

GOVERNMENT OF THE DISTRICT OF COLUMBIA

District Department of the Environment

Air Quality Division



CHAPTER 2 TECHNICAL SUPPORT MEMORANDUM

TO: File

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SUBJECT: District of Columbia Water and Sewer Authority (DC Water)
Blue Plains – Biosolids Management Facilities Modifications to
Permit No. 6372-C-A2

DATE: June 24, 2014

Background

On June 6, 2014, the Air Quality Division (AQD) received a request from DC Water to modify Permit No. 6372-A1, issued March 15, 2012, in order to accommodate all the final design specifications of the equipment for the biosolids management facilities.

Publication of the permit action is planned for June 27, 2014, in the D.C. Register. Public comment for the permit action will be solicited through July 28, 2014.

The project was undertaken because the Blue Plains facility needs to develop an efficient and environmentally beneficial technique for handling the raw biosolids influent stream. The proposed Biosolids Handling Facilities (BHF) project consists of three separate, but interrelated projects within the BHF.

The BHF consists of the following components:

1. Main Process Train: Where the biosolids undergo biochemical transformation through a thermal hydrolysis process (THP) prior to anaerobic digestion of the hydrolyzed biosolids. The MPT will require steam needed for the THP. Auxiliary boilers, duct burners, two small temporary boilers will also be needed as part of the MPT process. However, the temporary boilers have been permitted under Permit No. 6809 and 6810. The MPT will produce digester gas and odorous sulfur compounds that must pass through scrubber system for proper cleaning. The digester gas is used to power the Combined Heat and Power Plant.



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2. Combined Heat and Power Plant: Where power is produced through the use of digester gas. Gas turbines (3) use the digester gas and to a lesser extent natural gas to produce 13 MW of in-facility electricity when running at maximum capacity. Equipment associated with this segment of the project include emergency flares, a flare for destruction of Siloxane gas prior to feeding the digester gas to the auxiliary boiler or gas turbine or duct burners.

3. Final Dewatering Facility: Here is where the post hydrolyzed and digested biosolids undergo final dewatering process through belt-filtering process which results in a Class A biosolids suitable for agricultural use. Scrubbers associated with odor removal include a new DSLF scrubber, a new odor DSLF scrubber for the final dewatering facility.

The BHF is a complex project involving many projects in one, and requiring design build, design bid build, and design-build-operate types of contracts. The Department ensured that all equipment specifications in the application would meet all required regulatory standards and that the shop drawings and vendor information in the original application would be consistent with at least 70% of the As-Built configuration and design. On-going communications and updates were received from DC Water throughout the development of the original permit to contract.

As noted above, during the design and construction process, there have been some minor changes to the design of the equipment. The permit amendment application submitted on June 6, 2014 is intended to incorporate into the permit these changes.

DC Water has not requested that any portions of the permit application be kept confidential.

Issues

The specifics of the equipment involved in the final design of the various components of the project have now been determined. As a result DC Water requested that the current construction permit be modified to reflect the changes and the status of the emissions profiles.

While there have been changes to the equipment sizes, the net change in the potential emissions is not resulting in any increases, except for minor increases in particulate matter and carbon monoxide. The NO_x offsets of 110 tons of NO_x still remains in effect.

The significant changes are as follows:

1. In the previous version of the permit, the MPTOS odor scrubber was identified as a "58,000 cfm Biorem Mytilus Biological Odor Scrubber (or equivalent)". The applicant is now clarifying that they have settled upon a 44,800 cfm Enduro biological odor scrubber. They have not requested any modifications to the emission control requirements for this scrubber.
2. The auxiliary boiler was originally planned to be sized at 65.99/64.30 MMBtu/hr heat input (digester gas/natural gas), but has been revised to be a slightly smaller 62.52/61.79 MMBtu/hr unit.

