GOVERNMENT OF THE DISTRICT OF COLUMBIA
Department of Energy and Environment

CHAPTER 2 OPERATION PERMIT MEMORANDUM

TO: File

THROUGH: Stephen S. Ours, P.E. SSO
Chief, Permitting Branch

FROM: Abraham T. Hagos ATH
Environmental Engineer

SUBJECT: Georgetown University
Central Utilities Plant
Permit Nos. 7214 through 7217 to Install Low NOx Burners on Boiler Nos. 1 through 3 and to Construct and Operate a New Boiler No. 4

DATE: March 28, 2019

BACKGROUND INFORMATION

On May 15, 2018, the Air Quality Division (AQD) received a permit application package to construct a new boiler and retrofit three older boilers at the Georgetown University Central Utilities Plant, located at 3700 O Street NW. An amendment to the application package was received on September 14, 2018.

The new boiler to be constructed, designated Boiler 4 (EPN-4) is to be a 119.8 MM Btu per hour rated heat input Indeck Keystone Energy boiler with low NOx burners and a flue gas recirculation system (12 ppm NOx). It will have a maximum steam production capacity of 100,000 lb/hr. It will be fueled by natural gas and No. 2 fuel oil. A new stack with a height of 77 to 81 feet will be constructed to vent exhaust from the unit.

The project also involves the retrofit of three existing boilers (Boiler Nos. 1, 2, and 3 and also known as EPN-1, EPN-2, and EPN-3, respectively) by replacing the existing burners with low NO_x burners. The units will be expected to emit no more than 12 ppm NO_x. The equipment is to be manufactured by Indeck Keystone Energy. The three boilers will each have a maximum steam production capacity of 100,000 lb/hr. Three new stacks with heights of between 77 and 81 feet above grade that will replace the corresponding existing three stacks 56 feet in height above grade.

Appropriate stack heights for the four units were determined using air dispersion modeling techniques, using EPA's AERMOD model, to optimize the minimization of downwind concentrations of pollutants, while also minimizing the structural visibility of the stacks.

The permit action will be published in the DC Register and on the Department's website on April 5, 2019. Public comments for the permit action will be solicited through May 6, 2019.

Georgetown University has not requested that any of the materials submitted with this application be held confidential.

REGULATORY REVIEW

20 DCMR Chapter 2, Sections 200 and 201: General Permit Requirements and General Requirements for Permit Issuance

The Georgetown University is an air pollution source for criteria and other air pollutants. The applicant is requesting a permit to construct and retrofit fuel burning equipment units greater than 5 MMBTU/hr heat input. Thus Chapter 2 permits are required for each of the units.

At the request of Georgetown University, some permit requirements that go above and beyond minimum regulatory requirements have been established in the permits pursuant to authority under to 20 DCMR 201. In particular, fuel oil usage has been limited to an equivalent of 1% of the maximum operational capacity of the units. Additionally, steam output from the four units in combination has been limited to 300,000 pounds of steam per hour (where the total capacity of the units is 400,000 pounds of steam per hour).

Additionally, as a result of modeling related to this project, Georgetown University has identified that there is a grassy area directly north of the Central Utility Plant, south of the Yates Lot Y parking lot where, under certain circumstances, primarily related to cooling towers, exceedances of the PM2.5 24-hour National Ambient Air Quality Standard (NAAQS) could be exceeded. They proposed excluding the public from access to this area should the Department find that advisable. A requirement to do so has been added as Condition I(i) of the permits.

20 DCMR Chapter 2, Section 204: Permit Requirements for Major Sources Located in Non-Attainment Areas (New Source Review)

Based on the 12 ppm NOx emission rate and the fuel usage limit for No. 2 fuel oil (or other distillate oil) contained in Condition III(b) of the permit, it is estimated that the new Boiler No. 4 will have a potential to emit approximately 8.0 tons per year of NOx, well below the 25 tons per year trigger threshold for Non-attainment New Source Review (NNSR). Similarly, potential emissions of VOCs from Boiler 4 are to be 2.1 tons per year. As such, emissions increases of non-attainment pollutant precursors do not meet the definition of "significant" and therefore do not trigger NNSR. The retrofits of Boilers 1, 2, and 3 will each reduce emissions, so these will not trigger NNSR either.

