

**ALLEGHENY COUNTY HEALTH DEPARTMENT  
AIR QUALITY PROGRAM**

September 18, 2020

**SUBJECT:** Review of Application  
Renewal Title V Operating Permit  
Bellefield Boiler Plant  
S. Neville Street  
Pittsburgh, PA 15213

**RE:** Operating Permit File No. 0047-OP20  
Commercial steam generation plant

**TO:** JoAnn Truchan, P.E.  
Section Chief, Engineering

**FROM:** Hafeez Ajenifuja  
Permit Engineer

**FACILITY DESCRIPTION:**

The Bellefield Boiler Plant, is a commercial steam generation facility located on Boundary Street in the Oakland section of Pittsburgh, PA, which supplies steam for heating and refrigeration to institutional sites in that area. The plant is composed of six (6) boilers exhausting to one stack, which fire natural gas as their primary fuel and has the capacity to fire no. 2 fuel oil with sulfur content of 0.0015% (15 ppm) at times of emergency or natural gas curtailment with the exception of boilers 1, 5 and 8a, which do not have the capability to fire fuel oil. Boilers 3, 6 and 7 emergency fuel oil usage will be based on 430 hours/year. The facility also has two (2) oil fired emergency generators rated at 771 hp (5.4 MMBtu/hr) each.

The facility is a major source of nitrogen oxides (NO<sub>x</sub>) and carbon monoxide emissions (CO), a minor source of particulate matter (PM), particulate matter < 10 microns in diameter. (PM<sub>10</sub>), sulfur dioxide (SO<sub>2</sub>), volatile organic compounds (VOCs) and hazardous air pollutants (HAPs) as defined in section 2101.20 of Article XXI.

The facility consists of the following emission units:

1. Boiler no.1 at 74 MMBtu/hr - Natural gas only
2. Boiler no.3 at 128 MMBtu/hr (natural gas) and 119 MMBtu (fuel oil)– Natural Gas as Primary Fuel & No. 2 fuel oil as an emergency
3. Boiler no. 5 at 74 MMBtu/hr- Natural gas only
4. Boiler no. 6 at 179 MMBtu/hr - Natural Gas as Primary Fuel & No. 2 fuel oil as an emergency
5. Boiler no. 7 at 188 MMBtu/hr - Natural Gas as Primary Fuel & No. 2 fuel oil as an emergency
6. Boiler no. 8a at 87 MMBtu/hr each- Natural gas, rental unit
7. Two (2) 771 HP/500 kW (5.4 MMBtus/hr) each emergency generator – no. 2 fuel oil
8. One 30,000 gal horizontal fuel oil # 2 UST and One 2,000 gal Diesel AST

Coal fired boilers no.2 & no.4 were shut down in December 2003 and November 2002 respectively.

**PROCESS DESCRIPTION:**

This is a Title V renewal operating permit for Bellefield Boiler Plant located in the City of Pittsburgh, Allegheny County. The original operating permit was issued on August 31, 2004.

Changes were made to the facility's boilers NO<sub>x</sub> emissions limit, fuel usage, and annual capacity factor based on the RACT IP No. 0047-I003.

Boiler No.	Design Heat Input Rate for Oil (MMBtu/hr)	Permitted Maximum Oil Combustion Rate (gallons/hr)
3	119	850
6	179	1,280
7	188	1,340

Boilers 3, 6 and 7 are limited to 4.91% annual capacity factor (430 hours per year) each while combusting fuel oil.

**EMISSION SOURCES OF MINOR SIGNIFICANCE:**

1. Paved areas are a source of minor significance with negligible emissions of PM and PM<sub>10</sub> as per US EPA, AP-42, Section 13.2.1, “Paved Roads”, 10-97.
2. The Two No. 2 fuel oil underground storage tanks have negligible emissions of VOCs and HAPs as per US EPA, AP-42, Section 7.1, “Organic Liquid Storage Tanks”, 9-97.

**Fugitive emission sources:**

Paved areas: Total paved areas are <2,000 ft<sup>2</sup> including parking spaces.

Unpaved roads: None

Parking areas: Included in paved areas above

Other sources: None

**EMISSION CALCULATION:**

**EMISSION FACTOR SUMMARY:**

Pollutant	Boiler Emissions Factor- NG Only <sup>a</sup>		Boiler Emissions Factor-Fuel Oil Only <sup>b</sup>	
	PM	0.008 lb/MMBtu	Article XXI, §2104.02.a.1.A	0.0015 lb/MMBtu
PM <sub>10</sub>	0.008 lb/MMBtu	Article XXI, §2104.02.a.1.A	0.0015 lb/MMBtu	Article XXI, §2104.02.a.1.B
PM <sub>2.5</sub>	0.008 lb/MMBtu	Article XXI, §2104.02.a.1.A	0.0015 lb/MMBtu	Article XXI, §2104.02.a.1.B
NO <sub>x</sub>	RACT IP #0047-I003		RACT IP #0047-I003	
CO	0.0817 lb/MMBtu	AP-42	0.0357 lb/MMBtu	AP-42, Table 1.3-1 (7/98)
SO <sub>x</sub>	0.0006 lb/MMBtu	AP-42, Table 1.4-2 (7/98)	Article XXI, §2104.03.a.2.B	
VOC	0.0054 lb/MMscf	AP-42, Table 1.4-2 (7/98)	0.0024 lb/MMBtu	AP-42, Table 1.3-3 (7/98)

