

GOVERNMENT OF THE DISTRICT OF COLUMBIA
Department of Energy and Environment

CHAPTER 2 TECHNICAL SUPPORT MEMORANDUM

TO: Stephen S. Ours, P.E. *SSO*
Chief, Permitting

FROM: John Nwoke *JN*
Environmental Engineer

SUBJECT: **Carrollsborg A, Condominium
Permit Nos. 7132 and 7133 to Construct and Operate Two MicroTurbine
Generators**

DATE: January 17, 2017

BACKGROUND INFORMATION

On June 27, 2016, the Air Quality Division (AQD) receive two air permit applications dated May 24, 2016 from Carrollsborg A, Condominium (CAC) to construct and operate two microturbine generators to service a residential condominium complex. The complex and equipment are located at 1250 4th Street SW, Washington, DC. CAC indicated that the proposed equipment would only burn natural gas. CAC further indicated that the project was necessary to satisfy its obligations to PJM Interconnection, the electric grid independent system operator (ISO) covering the District of Columbia and surrounding states. The equipment consists of two identical 65 kW_e Capstone Turbine Corporation natural gas-fired MicroTurbines, MT1 & MT2.

The permit applications were not assigned for processing until early September 2016 due to the novelty of the equipment and research involved in handling this sort of equipment. Prior to assigning the permit for processing though, the Branch Chief had communicated with Mr. Keith Kirtley of Boland Services (a contractor) to assess any regulatory issues with the equipment. The assigned permit engineer did some research on microturbines and found that the neighboring states like Maryland and Delaware, for instance, have few or no regulations for microturbines, perhaps due to the low emissions associated with the operation of the equipment. However, the California Air Resource Board has regulations for microturbines. These regulations are administered by the various Air Quality Management Districts in the State of California.

CAC has not requested that any portions of the application be held confidential.

TECHNICAL INFORMATION

CAC applied for a permit to construct and operate the two new natural gas-fired microturbine generators, each having the capacity to produce 0.065 megawatts (MW) of electrical power. The power produced is to be utilized under an arrangement with PJM Interconnection. Per

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documentation from the manufacturer, Capstone Microturbines are considered inherently clean and able to meet strict emissions standards. The exhaust emissions are established under full power and standard operating conditions. The emissions for the C65 NG Standard units are the basis of the emissions calculations in the applications. However, data for sulfur dioxide and particulate matter were not included. Following some research and further study, the emissions for those pollutants were computed and appropriate limits were included in the permits.

Emission Evaluation

CAC analyzed the project as a minor source because the potential nitrogen oxides emissions from the source are 0.13 tons per year. This is less than the major source threshold of 25 tons per year as shown on the tables below. Note that the tables below reflect the emission rates based on the manufacturer's data with the exception of sulfur dioxide and particulate matter which are fuel dependent, but were calculated based on AP-42 emission factors and natural gas properties.

Table 1: Total 12-Month Rolling Emissions from Each MicroTurbine

Pollutant	12-Month Rolling Emissions Limit (tons/yr)
PM (Total) ^{1,2}	0.0055
SOx	0.0099
NOx	0.13
VOC	0.03
CO	0.36

1. Total PM is the sum of the filterable PM and condensable PM.

2. All PM is expected to be smaller than 2.5 microns, so PM (Total) equals PM_{2.5}

Table 2- Maximum Hourly Emissions (lbs/hr)

Pollutants	Hourly Emissions
PM (Total)	0.0013
SOx	0.00226
NOx	0.03
VOC	0.0065
CO	0.082

REGULATORY REVIEW

20 DCMR Chapter 2, Section 200: General Permit Requirements

The provisions of this section are applicable to the microturbines as stationary sources of air pollution. A permit is therefore required to operate each microturbine generators pursuant to 20 DCMR 200.1 and 200.2. The operating permits will be valid for five years. It should be noted

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that, despite heat input ratings below 5 MMBTU/hr, these units are not eligible for the “fuel burning equipment” exemption from permitting pursuant to 20 DCMR 200.12 because the equipment does not meet the definition of “fuel burning equipment”. The definition of “fuel burning equipment” in 20 DCMR 199 is as follows:

Fuel burning equipment - any furnace, boiler, apparatus, stack, and all appurtenances in connection with, used in the process of burning fuel for the primary purpose of producing heat or power by indirect heat transfer.

The Capstone MicroTurbine technology uses direct heat transfer, rather than indirect heat transfer, thus it does not qualify for the permit exemption.

20 DCMR Chapter 2, Section 204: Permit Requirements for Sources Affecting Non-Attainment Areas

The review of the Chapter 2 permit applications indicated that the proposed equipment would emit maximum potential emissions of 0.13 tons of NO_x per 12-month rolling period. The significance threshold to trigger NSR requirements for NO_x is 25 tons per year per the definition of “significant” in 20 DCMR 299. The proposed project will not generate emission in excess of the significance threshold, and therefore the project is not considered a new major stationary source or a “major modification” as defined in 20 DCMR 299. Therefore, pursuant to 20 DCMR 204.1, a major non-attainment new source review analysis is not required.