20 DCMR Chapter 2, Section 209: Permit Requirements for Non-Major Stationary Sources (Minor New Source Review)

Effective January 1, 2014, the requirements of this section are applicable to any source required to obtain a chapter 2 permit to construct a new stationary source, modify an existing stationary source, or install or modify an air pollution control device on a stationary source that results in an

increase in potential to emit (PTE) of equal to or greater than five tons per year (5 TPY) from an individual unit of any of the listed pollutants (VOC, NOx, SO_2, PM10, PM2.5, and total HAPs).

The proposal to equip Boiler Nos. 1 through 3 with low NOx burners constitute modifications to existing stationary sources. However, because emissions are being reduced, these modifications do not trigger the applicability of MNSR.

Regarding Boiler 4, only the NOx change in PTE for Boiler 4 is greater than 5.0 tons per year (8.0 tons per year). As a result a NOx control technology evaluation (referred to in the application as a BACT determination) was completed for Boiler 4. The conclusions of the evaluation indicate that the proposed use of low NOx burners, flue gas recirculation systems, and an oxygen trim system for combustion control constitutes NO_x BACT for Boiler 4 and satisfies the requirements of 20 DCMR 209. These controls are designed to limit emissions and maximize the reduction of pollutants and have been incorporated as requirements in the permit. Please see Appendix D1 of the application for the details of this evaluation.

20 DCMR Chapter 3: Operating Permits and Acid Rain Programs

Georgetown University is a major source subject to the requirement to obtain and maintain a Title V permit to operate pursuant to 20 DCMR Chapter 3. The facility has an existing Title V permit that is in the process of being modified and renewed. The modifications to Boilers 1 through 3 and the installation of Boiler 4 will be required to be reflected in the facility-wide Title V permit. Consistent with 20 DCMR 301.1(a)(2), Condition I(h) of the draft Chapter 2 permits has been written to require that the Permittee apply for incorporation of these units into the Title V permit within 12 months of initial startup of each new or modified unit.

Acid rain program requirements apply to stationary fossil-fuel fired electric generators with a capacity of more than 25 MW that produce electricity for sale. Boiler Nos. 1 through 4 do not meet this description, and are therefore not subject to the acid rain program.

20 DCMR Chapter 5: Source Monitoring and Testing

The draft Chapter 2 permits incorporate numerous monitoring, testing, record keeping, and reporting requirements. Many of these are established as requirements of other regulations, such as 40 CFR 60, Subpart Dc, and are consistent with the requirements of Chapter 5. Others are established to ensure practical enforceability of requirements established pursuant to Chapter 2 authority or older regulations that do not contain specific requirements of this type. Throughout the draft permits, references to relevant sections of Chapter 5 have been included where appropriate. It should be noted that general Chapter 5 authority is not always cited in the permits when other regulations specify more exact requirements that also meet the more general requirements of Chapter 5.

In particular, continuous emission monitoring systems (CEMS) for monitoring NOx emissions are required pursuant to Condition IV(a), while continuous opacity monitoring systems (COMS)

for monitoring visible emissions are required pursuant to Condition IV(b). Proper operation and calibration of the CEMS and COMS are required pursuant to Condition IV(c).

Fuel sulfur sampling and testing or maintenance of records of fuel supplier documentation is required pursuant to Condition IV(f).

Emission testing of pollutants not covered by the CEMS and COMS are required pursuant to Condition IV(g), (h), and (i). Condition IV(i) also requires reporting of the results of such testing. Additional testing may be required by the Department pursuant to Condition IV(j).