<sup>a</sup>Note AP-42 emission factor was converted from lbs/MMSCF to lbs/MMBtu using the natural gas heating value of 1,050 Btu/scf.

<sup>b</sup>Note AP-42 emission factor was converted from lbs/Mgal to lbs/MMBtu using the fuel oil heating value of 140,000 Btu/gal

**POTENTIAL EMISSION SUMMARY:**

**Boilers No.1, No.5 and No.8a Firing NG Only-All exhausting through Stack No.2**

Pollutants	Emissions <sup>a</sup>					
	Boiler 1 74 MMBtu/hr		Boiler 5 74 MMBtu/hr		Boiler 8a 87 MMBtu/hr	
	Lbs/hr	Tons/yr <sup>b</sup>	Lbs/hr	Tons/yr <sup>b</sup>	Lbs/hr	Tons/yr <sup>b</sup>
PM/PM <sub>10</sub>	0.59	2.59	0.59	2.59	0.70	3.05
NO <sub>x</sub>	7.40	32.4	7.4	32.4	4.79	20.98
SO <sub>x</sub>	0.04	0.19	0.04	0.19	0.05	0.23
CO	6.05	26.48	6.05	26.48	7.10	24.50
VOC	0.40	1.75	0.40	1.75	0.47	2.10

<sup>a</sup>The boiler NO<sub>x</sub> emission is based on RACT IP 0047-I003

<sup>b</sup>A year is defined as any consecutive 12-month period

**Boilers No. 3, No.6, No. 7 Firing NG & Fuel Oil as Emergency Only-All exhausting through Stack No. 2**

Pollutants	Emissions <sup>a</sup>								
	Boiler <sup>b</sup> 3 128 MMBtu/hr			Boiler 6 179 MMBtu/hr			Boiler 7 188 MMBtu/hr		
	NG Lbs/hr	Fuel Oil Lbs/hr	Annual Limit Tons/yr <sup>b</sup>	NG Lbs/hr	Fuel Oil Lbs/hr	Annual Limit Tons/yr <sup>b</sup>	NG Lbs/hr	Fuel Oil Lbs/hr	Annual Limit Tons/yr <sup>b</sup>
PM/PM <sub>10</sub>	1.02	1.78	2.24	1.43	2.69	5.91	1.50	2.82	1.00
NO <sub>x</sub>	25.60	74.97	56.06	17.90	50.12	78.40	26.32	37.60	38.00
SO <sub>x</sub>	0.08	103.61	22.28	0.11	147.20	31.65	0.11	153.54	38.39
CO	10.46	4.25	22.90	14.62	6.39	64.05	15.36	7.24	27.0
VOC	0.69	0.29	1.51	0.97	0.43	4.23	1.02	0.46	3.6

<sup>a</sup>The boiler NO<sub>x</sub> emission is based on RACT IP 0047-I003

<sup>a</sup>The fuel oil usage for boilers 3, 6 & 7 are based on 430 hours per year each.

<sup>a</sup>NG heating value is 1050 btu/scf

<sup>b</sup>Boiler 3 is limited to 50% capacity or operate at 64 MMBtu/hr or 560,640 MMBtu/yr based on RACT Order

<sup>b</sup>Boiler 3 burner is 119 MMBtu/hr when firing fuel oil

**Sample Calculation (PM for boiler firing natural gas)**

PM:  $(0.008 \text{ lb/MMBtu}) \times (128 \text{ MMBtu/hr}) = 1.02 \text{ lb/hr}$

$(1.02 \text{ lb/hr}) \times (8760 \text{ hr/yr}) / (2000 \text{ lb/ton}) \times (0.5) = 2.24 \text{ tpy}$

OR

For No. 2 Fuel Oil (PM for boiler firing No. 2 fuel oil)

PM:  $(0.015 \text{ lb/MMBtu}) \times (119 \text{ MMBtu/hr}) = 1.78 \text{ lb/hr}$

$(1.79 \text{ lb/hr}) \times (430 \text{ hr/yr}) / (2000 \text{ lb/ton}) = 0.38 \text{ tpy}$

