



Fact Sheet

on the draft Major Source Permit for Rhode Island Central Genco

Introduction

The Department of Environmental Management, Office of Air Resources has received an application from Rhode Island Central Genco, LLC to install five, landfill gas-fired combustion turbines and three flares at its existing facility in the town of Johnston. The Office of Air Resources has reviewed the application for compliance with the applicable state and federal air pollution control regulations. A draft Major Source Permit for public review and comment has been prepared. This fact sheet will describe the facility, important aspects of the application and draft permit and the process for public comment.

Description of the Proposed Facility

The proposed project will include five Solar Taurus 60 landfill gas-fired combustion turbines. Each combustion turbine has a nominal electrical output of 6 MWe. The hot flue gases from each combustion turbine pass through a heat recovery steam generator (HRSG) to generate steam. The steam produced by the five HRSGs will be used to power a single steam turbine. The design rating for the steam turbine is approximately 11 MW of electrical power. The total landfill gas consumption for the five combustion turbines is approximately 12,200 scfm.

Additionally, the proposed project will include a John Zink Ultra Low Emissions (ULE) flare. This flare will be used to treat the purge gas from regenerating the adsorbent in the landfill gas treatment system that is part of this project. The flare will use up to 630 scfm of landfill gas for a purge gas stream of up to 6900 scfm. The flare is expected to operate continuously.

The proposed project will also include two John Zink enclosed flares. These flares are to serve as backup flares to provide additional landfill gas control capacity in the event any of the power generating equipment (engines and/or turbines) is out-of-service. Each flare is capable of treating 3000 scfm of landfill gas.

The existing facility consists of nine Waukesha, two Deutz and four Caterpillar landfill gas fired engine-generator sets. The Waukesha and Deutz engine-generator sets will be permanently removed. Each Caterpillar engine-generator set consists of a 2229 HP engine and a 1600 kWe generator. Each Caterpillar engine consumes approximately 500 scfm of landfill gas when operating at maximum capacity.

Each combustion turbine will be equipped with Selective Catalytic Reduction (SCR) to limit emissions of nitrogen oxides to 25 ppmv corrected to 15% O₂. The entire facility, including the existing engines, will have a nominal electrical output of approximately 51 MW and is capable of combusting approximately 15,000 scfm of landfill gas.

The facility is located within the property of the Central Landfill, 65 Shun Pike. The Central Landfill, owned and operated by the Rhode Island Resource Recovery Corporation, is an integrated solid waste management facility located on a site comprising approximately 1100 acres. The primary solid waste management activity at the site is the operation of a municipal solid waste landfill.

A large quantity of landfill gas is generated at the Central Landfill from the anaerobic decomposition of the municipal solid waste. The landfill gas is collected in a number of vertical extraction wells and horizontal collection trenches and then piped to the Ridgewood facility. Flares control any excess landfill gas that is not used by Ridgewood.

The landfill gas is treated prior to combustion. The landfill gas treatment system will remove siloxanes and other contaminants that would interfere with the SCR system. The gas treatment system filters, dewateres and compresses the landfill gas. This gas treatment system meets the requirements of 40 CFR 60, Subpart WWW (40 CFR 60.752(b)(2)(iii)(C)). It will also remove sulfur compounds, down to a concentration of 100 ppmv, as hydrogen sulfide.

Additional sources of air pollution emissions will include a four cell wet cooling tower for the steam turbine condenser and an auxiliary cooling tower for the gas treatment and compression system.

Emission Limitations

The emission limitations for nitrogen oxides (NO_x) and volatile organic compounds (VOC) must be considered the lowest achievable emission rate (LAER) because Rhode Island is a nonattainment area for ozone and the potential increase in allowable emissions for each of these pollutants is greater than 25 tons per year.

LAER is the most stringent emission limitation derived from either of the following:

- (1) the most stringent emission limitation contained in the implementation plan of any State for such class or category of source; or
- (2) the most stringent emission limitation achieved in practice by such class or category of source.