Prevention of Significant Deterioration (PSD) (Federal program)

The project will have a potential to emit (PTE) of less than 250 tpy for all pollutants, except greenhouse gases, which is also below the applicable threshold, and so this project is not subject to the PSD program (implemented by EPA).

20 DCMR Chapter 2, Section 205: New Source Performance Standards

Subsection 205.1 of 20 DCMR adopts the federal New Source Performance Standards (NSPS) as in effect on September 30, 1997. Additionally, in order to be sufficiently protective of public health pursuant to 20 DCMR 201, the Department places all current applicable NSPS standards into all Chapter 2 permits issued.

The microturbines are not subject to NSPS Subpart KKKK, Standards of Performance for Stationary Combustion Turbines, because they are below the 10 MMBTU/hr heat input size threshold for applicability. Based on the rated fuel consumption of 816 cubic feet of natural gas per hour stated in the permit application, this equates to a heat input rating of 0.83 MMBTU/hr, well below the 10 MMBTU/hr threshold.

Similarly, the units are not subject to 40 CFR 60, Subpart GG, Standards of Performance for Stationary Gas Turbines, as they are below an identical 10 MMBTU/hr heat input applicability threshold.

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20 DCMR Chapter 2, Section 209: Minor New Source Review

Each individual unit has the potential to emit less than 5 tons per year of the pollutants addressed by this regulation, therefore applicability of this regulation is not triggered for these units.

20 DCMR Chapter 3: Operating Permits and Acid Rain Programs

The project is not subject to the major source operating permit program or the acid rain program because the facility is not a major source facility.

20 DCMR Chapter 5: Testing, Monitoring and Record keeping Requirements

Testing, monitoring and record keeping requirements pursuant to 20 DCMR 500.8 and 502 have been included in the permit documents under Conditions IV and V. Due to the low-emitting nature of the technology involved, the type of fuel used (natural gas), and the lack of regulations specific to this type of equipment, few monitoring or testing requirements are appropriate. AQD did include minimal monitoring and testing requirements related to visible emissions, as well as record keeping to ensure that the equipment is being operated and maintained appropriately.

Chapter 6: Particulates

20 DCMR 600.1 is not applicable to the equipment. This section covers “fuel burning equipment”. As discussed above, this equipment does not meet the definition of “fuel burning equipment” found in 20 DCMR 199.

The microturbines could emit visible emissions during any period of equipment startup, operation or shutdown and as such 20 DCMR 606.1 is applicable. This requirement is contained in Condition II(b) of the proposed permits. Related monitoring, testing, and record keeping requirements are also included in the permits.

Chapter 8: Asbestos, Sulfur, Nitrogen Oxides, and Lead

The fuel sulfur provisions of 20 DCMR 801 are not applicable because the unit will not use fuel oil. The NOx RACT provisions of 20 DCMR 805 are not applicable because the facility is a minor source of NOx.

Chapter 9, Section 903: Odorous or Other Nuisance Air Pollutants

The microturbines could emit emissions during any period of equipment startup, operation or shutdown and as such 20 DCMR 903.1 is applicable. This requirement is contained in the proposed permits. Minimal monitoring is required as the design of the equipment is unlikely to emit appreciable odors.

Other Regulations

Maximum Achievable Control Technology (MACT) Standards for Gas Turbines

40 CFR 63 Subpart Yyyy for gas turbines regulates/monitors Hazardous Air Pollutants (HAPs) such as acetaldehyde, acrolein, benzene, toluene, xylene, cadmium, chromium, lead, etc, through

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surrogate compounds such as formaldehyde, carbon monoxide (CO) and/or volatile organic compounds (VOCs).

A facility that emits or has the potential to emit 10 tons/year of any single HAP or 25 tons/year of any combination of HAPs, is considered a major source. The proposed project will produce emissions of HAP that are well under the major source thresholds. The facility as a whole is also a minor source of HAPs. Therefore the microturbines are not subject to this MACT standard.

Compliance Assurance Monitoring (CAM) (40 CFR 64)

The project is not subject to 40 CFR 64 because the pre-control emissions of pollutants for all sources are less than the applicability thresholds of the rule.

RECOMMENDATIONS

The applications to construct and operate the microturbines and the proposed permits comply with all applicable federal and District air pollution control laws and regulations.

Public comments for the permit action will be solicited from January 27, 2017 through February 27, 2017. AQD will resolve any comments received before taking any final action on the permit. If no adverse comments are received, I recommend that permit Nos. 7132 and 7033 be issued in accordance with 20 DCMR 200.2 promptly upon the completion of the public review period.

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