The three-year records retention requirement in 20 DCMR 500.8 is streamlined with longer duration record retention requirements in Condition V(a) for all records required to be maintained pursuant to the permit. Throughout Condition V of the permit, records are required to be maintained in accordance with 20 DCMR Chapter 5 in order to ensure that compliance (or noncompliance) with emission limits, operational requirements, and testing and monitoring requirements are documented and can be subsequently evaluated or reported to the Department.

Similarly, Chapter 5 authority is cited to require reporting of various documentation throughout Condition VI of the permit. In particular, notification of equipment startup is required per Condition VI(d) and semiannual excess emission reports are required pursuant to Conditions VI(g) and (h).

20 DCMR Chapter 6, Section 600: Fuel Burning Particulate Emission
All four boilers are held to a total suspended particulate matter emission limit of 0.06 lb/MMBTU at all times, pursuant to this regulation. This requirement is contained in Condition II(e)(1) of the permits. While Boiler 4 is subject to a more stringent standard pursuant to other regulations, these other standards to not apply during startup or shutdown, so both standards are listed separately in Condition II(e).

20 DCMR Chapter 6, Section 606: Visible Emissions
Boilers Nos. 1 and 2 each began initial operation before January 1, 1977. Therefore, 20 DCMR 606.2 requires visible emissions from Boiler Nos. 1 and 2 to not exceed ten (10) percent (10%) opacity (un-averaged) except that:

(a) Opacity not in excess of forty percent (40%) (unaveraged) shall be permitted for two (2) minutes in any sixty (60) minute period and for an aggregate of twelve (12) minutes in any twenty-four hour (24 hr.) period other than during start-up of equipment;

(b) During start-up of equipment, opacity not in excess of forty percent (40%) (averaged over six (6) minutes) shall be permitted for an aggregate of five (5) times per start-up; and

(c) In addition to the emissions permitted under § 606.2(a), during shutdown of equipment, opacity not in excess of fifteen percent (15%) (unaveraged) shall be allowed and in addition, opacity not in excess of thirty percent (30%) (averaged over three (3) minutes)

This set of requirements is reflected in Condition II(h) of the permits.

Boiler No. 3 began initial operation after January 1, 1977 and Boiler No. 4 will began operation after January 1, 1977. Therefore, pursuant to 20 DCMR 606.1 visible emissions from Boiler Nos. 3 and 4 shall not be emitted into the outdoor atmosphere; except that discharges not exceeding forty percent (40%) opacity (unaveraged) shall be permitted for two (2) minutes in any sixty (60) minute period and for an aggregate of twelve (12) minutes in any twenty-four hour (24 hr.) period during start-up, cleaning, soot blowing, adjustment of combustion controls, or malfunction of equipment.

An exception to the above requirement for Boilers 3 and 4 can be granted to establish an emission limit of up to 10% opacity in certain circumstances pursuant to 20 DCMR 606.3. Georgetown University provided justification for a 5% opacity standard in a March 12, 2019 letter from Mr. Gregory Simmons (transmitted by email to Stephen Ours by Bob Sidner, a consultant for the facility, on March 15, 2019). This justification explained why the equipment meets the standards set forth for an alternate opacity standard in 20 DCMR 606.3. Based on this evaluation and the fact that the compliance determination method is the use of COMS, which, as a result of the limitations of their technology, fluctuate around the true opacity slightly, and would therefore never show compliance with an instantaneous zero percent opacity standard, such as that in 20 DCMR 606.1, the Department has granted a 5% opacity standard pursuant to 20 DCMR 606.3. This standard has been reflected Condition II(f) for both units.

Additionally, it should be noted that 20 DCMR 606 is subject to a call for a State Implementation Plan (SIP) revision from EPA, commonly referred to as the "Startup, Shutdown, and Malfunction SIP call". The Department is evaluating potential revisions to the regulation which would potentially change and supersede the visible emissions requirements for all four boilers. This is reflected in notes incorporated in both permit conditions.

