for the boilers was multiplied by sulfur content 0.05%

Sample Calculation (PM for 350 kW Generator firing #2 fuel oil)

$$140,000 \text{ Btu}/\text{gal} (\text{heating value}) * (12,500 \text{ gal}/\text{yr}) * (\text{yr}/500\text{hr}) = 3.5 \text{ MMBtu}/\text{hr}$$

$$\text{PM}: (0.05 \text{ lb}/\text{MMBtu}) * (3.5 \text{ MMBtu}/\text{h}) = 0.18 \text{ lb}/\text{hr}$$

$$(0.18 \text{ lb}/\text{hr}) * (500 \text{ hr}/\text{yr}) / (2000 \text{ lb}/\text{ton}) = 0.045 \text{ tpy}$$

RENEWAL OPERATING APPLICATION COMPONENTS:

1. Renewal Permit Application No. 0044 was received on May 19, 2014.
2. E-mail correspondence dated May 30, 2014 (Request for Signed Section 15 of the Application-Certificate of Corporate Authority & Emission Calculation Spreadsheet);
3. E-mail correspondence dated October 30, 2014 ((Received Signed Certificate of Corporate Authority);
4. E-mail correspondence dated October 29, 2014 (Received Emission Calculation Spreadsheet);
5. E-mail correspondence dated October 29 2014 (Received Wet Weather Plan & ALCOSAN Wastewater Discharge Permit);
6. E-mail correspondence October 30, 2014 (Received Cooling Tower & Boiler Blowdown Rate and Volume);

METHOD OF DEMONSTRATING COMPLIANCE:

The facility will demonstrate compliance by complying with the weekly inspections of the boiler combustion equipment and cooling towers, fuel certifications with sulfur content of 0.05% from fuel oil suppliers along with record keeping and reporting requirements that include inspection, maintenance and repair data for the boiler and cooling towers and monthly usage of natural gas and fuel oil. Total Dissolve Solid (TDS) for the cooling towers shall be determined by conductivity testing. See the Title V Permit No. 0022, for the specific conditions for determining compliance with the applicable requirements.

REGULATORY APPLICABILITY:

1. Article XXI Requirements for Issuance:

The requirements of Article XXI, Parts B and C for the issuance of this renewal permits have been met for this facility. Article XXI, Part D, Part E & Part H will have the necessary sections addressed individually.

2. Testing Requirements:

Pursuant to the RACT requirement of §2105.06.b.4.B of Article XXI, the facility will test boilers 1-3 firing natural gas only for NO_x emissions every two (2) years (24 consecutive months) according to approved U.S. EPA test methods and Section 2108.02 of Article XXI.

The permittee shall also perform NO_x, SO_x and particulate matter emission testing on boilers 1-3 within 60 days of firing fuel oil in order to demonstrate compliance with the fuel oil NO_x, particulate and SO_x emissions according to approved U.S. EPA test methods and Section 2108.02 of Article XXI. Pursuant to §63.11237 (Gas-Fired Boiler Definition), the fuel oil periodic testing required shall not exceed 48 hours per year shall not exceed 48 hours per year.

3. New Source Performance Standards (NSPS):

The boilers 1-3 are not subject to the NSPS conditions because boilers 1-2 were installed in 1964 and boiler 3 was installed in 1972. Boiler 4 is subject following section:

- §60.48.c. (f): Reporting of the fuel (natural gas) usage and certifications that demonstrate initial and continuing compliance. The fuel certification shall consist of the name of the

supplier. The permittee must certify that the fuel records submitted represent all the fuel combusted during the reporting period.

Boiler 5 is not subject to NSPS because it is only used during emergency.

4. **NESHAP and MACT Standards:**

- a. *40 CFR PART 63 Subpart JJJJJ-National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Source:*

The facility has 5 (boilers 1-5) gas fired boilers, and boilers 1 through 3 has the ability to burn fuel oil during natural gas emergency or gas curtailment. Pursuant to 63.11195(e), 63.11237 & Area Source Boiler NESHAP, 40 CFR Part 63, Subpart JJJJJ (6J), Questions and Answers. A gas-fired boiler is allowed to burn oil during periods of gas curtailment and still be considered gas-fired and not covered under the rule.

5. **Compliance Assurance Monitoring:**

The Compliance Assurance Monitoring (CAM) rule found in 40 CFR 64 is not applicable to the facility pursuant to §64.2(a)(2), which states “the CAM requirements apply to unit that uses control device to achieve compliance with any such emission limitation or standard”. Therefore, since the facility does not have any control device, it is exempt from the CAM requirement.

6. **EMISSIONS SUMMARY:**

The allowable emission summary for the facility is given in Table below:

Pollutant	Annual Emissions (tons/year)
PM/PM ₁₀	19.07
NO _x	190.85
SO _x	4.37
CO	130.42
VOC	8.38

RECOMMENDATIONS:

All the sources, operations and conditions are still the same as in the original permit. All applicable Federal, State, and County regulations have been addressed in the permit application. I recommend the issuance of the renewal operating permit No. 0022.