By definition LAER can not be less stringent than any applicable new source performance standard (NSPS).

For the combustion turbines, the Office of Air Resources has determined that a NO_x emission limitation of 25 ppmvd corrected to 15% O₂ and a VOC emission limitation of 10 ppmvd corrected to 15% O₂ represents LAER. For the regen flare, the Office of Air Resources has determined that a NO_x emission limitation of 0.025 lb/MMBTU and a VOC destruction efficiency of 99% represents LAER. For the backup flares, the Office of Air Resources has determined that a NO_x emission limitation of 0.06 lb/MMBTU and a VOC destruction efficiency of 98% represents LAER.

These determinations are based on a review of recently issued permits by state and local air pollution control agencies for landfill gas-fired combustion turbine projects and landfill gas flares and a review of state and local air pollution control rules and regulations for landfill gas-fired combustion turbines and landfill gas flares.

The emission limitations for carbon monoxide (CO), particulate matter less than 10 microns (PM-10) and sulfur dioxide (SO₂) must be considered the best available control technology (BACT) because for CO, PM-10 and SO₂, the location is an attainment area for these pollutants and there would be a net increase in the emission of these pollutants.

Best available control technology is defined as "an emissions limitation (including a visible emission standard) based on the maximum degree of reduction for each air pollutant which would be emitted from any proposed stationary source or modification which the Director, on a case-by-case basis, taking into account energy,

environmental and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant.

The Office of Air Resources has determined that the following emission limitations represent BACT for the combustion turbines:

Carbon monoxide: 100 ppmvd corrected to 15% O₂
 PM-10: 0.024 lb/MMBTU
 Sulfur dioxide: 0.034 lb/MMBTU

The Office of Air Resources has determined that the following emission limitations represent BACT for the regen flare:

Carbon monoxide: 0.06 lb/MMBTU
 Sulfur dioxide: landfill gas pretreatment to remove hydrogen sulfide down to 100 ppmv

The Office of Air Resources has determined that the following emission limitations represent BACT for the backup flares:

Carbon monoxide: 0.20 lb/MMBTU
 Sulfur dioxide: landfill gas pretreatment to remove hydrogen sulfide down to 100 ppmv

These determinations are based on a review of recently issued permits by state and local air pollution control agencies for landfill gas-fired combustion turbine projects and landfill gas flares and a review of state and local air pollution control rules and regulations for landfill gas-fired combustion turbines and landfill gas flares.

Type and Quantity of Pollutants Emitted

Tables 1 and 2 list the pollutants that are expected to be emitted from the proposed modification and the potential annual emissions. The tons per year values in Table 1 assume each combustion turbine operates for an entire year (8760 hours). The tons per year values in Table 2 are based on the regen flare emissions, except for nitrogen oxides, carbon monoxide and VOC, where tons per year values are based on the backup flares being used in place of the regen flare for 2000 hours per year.

**Table 1
 Potential Emissions from the Proposed Combustion Turbines**

POLLUTANT	LB/HR/TURBINE	TONS/YR
Nitrogen oxides	7.95	159.1
Carbon monoxide	34.86	697.4
PM-10/Particulates	1.90	39.3
VOC/Nonmethane hydrocarbons	1.99	39.9
Sulfur dioxide	2.70	54.1
Ammonia	2.35	47.1
Hydrogen sulfide	0.03	0.6
Hydrogen chloride	0.197	3.9

Table 2
Potential Emissions from the Proposed Flares

POLLUTANT	LB/HR/FLARE		TONS/YR
	REGEN FLARE	BACKUP FLARE	
Nitrogen oxides	0.52	5.94	3.00
Carbon monoxide	1.25	19.80	8.37
PM-10/Particulates	1.08	1.66	4.73
VOC/Nonmethane hydrocarbons	0.31	0.82	1.65
Sulfur dioxide	0.64	3.04	2.80
Ammonia	-	-	-
Hydrogen sulfide	0.007	0.032	0.03
Hydrogen chloride	0.046	0.22	0.20