As noted above, Georgetown University intends to use COMS to monitor for compliance with the opacity standards in order to ensure continuous compliance with visible emissions standards. As such, appropriate requirements related to the installation, certification, operation, and maintenance of the COMS equipment has been incorporated into the permit. These requirements generally reflect the requirements for COMS incorporated in 40 CFR 60.

20 DCMR Chapter 8, Section 801: Sulfur Content of Fuel Oils

The purchase, sale, offer for sale, storage, transport, or use of No. 2 commercial fuel oil limitation of 20 DCMR 801.3 is applicable to all four units. On and after July 1, 2018, the purchase, sale, offer for sale, storage, transport, or use of number two (No. 2) commercial fuel oil

is prohibited if it contains more than fifteen parts per million (15 ppm) or fifteen ten-thousandths percent (0.0015%) by weight of sulfur, unless otherwise specified in § 801.5.

Therefore, a limit of 0.0015% sulfur by weight has been included in Condition III(a) of the permits.

20 DCMR Chapter 8, Section 804. 1: Nitrogen Oxides Emissions
Because the units are fossil-fuel-fired steam-generating units with a heat input greater than 100 MMBTU/hr, this regulation is applicable, and each of the units shall not discharge NOx in excess of the limits set forth in Appendix 8-1 of 20 DCMR, Chapter 8. Appendix 8-1(a), which limits emissions to 0.2 lb/MMBTU heat input, maximum 2-hour average applies to the equipment when burning natural gas. Appendix 8-1(b), which limits emissions to 0.3 lb/MMBTU heat input, maximum 2-hour average, applies to the equipment when burning distillate fuel oil (including No. 2 fuel oil).

These requirements are incorporated into Condition II(d)(1) of the permit. Compliance is determined with the use of CEMS. As such, appropriate requirements related to the installation, certification, operation, and maintenance of the CEMS equipment has been incorporated into the permit. These requirements generally reflect the requirements for CEMS incorporated in 40 CFR 60.

20 DCMR Chapter 8, Section 805: Reasonably Available Control Technology for Major Stationary Sources of the Oxides of Nitrogen
Because the units are fossil-fuel-fired steam-generating unit with a heat input greater than 20 MMBTU/hr at a major stationary source of NOx, 20 DCMR 805.1(a)(1) is applicable to all four of the boilers. Georgetown is required to comply with the following:

1. 20 DCMR 805.2 (a) – Georgetown University shall maintain continuous compliance with all the applicable emission limitations in 20 DCMR 805. Compliance shall be determined by test methods approved by the District and EPA or by CEMS satisfying the requirements of 40 CFR 60 Appendix B. Georgetown University has opted to install and operate CEMS for this purpose. As such, the relevant requirements of 40 CFR 60, Appendix B have been incorporated throughout the permits.

2. 20 DCMR 805.5(a) requires combustion adjustments in accordance with 20 DCMR 805.8 by May 1 of each year for boilers with heat input ratings greater than 20 MMBTU/hr. This is applicable to all four units and has been incorporated in Conditions II(k) and III(f) and (g). Related records must be maintained as specified in Condition V(i). These combustion adjustment requirements have been streamlined with similar, but not identical, requirements in 40 CFR 60, Subpart JJJJJJ.

3. 20 DCMR 805.5(c)(2) establishes, for face-fired fossil-fuel-fired steam-generating units with heat input ratings in excess of 100 MMBTU/hr heat input, such as all four of these boilers, to 0.25 lb/MMBTU NOx, based on a calendar day average when combusting fuel oil or a combination of fuel oil and natural gas. It also establishes a limit of 0.20 lb/MMBTU NOx, based on a calendar day average, when combusting natural gas only. These limits are incorporated into Condition III(d)(3).

4. 20 DCMR 805.5(d) requires submission of an emissions control plan. For the purposes of compliance with this requirement, the Department considers the permit application to meet this requirement.