**RENEWAL OPERATING APPLICATION COMPONENTS:**

1. Renewal Permit Application No. 0044 was received on June 18, 2018.
2. RACT IP No. 0047-I003, Issued on April 14, 2020

**METHOD OF DEMONSTRATING COMPLIANCE:**

The facility will demonstrate compliance by complying with the daily recording of fuel type and consumption; maintain fuel certifications with sulfur content of 0.0015% from #2 fuel oil suppliers per shipment. The facility shall continuously monitor NO<sub>x</sub> in boilers 7 and 8a. The facility shall also continuously monitor and record flue gas oxygen content for all the boilers and to ensure the boilers are being operated and maintained properly and recordkeeping and reporting requirements that include inspection, maintenance and repair data. In addition, NO<sub>x</sub> compliance may be demonstrated by the specified periodic NO<sub>x</sub> emission tests. See the Operating Permit No. 0047 for the specific compliance methods, record keeping and reporting requirements for the facility.

## **REGULATORY APPLICABILITY:**

### **1. Article XXI Requirements for Issuance:**

The requirements of Article XXI, Parts B and C for the issuance of major source operating 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 IP 0047-I003 requirement and §2105.06.b.4.B of Article XXI, Major Sources of NO<sub>x</sub> and or VOCs Reasonably Available Control Technology, the facility will test boilers no.1,3,5 and 6 for compliance with NO<sub>x</sub> emissions every five years, while combusting natural gas.

The permittee shall also perform NO<sub>x</sub> and SO<sub>x</sub> emission testing on boilers 3, 6 and 7 within 60 days of accruing 40 hours or more operating hours in any consecutive 12 month period while firing fuel oil in order to demonstrate compliance with the fuel oil NO<sub>x</sub>, and SO<sub>x</sub> emissions according to approved U.S. EPA test methods and Section 2108.02 of Article XXI.

Pursuant to §63.11237 (Gas-Fired Boiler Definition), Gas-fired boiler includes any boiler that burns gaseous fuels not combined with any solid fuels and burns liquid fuel only during periods of gas curtailment, gas supply interruption, startups, or for periodic testing, maintenance, or operator training on liquid fuel. Periodic testing, maintenance, or operator training on liquid fuel shall not exceed a combined total of 48 hours during any calendar year.

### **3. New Source Performance Standards (NSPS):**

- a. ***40 CFR PART 60, Subpart Db, Standards of Performance for Industrial Commercial-Institutional Steam Generating Units:***

This subpart is not applicable to boilers 1, 3, 5 & 6 because they were all installed before the applicability date of June 19, 1984 and also boilers 1 & 5 are below 100 MMBtu/hr. But the subpart is applicable to boiler 7 because the capacity is greater than 100 MMBtu/hr and it was installed in 1994.

- b. ***40 CFR PART 60, Subpart Dc, Standards of Performance for Small Industrial Commercial-Institutional Steam Generating Units:***

Boiler 8a is the only boiler subject to this NSPS, Subpart Dc because boiler 8a was installed in 2004.

- c. ***40 CFR 60, Subpart IIII (Standards of Performance for Stationary Compression Ignition Internal Combustion Engines – CI RICE):***

This rule is not applicable to the emergency generators because it was installed before the applicability date.

### **4. NESHAP and MACT Standards:**

- a. ***40 CFR PART 63 Subpart DDDDD--National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters:***

The facility was once subject to Subpart DDDDD due to firing coal as the primary fuel and was therefore, considered a major source of HCL. But after July 1, 2009, the facility ceased combusting coal and changed to natural gas as the primary fuel and fuel oil as back up in boilers 3,6 & 7. The changing from coal fuel to natural gas makes the facility a minor source of HAPs and no longer subject to subpart DDDDD.

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

The facility is not subject to this subpart. The facility has 6 (boilers 1, 3, 5-8a) gas fired boilers, and boilers 3, 6 and 7 have 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, Gas-fired boilers, which burn gaseous fuel not combined with any solid fuels and only burn liquid fuel during periods of gas curtailment, gas supply interruption and periodic testing, maintenance, or operator training up to 48 hours per year, are not covered under the rule.

- c. ***40 CFR Part 63, Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines:***

This rule is not applicable to the emergency generators because it meets the operational requirements of “emergency stationary RICE” under §63.6640(f), and therefore is not subject to this subpart per §63.6585(f).

**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 a 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. Reasonable Available Control Technology (RACT)**

Section 2105.06 of Article XXI requires that RACT be applied to all major sources of NO<sub>x</sub>. The facility is subject to NO<sub>x</sub> Reasonable Available Control Technology (NO<sub>x</sub> RACT) because it is a major source of NO<sub>x</sub>.

