

GOVERNMENT OF THE DISTRICT OF COLUMBIA
Department of Energy and Environment

CHAPTER 2 TECHNICAL SUPPORT MEMORANDUM

TO: File

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

FROM: Olivia Achuko *OA* 2/4/2025
Environmental Engineer

**SUBJECT: Smithsonian Institution, National Zoological Park
Permit Nos. 7381 and 7382 to Modify Two 20.17 MMBTU per Hour, Dual
Fuel-Fired (Natural Gas/No. Fuel Oil) Steam Boilers**

DATE: February 4, 2025

BACKGROUND INFORMATION

On or about April 2, 2024, the Air Quality Division (AQD) of the Department of Energy and Environment (DOEE) received applications, with cover letter dated March 29, 2024, from the Smithsonian Institution/Board of Regents (the applicant) for the modification and operation of two existing dual fuel-fired (natural gas as primary and No. 2 fuel oil as back-up fuel) boilers. The boilers will each be rated at 20.17 MBTU/hour of heat input when burning natural gas and 19.35 MMBTU/hr when burning No. 2 fuel oil. The boilers are located in the Central Heating Plant of the National Zoological Park, 3001 Connecticut Avenue NW, Washington DC.

The modification at this source consists of the installation of new low oxides of nitrogen (NO_x) burners on two existing boilers (CU-1 and CU-2) that are currently operating under Title V Operating Permit No. 024-R3. The potential to emit (PTE) calculations for this source are based upon operating each boiler for 8,760 hours per year. Emission factors were obtained from manufacturer's provided emission data, if available, or from AP-42, Section 1.3 and Section 1.4.

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

REGULATORY REVIEW

20 DCMR Chapter 2, Section 200: General Permit Requirements

The two boilers, as they are to be modified, will be rated at 20.17 MMBTU/hr heat input when burning natural gas and 19.35 MMBTU/hr when burning No. fuel oil-fired). These units have heat input ratings greater than 5 MMBTU/hr, and therefore require pre-construction permits pursuant to 20 DCMR 200 to perform the modifications.

CHAPTER 2 TECHNICAL SUPPORT MEMORANDUM

Smithsonian Institution, National Zoological Park

Permits Nos. 7381 and 7382 to Modify and Operate Two Dual-Fuel Boilers

February 4, 2025

Page 2

20 DCMR Chapter 3: Operating Permits and Acid Rain Programs

The facility is a major source of NO_x, and is therefore subject to Chapter 3 (Title V) permitting requirements. They currently hold Title V permit No. 024-R3. That permit expires June 22, 2027. Condition I(g) of the application requires that the applicant submit an application to incorporate the requirements of these Chapter 2 permits into the Title V operating permit within 12 months of issuance of these permits.

20 DCMR Chapter 5, Section 500: Source Monitoring and Testing Requirements

Appropriate monitoring and testing requirements have been included in Condition IV of the permits with associated record keeping and reporting requirements in Condition V of the permits to ensure that compliance can be fully evaluated.

20 DCMR Chapter 6, Section 600: Fuel Burning Particulate Emission

Total suspended particulate (TSP) emissions from each of the boilers shall not exceed 0.09 pounds per million BTU. This requirement is contained in Condition II(c) of the permit. Stack testing to determine compliance is required pursuant to Condition IV(b).

It should be noted that this regulation refers to “particulate matter” rather than TSP, however, at the time that the regulation was promulgated, this term was understood to refer to TSP. Since that time, the more general term “particulate matter” is no longer specific enough to clarify what is meant. As a result, the permit document refers to TSP rather than using the specific term used in the regulation.

20 DCMR Chapter 6, Section 606: Visible Emissions

Both boilers are subject to the visible emissions limitations of 20 DCMR 606.1. Visible emissions shall not be emitted from the equipment covered by this permit except that discharges shall be permitted for two (2) minutes during any startup, cleaning, adjustment of combustion or operational controls, or regeneration of emissions control equipment; provided, that such discharges shall not exceed twenty percent (20%) opacity (unaveraged) when burning exclusively natural gas and twenty-seven percent (27%) opacity (unaveraged) when burning fuel oil or a combination of fuel oil and natural gas. This requirement is contained in Condition II(b) of the permits. Specific testing requirements related to this regulation are also included in the permits in Conditions IV(b), (c), and (d).

Additionally, this regulation establishes certain operational, maintenance, and training requirements which have been incorporated into Conditions III(c), (d), and (e). Record keeping requirements are incorporated into Conditions V(c) and (d).