Air Quality Impacts

The applicant conducted air quality modeling to predict the impact on air quality from the proposed modification. The Office of Air Resources reviewed the modeling and agrees with the modeling results. The modeling demonstrated that the maximum predicted impacts for the proposed facility will not cause or contribute to air pollution in violation of the National Ambient Air Quality Standards (NAAQS). Table 3 is a summary of the maximum predicted impacts of the facility added to the existing background concentration and compared to the NAAQS.

Table 3
Summary of Maximum Predicted Impacts of
Criteria Pollutants and Comparison to NAAQS ($\mu\text{g}/\text{m}^3$)

Pollutant	Averaging Time	Maximum Predicted Impact ($\mu\text{g}/\text{m}^3$)	Background Concentration ($\mu\text{g}/\text{m}^3$)	Total Concentration ($\mu\text{g}/\text{m}^3$)	NAAQS ($\mu\text{g}/\text{m}^3$)
SO ₂	3-hour	48	126	174	1300
	24-hour	26	63	89	365
	Annual	4.7	18	23	80
CO	1-hour	635	11,106	11,741	40,000
	8-hour	534	2862	3,396	10,000
NO ₂	Annual	11.2	33	44	100
PM-10	24-hour	19	54	73	150
	Annual	2.7	24	27	50

Air quality modeling conducted by the applicant in support of its application demonstrated that the maximum predicted impacts for the proposed facility will not cause or contribute to air pollution in violation of the allowable Prevention of Significant Deterioration (PSD) increments for criteria pollutants. PSD

increments limit the degree to which air quality in an area can be degraded from new or modified air pollution sources. Table 4 is a summary of the maximum predicted impacts of the proposed facility and all other new or modified sources in the area in comparison to PSD increments.

Table 4
Summary of Maximum Predicted Impacts of
Criteria Pollutants and Comparison to PSD Increments ($\mu\text{g}/\text{m}^3$)

Pollutant	Averaging Time	Maximum Predicted Impact All Sources ($\mu\text{g}/\text{m}^3$)	Full PSD Increment ($\mu\text{g}/\text{m}^3$)
SO ₂	3-hour	48	512
	24-hour	26	91
	Annual	4.7	20
NO ₂	Annual	11.2	25
PM-10	24-hour	19	30
	Annual	2.7	17

The proposed project is a major modification for the pollutant nitrogen oxides. Subsection 9.5.3(a) of Air Pollution Control Regulation No. 9 limits increment consumption for major modifications to 25% of the remaining annual increment. Table 5 is a summary of the maximum predicted impacts of nitrogen oxides for the proposed facility in comparison to the allowable remaining PSD increment.

Table 5
Maximum Predicted Impacts of Nitrogen Oxides and
Comparison to Allowable Remaining PSD Increments ($\mu\text{g}/\text{m}^3$)

Pollutant	Averaging Time	Maximum Predicted Impact All Existing Sources ($\mu\text{g}/\text{m}^3$)	Full PSD Increment ($\mu\text{g}/\text{m}^3$)	Maximum Predicted Impact from Modification ($\mu\text{g}/\text{m}^3$)	Allowable Remaining PSD Increment ($\mu\text{g}/\text{m}^3$)
NO ₂	Annual	11.0	25	3.0	3.5

Air quality modeling conducted by the applicant in support of its application demonstrated that the maximum predicted impacts due to the proposed modification combined with other emission sources at Ridgewood and the Central Landfill, for the pollutants, 1,4-dichlorobenzene, benzene, hydrogen sulfide, tetrachloroethylene, mercury, hydrogen chloride, ammonia and vinyl chloride are below acceptable ambient levels set in Air Pollution Control Regulation No. 22 "Air Toxics". The maximum predicted impacts of these pollutants are summarized in Table 6 and compared to acceptable ambient levels.

