

GOVERNMENT OF THE DISTRICT OF COLUMBIA

District Department of the Environment

Air Quality Division



CHAPTER 2 TECHNICAL SUPPORT MEMORANDUM

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

Handwritten signature of Stephen S. Ours in black ink.

FROM: John Nwoke
Engineer

Handwritten signature of John Nwoke in blue ink, followed by the date 11/20/12.

**SUBJECT: The George Washington University
Ross Hall Cogeneration Project
Permit 6618-C to Construct a Cogeneration Facility**

DATE: November 20, 2012

BACKGROUND INFORMATION

On June 13, 2012, the George Washington University (GW) submitted an air permit application to construct and operate a gas turbine and heat recovery steam generator/duct burner at Ross Hall on GW's Foggy Bottom campus. GW indicated that the proposed equipment would only burn natural gas. GW further indicated that the project would reduce its greenhouse gas footprint, because their electricity consumption would come from the highly efficient and low-emission gas turbine/heat recovery steam generator combo. The power produced by the cogeneration plant would be for internal consumption and not for sale.

During the exploratory meeting that GW and the Air Quality Division (AQD) held on June 13, 2012, GW stated its intention not to use the old New Source Review (NSR) rule for the project. Instead GW would apply the proposed new DC NSR to the project. This approach was acceptable to AQD, provided DC Council approved the proposed rule (which occurred in early November 2012). The draft permit could not be published in the DC Register for public comment until the NSR rule was published as a final rule, which occurred on November 16, 2012. Only following the public comment period and resolution of any comments could the Department issue a construction permit to GW.

The permit application and air quality impact analysis were based on GW's interpretation of the new District of Columbia non attainment new source review (DC NSR).

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



CHAPTER 2 TECHNICAL MEMORANDUM

George Washington University Ross Hall Central Utility Plant

Permit #6618-C to Construct a Cogeneration Facility

November 20, 2012

Page 2

TECHNICAL INFORMATION

GW applied for a permit for a modification to its existing facility because of a planned project involving the construction of a natural gas fired gas turbine having the capacity to produce 4.6 megawatts (MW) of electrical power. GW plans to install the gas turbine and heat recovery steam generator (HRSG)/duct burner in the central utility plant within Ross Hall on its Foggy Bottom campus. The HRSG/duct burner will produce steam by burning natural gas. The HRSG/duct burner is rated at 18.9 million Btu/hour heat input. The HRSG/duct burner steam will be used to meet total demand, while excess steam is routed to the existing steam turbine at Ross Hall for generating electric power. Construction for this project is scheduled to begin in July 2013 with completion of construction planned for January 2014.

Emission Evaluation

GWU analyzed the project as a minor modification to the source because the nitrogen oxide emissions from the source is 23 tons per year. This is less than the significance threshold of 25 tons per year as shown on the tables below.

Table 1: Total 12-Month Rolling Emission Limits from Permitted Equipment¹

Pollutant	12-Month Rolling Emissions Limit (tons/yr)
PM (Total) ^{2,3}	7.3
SOx	1.2
NOx	23.0
VOC	2.4
CO	21.4

1. The equipment covered consists of one Solar Centaur 50 gas turbine, and one HRSG/duct burner.

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

3. 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) when Operating At 100 % Load

Pollutants	Solar Centaur 50 Gas Turbine (CT) and HRSG/Duct Burner (HDB)
PM (Total)	1.7
SOx	0.3
NOx	5.2
VOC	0.6
CO	4.9

It should also be noted that, while not an emission limit in the permit, total hazardous air pollutant (HAP) emissions are expected to be no more than 0.4 tons per year in total, well below the NSR significance threshold for applicability.