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

Pursuant to 20 DCMR 801.3, no No. 2 commercial fuel oil that contains more than fifteen thousandths percent (0.0015%) by weight of sulfur shall be purchased, sold, offered for sale, stored, transported, or used in the District. This restriction is contained in Condition III(b) of the permits.

CHAPTER 2 TECHNICAL SUPPORT MEMORANDUM

Smithsonian Institution, National Zoological Park

Permits Nos. 7381 and 7382 to Modify and Operate Two Dual-Fuel Boilers

February 4, 2025

Page 3

20 DCMR Chapter 8, Section 805: Reasonably Available Control Technology for Major Stationary Sources of the Oxides of Nitrogen (NO_x RACT)

NO_x RACT is applicable to this facility pursuant to 20 DCMR 805.1(a) because it is a major source of NO_x. 805.4 through 805.7, boilers with heat input ratings in excess of 5 MMBTU/hr are subject to tune-up requirements according to 20 DCMR 805.5(b). This requirement has been included in Condition II(e). Tuning is required every calendar year per 20 DCMR 805.9(b) because the units are capable of firing at a rate in excess of 20 MMBTU/hr. The record keeping requirements of 20 DCMR 805.9(c) are included in Condition V(h) of the permit. Note that a regulatory proposal to amend the schedule for annual tuning is currently undergoing public comment. A footnote to Condition II(e) has been included in the permit to indicate that if a new regulatory schedule is adopted, it will supersede the schedule specified in the permit language.

Because the units are not larger than 25 MMBTU/hr heat input, the emission limits contained in 20 DCMR 805.5 are not applicable.

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(d) of the permits. Additionally, the affirmative defense provisions of 20 DCMR 903.13(b) have also been included in Condition II(d). The requirements to develop an odor control plan (OCP) do not apply to this facility at this time.

40 CFR 60, Subpart Dc – Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units (NSPS Subpart Dc)

Combustion units operating as dual-fuel boilers are potentially subject to NSPS Subpart Dc. Applicability for NSPS for boilers is based on unit size and age. The boilers must have heat input ratings greater than 10 MMBTU/hr and less than 100 MMBTU/hr and must have been installed after June 9, 1989. Both criteria for age and size must be met for applicability of 40 CFR 60.40c – Subpart Dc to be triggered. The two (2) dual fuel boilers in operation CU-1 and CU-2 have a heat input capacity of 20.17 MMBTU/hr when burning natural gas and 19.35 MMBTU/hr when burning fuel oil and were installed in 1995. The units meet both the size and age thresholds; therefore, Subpart Dc is applicable to these units. The requirements of Subpart Dc have been incorporated in the permit as applicable. Note that the “Standard for particulate matter (PM)” in 40 CFR 60.43c is not applicable to these units as they are below 30 MMBTU/hr in rated heat input. The sulfur in fuel requirements of 40 CFR 60.42c(d) have been streamlined with the more stringent requirements of 20 DCMR 801.3 in Condition III(b) of the permits. Monitoring and testing requirements are contained in Condition IV(e).

40 CFR 63, Subpart JJJJJ: National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers at Area Sources (NESHAP Subpart JJJJJ)

CHAPTER 2 TECHNICAL SUPPORT MEMORANDUM

Smithsonian Institution, National Zoological Park

Permits Nos. 7381 and 7382 to Modify and Operate Two Dual-Fuel Boilers

February 4, 2025

Page 4

This regulation does not apply to the two boilers as they are prohibited from operating using No. 2 fuel oil except during natural gas interruptions and up to 48 hours per year for periodic testing, maintenance, and operator training. See Condition III(c) of the permits. They are therefore characterized as “gas-fired boiler[s]” as defined in 40 CFR 63.11237, and are thence not subject to 40 CFR 63, Subpart JJJJJ in the category of oil-fired boilers (see 40 CFR 63.11200) pursuant to 40 CFR 63.111959(e). Appropriate record keeping requirements have been included in the permit to ensure that the equipment continues to be operated as “gas-fired boilers”.

RECOMMENDATIONS

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

The permit action for the boilers will be published in the DC Register and on DOEE’s website on February 14, 2025. Public comments for the permit action will be solicited from February 14, 2025 through March 17, 2025. Concerned persons may also request a public hearing on this subject during this period. AQD will address any comments received before taking final action on the applications. If no comments are received, I recommend that permit Nos. 7381 and 7382 be issued in accordance with 20 DCMR 200 promptly following the end of the public comment period.

SSO/NOA