Table 6
Summary of Maximum Predicted Impacts of
Listed Toxic Air Contaminants and Comparison to Acceptable Ambient Levels ($\mu\text{g}/\text{m}^3$)

Pollutant	Averaging Time	Maximum Predicted Source Impact ($\mu\text{g}/\text{m}^3$)	Acceptable Ambient Level ($\mu\text{g}/\text{m}^3$)
1,4 Dichlorobenzene	1-hour	0.006	12,000
	24-hour	0.003	800
	Annual	0.0003	0.09
Benzene	1-hour	0.019	30
	24-hour	0.008	20
	Annual	0.001	0.1
Hydrogen sulfide	1-hour	0.661	40
	24-hour	0.267	30
	Annual	0.032	10
Tetrachloroethylene	1-hour	0.029	1000
	Annual	0.001	0.2
Mercury	1-hour	0.006	2
	24-hour	0.0025	0.3
	Annual	0.0013	0.009
Hydrogen Chloride	1-hour	4.536	2000
	Annual	0.214	9
Ammonia	1-hour	15.324	1000
	24-hour	9.468	100
	Annual	1.253	70
Vinyl Chloride	1-hour	0.009	1000
	24-hour	0.004	100
	Annual	0.0004	0.2

Emissions Offsets

Subsection 9.4.2 (c) of Air Pollution Control Regulation No. 9 requires the applicant to offset the annual emissions of nitrogen oxides and volatile organic compounds allowed from the proposed new modification with emissions reductions from this facility or another facility.

The new nitrogen oxides emissions must be offset with reductions at a ratio of 1.2:1. The offset requirement is 116 tons of NO_x emissions (96.64 tons x 1.2 = 116 tons).

Ridgewood Rhode Island Generation has entered into a purchase agreement for 117 tons of NO_x offsets to satisfy this requirement. These offsets were generated by the voluntary installation of an SCR system at the Medical Area Total Energy Plant (MATEP) in Boston, MA and the shutdown of equipment associated with the Lawrence RDF and the Ogden Martin Systems of Haverhill plants located in Lawrence, MA.

The new volatile organic compound emissions must be offset with reductions at a ratio of 1.2:1. The offset requirement is 36 tons of VOC emissions (29.76 tons x 1.2 = 36 tons).

Ridgewood Rhode Island Generation has entered into a purchase agreement for 36 tons of VOC offsets to satisfy this requirement. The VOC offsets were generated by the shutdown of the Quebecor Printing Providence, Inc. facility in Providence, RI in 1998.

Public Participation/Public Hearing

A public hearing on the draft permit will be held in Room 300 at the Rhode Island Department of Environmental Management's offices, 235 Promenade Street, Providence, Rhode Island on 16 April 2009 at 10:00 AM.

Members of the public are invited to make oral comments at the hearing. Members of the public may also mail or e-mail written comments to the Office of Air Resources. Written comments may be sent anytime during the public comment period which began on 11 March 2009. Written comments must be received by the Office of Air Resources no later than 4:00 PM, 16 April 2009, at which time the public comment period will close unless extended by the Hearing Officer. The mailing address for comments is:

Douglas McVay, Acting Chief
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Office of Air Resources
235 Promenade Street
Providence, RI 02908-5767

The e-mail address for comments is: doug.mcvay@dem.ri.gov

The draft Major Source Permit and supporting documentation may be viewed during normal business hours (8:30 AM to 4:00 PM) at the Office of Air Resources. A copy of the draft Major Source Permit, this fact sheet and the technical review document for the project are also available for viewing or downloading on the DEM website (www.state.ri.us/dem).

Contact Person

For a copy of the draft Major Source Permit or for more information concerning the project contact Douglas McVay at 401-222-2808.