TECHNICAL EVALUATION
&
PRELIMINARY DETERMINATION

APPLICANT

Broward County Water and Wastewater Operation Division
2401 N. Powerline Road
Pompano Beach, Florida 33069

North Regional Wastewater Treatment Plant
Facility ID No. 0112357

PROJECT

Project No. 0112357-015-AC
Application for Minor Source Air Construction Permit
Cogenerator Construction Permit

COUNTY

Broward County, Florida

PERMITTING AUTHORITY

Florida Department of Environmental Protection
Air Resource Section
Southeast District Office
400 North Congress Avenue, 3rd Floor
West Palm Beach, Florida 33401

1. GENERAL PROJECT INFORMATION

Air Pollution Regulations

Projects at stationary sources with the potential to emit air pollution are subject to the applicable environmental laws specified in Section 403 of the Florida Statutes (F.S.). The statutes authorize the Department of Environmental Protection (Department) to establish regulations regarding air quality as part of the Florida Administrative Code (F.A.C.), which includes the following applicable chapters: 62-4 (Permits); 62-204 (Air Pollution Control – General Provisions); 62-210 (Stationary Sources – General Requirements); 62-212 (Stationary Sources – Preconstruction Review); 62-213 (Operation Permits for Major Sources of Air Pollution); 62-296 (Stationary Sources - Emission Standards); and 62-297 (Stationary Sources – Emissions Monitoring). Specifically, air construction permits are required pursuant to Rules 62-4, 62-210 and 62-212, F.A.C.

In addition, the U. S. Environmental Protection Agency (EPA) establishes air quality regulations in Title 40 of the Code of Federal Regulations (CFR). Part 60 specifies New Source Performance Standards (NSPS) for numerous industrial categories. Part 61 specifies National Emission Standards for Hazardous Air Pollutants (NESHAP) based on specific pollutants. Part 63 specifies NESHAP based on the Maximum Achievable Control Technology (MACT) for numerous industrial categories. The Department adopts these federal regulations on a quarterly basis in Rule 62-204.800, F.A.C.

Glossary of Common Terms

Because of the technical nature of the project, the permit contains numerous acronyms and abbreviations, which are defined in Appendix A of this permit.

Facility Description and Location

The Broward County North Regional Wastewater Treatment Plant is an existing Wastewater Treatment Plant, which is categorized under Standard Industrial Classification Code No. 4952. The facility is be located in Broward County at 2555 West Copans Road in Pompano Beach, Florida. The UTM coordinates of the existing facility are Zone 17, 583.49 km East, and 2905.01 km North. This site is in an area that is in attainment (or designated as unclassifiable) for all air pollutants subject to state and federal Ambient Air Quality Standards (AAQS).

Facility Regulatory Categories

- The facility is a synthetic minor source of hazardous air pollutants (HAP).
- The facility has no units subject to the acid rain provisions of the Clean Air Act.
- The facility is a Synthetic Non-Title V source of air pollution in accordance with Chapter 213, F.A.C.
- The facility is not a major stationary source in accordance with Rule 62-212.400, F.A.C. for the Prevention of Significant Deterioration (PSD) of Air Quality.

Project Description

The applicant seeks to construct/install a digester gas co-generator rated at 1,999 kW which will produce electricity for the site while waste heat will be utilized for the digesters. The digester gas is currently being burned in boilers to heat the digesters or flared when not burned in the boilers. The co-generator will utilize all of the available digester gas when running, approximately 87 percent of the time. When the digester gas co-generator is not in service (13 percent of the time) the boilers and flares will be utilized as they are currently.

Processing Schedule

March 21, 2014	Application Fee Received
April 8, 2014	Received the application for a minor source air pollution construction permit.

2. PSD APPLICABILITY

General PSD Applicability

For areas currently in attainment with the state and federal AAQS or areas otherwise designated as unclassifiable, the Department regulates major stationary sources of air pollution in accordance with Florida's PSD preconstruction review program as defined in Rule 62-212.400, F.A.C. Under preconstruction review, the Department first must determine if a project is subject to the PSD requirements ("PSD applicability review") and, if so, must conduct a PSD preconstruction review. A PSD applicability review is required for projects at new and existing major stationary sources. In addition, proposed projects at existing minor sources are subject to a PSD applicability review to determine whether potential emissions *from the proposed project itself* will exceed the PSD major stationary source thresholds. A facility is considered a major stationary source with respect to PSD if it emits or has the potential to emit:

- 250 tons per year or more of any regulated air pollutant; or
- 100 tons per year or more of any regulated air pollutant and the facility belongs to one of the following 28 PSD-major facility categories: fossil fuel-fired steam electric plants of more than 250 million British thermal units per hour heat input, coal cleaning plants (with thermal dryers), Kraft pulp mills, portland cement plants, primary zinc smelters, iron and steel mill plants, primary aluminum ore reduction plants, primary copper smelters, municipal incinerators capable of charging more than 250 tons of refuse per day, hydrofluoric, sulfuric, and nitric acid plants, petroleum refineries, lime plants, phosphate rock processing plants, coke oven batteries, sulfur recovery plants, carbon black plants (furnace process), primary lead smelters, fuel conversion plants, sintering plants, secondary metal production plants, chemical process plants, fossil fuel boilers (or combinations thereof) totaling more than 250 million British thermal units per hour heat input, petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels, taconite ore processing plants, glass fiber processing plants and charcoal production plants.

Once it is determined that a project is subject to PSD preconstruction review, the project emissions are compared to the "significant emission rates" defined in Rule 62-210.200, F.A.C. for the following pollutants: carbon monoxide (CO); nitrogen oxides (NO_X); sulfur dioxide (SO_2); particulate matter (PM); particulate matter with a mean particle diameter of 10 microns or less (PM_{10}); volatile organic compounds (VOC); lead (Pb); fluorides (Fl); sulfuric acid mist (SAM); hydrogen sulfide (H_2S); total reduced sulfur (TRS), including H_2S; reduced sulfur compounds, including H_2S; municipal waste combustor organics measured as total tetra- through octa-chlorinated dibenzo-p-dioxins and dibenzofurans; municipal waste combustor metals measured as particulate matter; municipal waste combustor acid gases measured as SO_2 and hydrogen chloride (HCl); municipal solid waste landfills emissions measured as non-methane organic compounds (NMOC); and mercury (Hg). In addition, significant emissions rate also means any emissions rate or any net emissions increase associated with a major stationary source or major modification which would construct within 10 kilometers of a Class I area and have an impact on such area equal to or greater than 1 $\mu g/m^3$, 24-hour average.

If the potential emission exceeds the defined significant emissions rate of a PSD pollutant, the project is considered "significant" for the pollutant and the applicant must employ the Best Available Control Technology (BACT) to minimize the emissions and evaluate the air quality impacts. Although a facility or project may be *major* with respect to PSD for only one regulated pollutant, it may be required to install BACT controls for several "significant" regulated pollutants.

PSD Applicability for Project

The proposed new equipment is a GE/Jenbacher Spark Ignition Internal Combustion Engine (Model JMS 616 GX-B.L) utilizing digester gas as its fuel. The engine will be powering a 1.999 MW electrical generator. Waste heat from the engine will be utilized for heating the digester tanks. The facility currently has a 90 ton per year limit on NOx emissions in order to escape Title V Applicability and the applicant requests that the facility have a 90 ton per year CO limit in addition. Preliminary emissions calculations for the facility, based on current diesel fuel limits of 300,000 gallons per year are found in the table below and show that the facility's NOx and CO

emissions will remain under 90 tons per year. Since the emissions of engines running on digester gas are difficult to predict, the facility will be required to request a modification in the emergency generator diesel fuel limit based on the results of the co-generator's initial performance tests.

Broward North Regional WWTP Pollutant Emissions Calculations based on Technical Evaluation for 0112357-015-AC
Changes reflect Diesel Sulfur = 0.015%, new Nox Emission Rates Based on Test Data, and Digester Gas Generator

Emissions Unit 001 - Water Treatment Plant

WWTP	Rating			Emissions Factors (lb/mmcf)					Annual Emissions (TPY)				
	mmBtu/hr	mmcf/yr		Nox	CO	SO2	PM	VOC	Nox	CO	SO2	PM	VOC
									0	0	0	0	1.49
								Emissions Totals:	0	0	0	0	1.49

Emissions Unit 002 - Eight Process Heaters/Boilers (Burning Digester Gas)