A NO<sub>x</sub> RACT analysis found that no combustion or stack gas NO<sub>x</sub> control equipment was technically or economically feasible for use on boilers no. 1 through no.7. Plan Approval Order and Agreement Upon Consent Number 248, dated December 19, 1996, submitted to the U.S EPA as a site specific SIP revision to Allegheny County’s portion of the PA SIP, has established the following conditions for NO<sub>x</sub> RACT:

Maximum Allowable NO<sub>x</sub> RACT emissions for both natural gas and fuel oil are shown in the Table 1 below:

**Table 1  
Old NO<sub>x</sub> Limit**

Unit	Lbs/MMBtu
Boiler no.1	0.92
Boiler no.3	0.63
Boiler no.5	0.59
Boiler no.6	0.28
Boiler no.7	0.20

The facility submitted a NO<sub>x</sub> RACT evaluation application in July 12, 2017 and the facility has opted to comply with the PA- DEP presumptive RACT of 0.10 lb/MMBtu for natural gas boilers 1, 5 and 6, and case by case RACT limit, which is based on the 2012 stack test for boiler 3 and 2014 CEM test for boiler 7. The new NO<sub>x</sub> RACT limit is shown in the table below and is based on RACT IP 0047-I003, Issued on April 14, 2020:

The new Maximum Allowable NO<sub>x</sub> RACT emissions for the boilers are shown in the Table 2 below:

**Table 2  
Revised NO<sub>x</sub> Limit**

Unit	Lbs/MMBtu
Boiler no.1	0.10
Boiler no.3	0.20
Boiler no.5	0.10
Boiler no.6	0.10
Boiler no.7	0.14
Boiler no. 8a	0.055

NO<sub>x</sub> emission testing of boilers no.1,3,5 and 6 every five (5) years is required along with a NO<sub>x</sub> CEM on boiler no.7 and boiler no. 8a in accordance with 40 CFR 60, subpart Db. In addition, natural gas input to the burner in boiler no.3 is limited to a maximum of 64 mmbtu/hr or 560,640 MMBtu/yr along with record keeping and recording requirements for each boiler.

**7. Regulate Pollutants With No Established Regulatory Emission Limitation:**

Section 2103.12.a.2.B of Article XXI requires that RACT be applied to pollutants regulated by Article XXI without established regulatory emission limitations. RACT for carbon monoxide and volatile organic compound emissions from boilers no. 1 through no. 6 have been determined to be proper operation and maintenance of the boilers according to accepted combustion practices, therefore, the emission limitations for these pollutants will be the maximum potential emissions under proper operation of the boilers as shown in the above emission summary.

**EMISSIONS SUMMARY:**

The allowable emission summary of Bellefield Plant is given in Table below:

**Facility Potential Emissions**

**Emission Limitations**

<b>POLLUTANT</b>	<b>ANNUAL EMISSION LIMIT (tons/year*)**</b>
<b>Particulate Matter</b>	20.85
<b>PM<sub>10</sub></b>	20.85
<b>SO<sub>x</sub></b>	88.42
<b>NO<sub>x</sub></b>	308.6
<b>CO</b>	193.53
<b>VOC</b>	16.40

\*A year is defined as any consecutive 12-month period.

\*\*Includes Boiler 1 through 8a, EG-A and EG-B

**RECOMMENDATIONS:**

All applicable Federal, State, and County regulations have been addressed in the permit application. The renewal Title V permit for the Bellefield Plant should be approved with the emission limitations, terms and conditions in Permit No 0047-OP20.

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# APPENDIX A

## Emission Unit Data

I.D.	Make	Model	Type <sup>A</sup>	Input Rating	Date Installed	Primary Fuel	Secondary Fuel	Exhaust No.	Emission Control
B001	Babcock & Wilcox	2 Drum	Overfeed Stoker	74 MMBtu/hr	1956	NG	NA	Stack No. 2	None
B003 <sup>A</sup>	Erie City	VC	Chain Grate Stoker	128 & 119 MMBtu/hr	1977	NF	Fuel Oil	Stack No. 2	None
B005	Erie City	VC	Chain Grate Stoker	74 MMBtu/hr	1965	NG	NA	Stack No. 2	None
B006	Erie City	Keystone M21		179 MMBtu/hr	1973	NG	Fuel Oil	Stack No. 2	FGR
B007	IBW	WM 1500	CEM Installed	188 MMBtu/hr	1994	NG	Fuel Oil	Stack No. 2	Low NOx Burners
B008a	Rental	ND	CEM Installed	87 MMBtu/hr	2004	GN	NA	Stack No. 2	Low NOx with optional FGR
EG-A & B	Caterpillar	3412	IC engine	711 hp Each		Diesel	NA	EG-A&B stacks	None
Tanks	None	None	Underground Horizontal Each	30,000 gallons each		No.2 fuel oil each	NA	None	None

<sup>A</sup>Chain-grate (overfeed) stoker with sidewall gas burner

Gas: 128 MMBtu/hr maximum heat input

Oil: 119 MMBtu/hr maximum heat input

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