CHAPTER 2 TECHNICAL MEMORANDUM

George Washington University Ross Hall Central Utility Plant

Permit #6618-C to Construct a Cogeneration Facility

November 20, 2012

Page 3

REGULATORY REVIEW

Chapter 2, Section 200: General Permit Requirements

The provisions of this section are applicable to the equipment as a stationary source of air pollution. A permit is therefore required to construct and subsequently operate the equipment pursuant to 20 DCMR 200.1 and 200.2. The permit to construct will be valid for three years. Upon completion of construction and review by the Department confirming that the equipment was constructed as required, a permit to operate will be issued. The permit to operate may have a duration of up to five years.

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

The review of the Chapter 2 permit applications indicated that the proposed equipment would emit maximum potential emissions of 23 tons of NO_x per 12-month rolling period as measured at the exhaust stack of the HRSG. 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 would not be 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)

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). The potential emissions of greenhouse gases is 36,829 tons per year on a CO_{2e} basis.

The Greenhouse Gas Monitoring and Reporting Rule:

40 CFR 98 has requirements for monitoring and reporting of greenhouse gases such as CO₂, methane and nitrous oxide, if certain thresholds are exceeded. Additionally, combustion sources like gas turbines must report GHG emissions, if they emit 25,000 metric tons (tonnes) or more. The GHG mandatory reporting rule is not, however, an “applicable requirement”, and therefore is not addressed in the attached permit.

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 NSPS standards into all Chapter 2 permits issued.

CHAPTER 2 TECHNICAL MEMORANDUM

George Washington University Ross Hall Central Utility Plant

Permit #6618-C to Construct a Cogeneration Facility

November 20, 2012

Page 4

The gas turbine and HRSG/duct burner will be subject to the NSPS that applies to stationary gas turbines, HRSGs and duct burners (40 CFR Part 60, Subpart KKKK). The NSPS NO_x limit for the proposed modification is 25 ppm at 15% O₂. The NSPS also limits sulfur dioxide (SO₂) emissions to 0.060 lbs/MMBtu of heat input.

Chapter 3: Operating Permits and Acid Rain Programs

The project is not subject to the Acid Rain Program. However, the equipment will be part of a larger facility subject to the major source operating permit program of 20 DCMR Chapter 3. As such, pursuant to 20 DCMR 301.1(a)(2), the facility must apply for the requirements of this permit to be placed into its existing Title V operating permit. This requirement is contained in Condition I(j) of the proposed permit.

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 Condition III(a)(3) and (4), and Condition III(b)(3) and (4). These requirements are also based on 20 DCMR 200.7.

Chapter 6: Particulates

20 DCMR 600.1 is applicable to the equipment, thus its requirements have been included. Additionally, the gas turbine and HRSG/duct burners 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 also contained in the proposed permit.

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 NO_x RACT provisions of 20 DCMR 805 are not applicable because the combustion turbine is rated below 100 MMBTU/hr. The requirements of 20 DCMR 800, covering asbestos abatement are addressed in Condition I(i) in case construction will result in the disturbance of asbestos containing materials.

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

The gas turbine and HRSG/duct burners 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 permit.

Other Regulations

Maximum Achievable Control Technology (MACT) Standards for Gas Turbines

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

CHAPTER 2 TECHNICAL MEMORANDUM

George Washington University Ross Hall Central Utility Plant

Permit #6618-C to Construct a Cogeneration Facility

November 20, 2012

Page 5

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 under the major source threshold. The facility as a whole is also a minor source of HAPs. Therefore the gas turbine is not subject to this MACT standard.

Compliance Assurance Monitoring (CAM) (40 CFR 64)

The project appears not to be subject to this Part because the pre-control emissions of pollutants for all sources are less than 25 tpy for VOC and 100 tpy for ammonia (NH₃) and hydrogen sulfide (H₂S), respectively.

RECOMMENDATIONS

The draft permit will be posted in the D.C. Register on November 23, 2012 for a thirty-day public comment period.

The proposed project and attached permit comply with all applicable federal and District air pollution control laws and regulations. I recommend that the attached permit documents be issued if no comments are received following the completion of the public review period.

JCN

01950