Heater #	Rating			Emissions Factors (lb/mmcf)					Annual Emissions (TPY)				
	mmBtu/hr	mmcf/yr[11]		Nox	CO	SO2	PM[6]	VOC[7]	Nox	CO	SO2	PM	VOC
1	2.06	3.5		84.0	21.0	3.0	8.2	1.7	0.1474	0.037	0.005	0.014	0.003
2	2.06	3.5		84.0	21.0	3.0	8.2	1.7	0.1474	0.037	0.005	0.014	0.003
3	2.06	3.5		84.0	21.0	3.0	8.2	1.7	0.1474	0.037	0.005	0.014	0.003
4	2.06	3.5		84.0	21.0	3.0	8.2	1.7	0.1474	0.037	0.005	0.014	0.003
5	2.06	3.5		84.0	21.0	3.0	8.2	1.7	0.1474	0.037	0.005	0.014	0.003
6	2.06	3.5		84.0	21.0	3.0	8.2	1.7	0.1474	0.037	0.005	0.014	0.003
7	2.06	3.5		84.0	21.0	3.0	8.2	1.7	0.1474	0.037	0.005	0.014	0.003
8	2.06	3.5		84.0	21.0	3.0	8.2	1.7	0.1474	0.037	0.005	0.014	0.003
								Emissions Totals:	1.18	0.29	0.04	0.12	0.02

Emissions Unit 003 - Six Emergency Generators

Generator #	Rating		HOP	Emissions Factors (lb/gal)					Annual Emissions (TPY)				
	kw	gal/hr	(hr/yr)	Nox[8]	CO	SO2	PM	VOC[2]	Nox	CO	SO2	PM	VOC
1	2000	140.2	342	0.1548	0.037	0.00213	0.005	0.0115	3.7	0.9	0.1	0.120	0.276
2	2000	140.2	342	0.1548	0.037	0.00213	0.005	0.0115	3.7	0.9	0.1	0.120	0.276
3	2000	140.2	357	0.1548	0.037	0.00213	0.005	0.0115	3.9	0.9	0.1	0.125	0.288
4	2000	137.4	364	0.632	0.069	0.00213	0.004	0.0115	15.8	1.7	0.1	0.100	0.288
5	2000	137.4	364	0.632	0.069	0.00213	0.004	0.0115	15.8	1.7	0.1	0.100	0.288
6	2000	140.2	357	0.1548	0.037	0.00213	0.005	0.0115	3.9	0.9	0.1	0.125	0.288
								Emissions Totals:	46.8	7.1	0.3	0.69	1.70

Emissions Unit 004 - Two Flares

Flare #	Rating		Diges. Gas[9]	Emissions Factors (lb/mmBtu)					Annual Emissions (TPY)				
	mmcf/hr	mmcf/yr[11]	(mmBtu/mmcf)	NOx[4]	CO[1]	SO2[5]	PM[12]	VOC[3]	Nox	CO	SO2	PM	VOC
1	0.08815	12.04	560	0.06	0.55	0.00536	0.042	0.14	0.2	1.9	0.0	0.1	0.5
2	0.08815	12.04	560	0.06	0.55	0.00536	0.042	0.14	0.2	1.9	0.0	0.1	0.5
								Emissions Totals:	0.4	3.7	0.04	0.28	0.9

Emissions Unit 005 - Digester Gas Co-Generator

Co-Generator #	Rating		Diges. Gas[9]	Emissions Factors (lb/hr)[10]					Annual Emissions (TPY)				
	kw	hr/yr	(mmBtu/mmcf)	Nox	CO	SO2	PM13	VOC	Nox	CO	SO2	PM	VOC
1		7621	560	3.85	19.27	0.02	0.166	5.51	14.7	73.4	0.1	0.6	21.0
								Emissions Totals:	14.7	73.4	0.1	0.6	21.0

	Facility Total Annual Emissions (TPY)				
	Nox	CO	SO2	PM	VOC
Emissions Totals:	63.0	84.5	0.5	1.7	25.2

Notes:

1	From Technical Evaluation for 0112357-009 Permit with corrected Emission Factor. Corrected with info from 2013 AOR Submittal Attachment 'sub1_13CALCTAB5-3~CO.pdf', which is based on Texas Air Control emission factor.
2	From 0112357-009 Permit Application
3	From 2013 AOR Submittal Attachment 'sub1_13CALCTAB5-7~VOC.pdf', which is based on AP-42 Section ~~11.5~~ 13.5 (for Total Hydrocarbon) emission factor (0.14 lb/mmBtu)
4	From 2013 AOR Submittal Attachment 'sub1_13CALCTAB5-4~Nox.pdf', which is based on the Texas Air Control emission Factor (0.06 lb/mmBtu)
5	From 2013 AOR Submittal Attachment 'sub1_13CALCTAB5-6~SO2.pdf', which is based on Calculation based on gas sulfur content (3 lb/mmcf)
6	From 2013 AOR Submittal Attachment 'sub1_13CALCTAB5-5~PM.pdf', which is based on EBMUD 5076-01 emission factor. 8.2 lb/mmcf
7	From 2013 AOR Submittal Attachment 'sub1_13CALCTAB5-7~VOC.pdf', which is based on EBMUD 5076-01 emission factor. 1.7 lb/mmcf
8	Generators 1, 2, 3, and 6 Using New Nox emissions results from Arlington Test data on Engine No. 3. 14.13 lbs Nox/hr at 91.3 gal/hr and 1.29 MW (64.5% of rated power) Assuming a linear relationship, 21.91 lbs Nox/hr at 141.55 gal/hr and 2.0 MW = > (21.91 lb/hr)/(141.55 gal/hr) = 0.1548 lb/gal
9	New Gas Analysis completed (see new permit application for 0112357-015-AC)
10	From Permit App for 0112357-015-AC spreadsheet "Broward NRWWTP Biogas Emissions calcs v1.xls" sheet 'GensetEmissions'
11	Based on 87% uptime for the Co-generator, the 2 flares and 8 boilers will only operate 13% of the time that they previously operated.
12	Based on Table 5 of "Addendum to Air Pollution Control Permit Application for Proposed Landfill Gas-Fired Combustion Turbine Combined Cycle Power Plant" 0.042 lb/mmbtu
13	Based on AP-42 Table 3.2-3 for EF for 4 Stroke Rich Burn Engine burning natural gas. (0.00991 lb/mmbtu)(560 mmBtu/mmscf)(29955 scf/hr) = 0.166 lb/hr

As provided in the application, the following table summarizes potential emissions and PSD applicability for the project.

Table A. Potential Emissions (Tons/Year) and PSD Applicability

Pollutant	Current Permitted Emissions (TPY)	Project Potential Emissions (TPY)	Project Potential Emissions Increase (TPY)	Title V Emission Threshold (TPY)	Subject To Title V?	Significant Emissions Rate (TPY)	Subject To PSD?
CO	43.3	90	46.7	100	No	100	No
NO_X	90.0	90	0	100	No	40	No
PM/PM_{10}		1.7		100	No	25/15	No
SO_2	11.1	0.5	-10.6	100	No	40	No
VOC	12	25.2	13.2	100	No	40	No

As shown in the above table, total project emissions will not exceed the PSD significant emissions rates; therefore, the project is not subject to PSD preconstruction review.

3. APPLICATION REVIEW

State Requirements

Rule 62-4 Permits

Rule 62-204.220 Ambient Air Quality Protection

Rule 62-204.240 Ambient Air Quality Standards

Rule 62-204.800 Federal Regulations Adopted by Reference such as NSPS (40 CFR 60, Subpart JJJJ) and NESHAP (40 CFR 60, Subpart ZZZZ)

Rule 62-210.200 Definitions

Rule 62-210.300 Permits Required

Rule 62-210.350 Public Notice and Comments

Rule 62-210.270 Reports

Rule 62-210.550 Stack Height Policy

Rule 62-210.650 Circumvention

Rule 62-210.900 Forms and Instructions

Rule 62-212.300 General Preconstruction Review Requirements

Rule 62-212.400 Prevention of Significant Deterioration (Source Obligation)

Rule 62-296.320 General Pollutant Emission Limiting Standards

Federal NSPS Provisions

40 CFR 60 Subpart JJJJ (NSPS Standards of Performance for Stationary Spark Ignition Internal Combustion Engines)

Federal NESHAP Provisions

40 CFR 63 Subpart ZZZZ (NESHAP National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines)

Other Draft Permit Requirements

Although the applicant requested an increase in the diesel fuel limit for the emergency generators, since the emissions of engines running on digester gas are difficult to predict, the facility will be required to request a modification in the emergency generator diesel fuel limit based on the results of the co-generator's initial performance tests and the facility's CO, and NOx 90 tons per year limit. [Rule 62-4.070(3), F.A.C. Reasonable Assurance]

4. PRELIMINARY DETERMINATION

The Department makes a preliminary determination that the proposed project will comply with all applicable state and federal air pollution regulations as conditioned by the draft permit. This determination is based on a technical review of the complete application, reasonable assurances provided by the applicant, and the conditions specified in the draft permit. Scott D. Trainor is the project engineer responsible for reviewing the application and drafting the permit. Additional details of this analysis may be obtained by contacting the project engineer at the:

Florida Department of Environmental Protection
Air Resource Section
Southeast District Office
400 N. Congress Avenue, 3rd Floor
West Palm Beach, Florida 33401