5. 20 DCMR 805.5(e) requires that equipment subject to 20 DCMR 805.5(c), such as this equipment, must use CEMS to document continuous compliance. 20 DCMR 805.5(e)(1) establishes requirements for the operation of CEMS to ensure continuous compliance with the requirements of 20 DCMR 805.5. Though not word-for-word, these requirements have been incorporated into Condition IV(a), along with similar, and more specific requirements from other regulations.

20 DCMR Chapter 9, Section 903: Odorous or Other Nuisance Air Pollutants
"An emission into the atmosphere of odorous or other air pollutants from any source in any quantity and of any characteristic, and duration which is, or is likely to be injurious to the public health or welfare, or which interferes with the reasonable enjoyment of life or property is prohibited [20 DCMR 903.1]" is applicable to all sources. This requirement is contained in Condition II(j) of the permits.

40 CFR Part 60 Subpart Db – Standards of Performance for Industrial-Commercial- Institutional Steam Generating Units (NSPS Subpart Db)
NSPS Subpart Db applies to steam generating units with a heat input capacity greater than 100 MMBTU/hr heat input, the construction, modification, or reconstruction of which commenced after June 19, 1984. Construction of Boiler Nos. 1 and 2 commenced prior to June 19, 1984. Therefore, pursuant to 40 CFR 60.40b, NSPS Subpart Db does not apply to Boiler Nos. 1 and 2.

Boiler Nos. 3 and 4 both have rated heat input capacities in excess of 100 MMBTU/hr. Based on their furnace volumes and heat input capacities, they both have heat release rates in excess of 70,000 BTU/hr-ft^3, and are therefore considered to be high heat release rate boilers per 40 CFR 60.41b. Boiler No. 3 was constructed in 1998 and Boiler No. 4 will be constructed after February 28, 2005. Based on this information, both units are subject to the requirements of 40 CFR 60 Subpart Db as follows:

Boiler #3 burns natural gas and ultra-low sulfur diesel (ULSD, <0.0015% sulfur by weight). Emissions from Boiler #3 shall not exceed:

1. 0.20 lb SO_2/MMBTU heat input or shall not combust fuel oil with a sulfur content greater than 0.5% by weight [40 CFR 60.42b(a), (j)].

2. 20 percent opacity (six-minute average) and 27 percent opacity (one 6-minute period per hour) [40 CFR 60.43b(f)]. These standards do not apply during startup or shutdown per 40 CFR 60.43b(g).

3. 0.20 lb NO_x/MMBTU heat input when firing natural gas or oil [40 CFR 60.44b(l)(1)].

Boiler #4 will burn natural gas and ultra-low sulfur diesel (ULSD, <0.0015% sulfur by weight). Emissions from Boiler #4 shall not exceed:

1. 0.20 lb SO_2/MMBTU heat input or shall not combust fuel oil with a sulfur content greater than 0.5% sulfur by weight [40 CFR 60.42b(a), (j)].

2. 20 percent opacity (six-minute average) and 27 opacity (one 6-minute period per hour) [40 CFR 60.43b(f)]. These standards do not apply during startup or shutdown per 40 CFR 60.43b(g).

3. 0.03 lb PM/MMBTU heat input [40 CFR 60.445(h)(1)].

4. 0.20 lb NO_x/MMBTU heat input when firing natural gas or oil [40 CFR 60.44b(l)(1)].

Compliance will be demonstrated as specified in 40 CFR 60.45b and 60.46b. Monitoring, record keeping, and reporting shall be completed as specified in 40 CFR 60.47b through 60.49b.

These requirements, as well as related CEMS and COMS requirements where the regulations reference 40 CFR 60, Subpart A and Appendices B and F, have been incorporated throughout the permits to ensure that compliance with all of the requirements of NSPS Subpart Db enforceable as a practical matter. It should also be noted that several of the requirements of NSPS Subpart Db have been streamlined as described in the permits with requirements of other regulations.