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3. The applicant has requested the removal of the 2,682 hp diesel emergency generator from the permit as it will not be constructed.
4. The applicant has provided clarifying information related to the sizes and locations of numerous space heaters throughout the sections of the facility affected by the project. There have been some slight changes in the sizes of certain units from the original application. In addition, though not originally planned as part of this project, the applicant has asked to replace four existing space heaters in the solids blending building with four new 1.145 MMBtu/hr units. These changes, plus the addition of the four new (replacement) units has resulted in an overall heat input increase to space heaters in the permit of 3.3 MMBtu/hr and a potential natural gas usage increase from 85.3 MMCF/yr to 94.8 MMCF/yr from these units. Although this will result in an increase in potential emissions, with the exception of carbon monoxide and particulate matter, these emissions are offset by other changes proposed in the application.
5. As a result of design changes for the auxiliary boiler, the applicant has requested a somewhat more stringent NO_x emission limit per the LAER determination found in Condition I(k) of the permit. This more stringent requirement has been included in the permit. However, particulate matter emissions guarantees were lower than originally expected, so substantially less stringent PM limits are being included for this unit in this amendment. Note, however, that despite these increases, total potential to emit particulate matter for the project is only increasing from 18.07 tons per year to 18.45 tons per year. Hazardous air pollutant (HAP) emissions from the auxiliary boiler are also expected to increase from 0.04 tons per year to 0.17 tons per year as a result of the changes since the application. These changes do not trigger any new regulatory requirements. Emissions of SO_x, NO_x, VOC, and CO are expected to decrease from this unit's revised design.
6. Table 3 of the permit regarding start-up emissions has also been updated. Since the original application, plans for temporary steam boilers have been finalized where two small units will be used (and have since been permitted, with permits 6809 and 6810 issued to Pepco Energy Services, Inc. on December 30, 2013) instead of one larger unit. Potential emissions are expected to be lower as a result of these design changes. Similarly, Table 3 has been revised based on updated emergency flare operation plans, with lower emission emissions than previously estimated.
7. The requirements of 40 CFR 60.4330, as adopted in the permit, have been revised to reflect that the facility will not be able to ever burn more than 50% natural gas in the combustion turbines. This is based on the equipment design and required in Condition III(a)(2)(A). As such, Condition III(a)(1)(C) has been revised to remove the emission threshold if the unit burns greater than 50% natural gas in a month.
8. In Condition III(c)(1)(B), it was noted that, in the previous version of the permit, a particulate matter limit was inadvertently, and erroneously, combined with a NO_x limit. This condition has been re-written to reference the applicable particulate matter limit only. It should be

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noted that this particulate matter standard is somewhat different from the requirements in Condition III, Table 2, but DC Water should be able to show compliance with both requirements using the results of one set of emission testing.

9. DC Water determined that only natural gas will be used in the emergency and siloxane flare pilot lights. As such, Condition III(d)(2)(C)-(E) were revised to reflect this while a new Condition III(d)(2)(F) was added (with subsequent conditions re-lettered) to limit natural gas use in the pilot lights. Additionally, Condition III(d)(2)(E) along with the new Condition III(d)(2)(F) were written to clarify that the previous references to "per year" referred to any 12-month rolling period.
10. Previous conditions III(f)(3)(C) and (E) were removed from the permit as they had to do with recycle of centrate, filtrate, and wash water which DC Water indicated would not always happen and, in any case, would have no effect on air emissions either way.

Emissions Evaluation

When the equipment is fully operational and is operating on digester gas only, the potential to emit is reflected in the table below (as modified by the recent application revisions):

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

Pollutant	12-Month Rolling Emissions Limit (tons/yr)
PM (Total) ²	18.45
SOx	25.04
NOx	77.07
VOC	11.84
CO	97.51
PM10	18.45
PM2.5	18.45
HAPs (Total)	1.75

1. The equipment covered consists of three Solar Mercury 50 gas turbines, three duct burners, one auxiliary steam boiler, one siloxane removal system, , two emergency flares, space heating units as referenced in this permit, two odor scrubbers (MPTOS and FDFOS), and two lime silo baghouses.

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

Table 2- Maximum Hourly Emissions (lbs/hr)

Pollutants	Each Solar Mercury 50 Gas Turbine	Each Duct Burner	Auxiliary Boiler	Siloxane Removal System	Each Emergency Flare
PM (Total)	1.06	0.16	2.69	0.21	2.52
SOx	1.21	0.55	1.63	0.16	3.28
NOx	3.56	1.66	2.11	0.37	5.29
VOC	0.40	0.03	0.31	0.53	2.54
CO	4.34	2.31	2.22	1.25	2.52

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Pollutants	Each Solar Mercury 50 Gas Turbine	Each Duct Burner	Auxiliary Boiler	Siloxane Removal System	Each Emergency Flare
PM10	1.06	0.16	2.69	0.21	2.52
PM2.5	1.06	0.16	2.69	0.21	2.52
Total HAPs	0.07	0.06	0.17	0.01	0.19

Table 3 – Start-Up Emissions for Two Temporary Boilers and One Emergency Flare

Pollutant	Temporary Sources During Construction	
	Temporary Steam Boilers⁽¹⁾ (Natural Gas) (lbs/hr)	Emergency Flare (Digester Gas) (lbs/hr)
PM (Total)	0.020	2.52
SOx	0.04	3.28
NOx	2.00	5.29
VOC	0.10	2.54
CO	0.72	2.52
PM10	0.20	2.52
PM2.5	0.20	2.52

⁽¹⁾ The emission rates listed in this column are informational only and may be change without the amendment of the permit. The boilers are permitted under separate Permit Nos. 6809 and 6810, issued to Pepco Energy Services, Inc.

During a start-up period projected to have a duration of six to nine months after initial operation of portions of the equipment, natural gas will be the primary fuel, with supplemental digester gas as available.

Regulatory Review

These amendments have resulted in no changes in regulatory applicability from the analyses performed as a result of the earlier permit issuance.

Conclusions

Subject to receiving no adverse public comments with regard to a segment of this project or all of it, I recommend that the modified permit be issued to DC Water following completion of the public review period. If comments are received during the public review period, they will be addressed before issuance of a permit.

JCN/SSO

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