<u>40 CFR 63, Subpart DDDDD: National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters (NESHAP Subpart DDDDD)</u>
Pursuant to 40 CFR 63.7485, 63.7490 and 63.7575, NESHAP Subpart DDDDD applies to new industrial commercial or institutional boilers at major sources of Hazardous Air Pollutants (HAPs). Georgetown University is not a major source of HAPs. Therefore Subpart DDDDD does not apply.

40 CFR 63, Subpart JJJJJJ: National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources (NESHAP Subpart JJJJJJ()
NESHAP Subpart JJJJJJ applies to new, reconstructed, or existing industrial commercial or institutional boilers that are not exempt pursuant to 40 CFR 63.11195 and are located at or part of an area source of HAPs.

Boiler Nos. 1, 2, and 3 each burn natural gas and fuel oil, and they have heat input ratings greater than 10 MMBTU/hr and were constructed before June 4, 2010. Pursuant to 40 CFR 98.11194, 63.11200 and 63.11237, these boilers are subject to the requirements of Subpart JJJJJJ and are each classified as existing large boilers. Therefore, the following Subpart JJJJJJ work practice standards and management practices apply to Boiler Nos. 1, 2 and 3:

1. Each boiler, including associated air pollution control equipment and monitoring equipment, must be operated and maintained in a manner consistent with safety and good air pollution control practices for minimizing emissions. [40 CFR 63.11205(a)]

2. Each boiler must undergo an initial tune-up and subsequent tune-ups every two years thereafter. [40 CFR 63.11214, 40 CFR 63.11223(a) and (b)]

3. Each boiler must undergo an initial energy assessment performed by a qualified energy assessor by March 21, 2014. [40 CFR 63.11201(b) and 40 CFR 63.11196(a)(3)]

Boiler No. 4 will burn natural gas and fuel oil, has a heat input rating greater than 10 MMBTU/hr, and will be constructed after June 4, 2010. Boiler No. 4 will use an oxygen trim system for combustion control. Pursuant to 40 CFR 98.11194, 63.11200 and 63.11237, Boiler No. 4 is subject to the requirements of Subpart JJJJJJ. Therefore, the following Subpart JJJJJJ emission limits, work practice standards and management practices apply to Boiler No. 4:

1. The boiler, including associated air pollution control equipment and monitoring equipment, must be operated and maintained in a manner consistent with safety and good air pollution control practices for minimizing emissions. [40 CFR 63.11205(a)]

2. Minimize the boiler's startup and shutdown periods following the manufacturer's recommended procedures, if available. [40 CFR 63.11223(g)]

3. PM (filterable) emissions shall not exceed 0.03lb per MMBTU. [40 CFR 63.11201(a)]

4. Must undergo a tune-up no later than 61 months after start-up and subsequent tune-ups every five years thereafter. [40 CFR 63.11214, 40 CFR 63.11223]

Compliance will be demonstrated as specified in 40 CFR 63.11222 and 63.11223. Records shall be kept and notifications shall be submitted as specified in 40 CFR 63.11225.

All requirements of 40 CFR 63, Subpart JJJJJJ have been incorporated into the permits. Several of the relevant requirements have been streamlined with other regulatory requirements, as noted in the permits.

Compliance Assurance Monitoring

Georgetown University is not subject to the provisions of 40 CFR Part 64, Compliance Assurance Monitoring (CAM) plan. In order to be subject to these requirements, the individual unit must have a potential to emit greater than major source threshold of a covered pollutant, before application of controls. This will not be the case with the units following the construction project. Additionally, the units do not use control devices that are not integral to the operations of the units to comply with emission limits.

RECOMMENDATIONS

The proposed project and attached permits comply with all applicable federal and District air pollution control laws and regulations.

Public comments for the permit action will be solicited from April 5, 2019 through May 6, 2019. AQD will resolve any comments received before taking final action on the permit applications. If no comments are received, we recommend that permit Nos. 7214, 7215, 7216 and 7217 be issued in accordance with 20 DCMR 200.1 and 200.2, promptly following the end of the public comment period.