Golder Associates Inc.

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July 28, 2009

0938-7541

Florida Department of Environmental Protection
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Attention: Alvaro A. Linero, Program Administrator

RE: DEP FILE NO. 0930104-014-AC
BERMAN ROAD AND CLAY FARMS LANDFILLS
OKEECHOBEE LANDFILL, INC.
WASTE MANAGEMENT, INC. OF FLORIDA

Dear Mr. Linero:

Okeechobee Landfill, Inc. (OLI) and Golder Associates Inc. (Golder) met with you on June 22, 2009, to discuss additional information requirements for the air construction permit application for additional flares and turbines along with the Lo-Cat sulfur removal system at the Berman Road and Clay Farms Landfills (Okeechobee Landfill). OLI also received e-mails from you on July 2, 2009, requesting additional information to complete the best available control technology (BACT) analysis for the combustion turbines (CTs) being proposed by OLI. Specifically, you have requested additional information for the Solar Mercury 50 turbine and referenced the landfill gas to energy (LFGTE) project at the University of New Hampshire where a Mercury 50 turbine is being installed. You have also referenced the Ridgewood Power facilities LFGTE project in Rhode Island where selective catalytic reduction (SCR) is proposed to control nitrogen oxide (NO_x) emissions from a landfill gas (LFG)-fired CT. Golder has collected additional information on these projects and summarizes the following findings for your consideration. We also provide supplemental information and reiterate previous information submitted to the Florida Department of Environmental Protection (FDEP) on behalf of OLI.

University of New Hampshire Landfill Gas Project, NH

The New Hampshire Department of Environmental Services granted both a prevention of significant deterioration (PSD) and nonattainment new source review (NSR) permit to the University of New Hampshire (UNH) to construct and operate a LFGTE facility, which includes a LFG-fired Solar Mercury 50 CT. NO_x emissions from the turbine are subject to lowest achievable emission rate (LAER) and limited to 5 parts per million volume (ppmv) corrected to 15-percent oxygen (@15% O_2).

The UNH LFGTE facility will use 7,000 standard cubic feet per minute (scfm) of LFG generated at the Turnkey Landfill located 12.5 miles away. The raw LFG from the landfill, which has a heating value of approximately 500 British thermal units per standard cubic foot (Btu/scf), will be extensively treated prior to being burned in the CT at the facility. The dirty, low-energy gas will first be treated at a processing plant to remove moisture, sulfur compounds, siloxanes, volatile organic compounds (VOCs), O_2, and carbon dioxide (CO_2). This processing plant contains treatment that is much more extensive than a siloxane removal system in our current BACT review. Treated gas leaving the processing plant will be dry with heating value of 810 to 950 Btu/scf, which is nearly natural gas quality.

Note that Solar typically guarantees NO_x emissions for 5 parts per million (ppm) @15% O_2 for natural gas-fired Mercury 50 turbines and 25 ppm @15% O_2 for LFG-fired Mercury 50 turbines.

Based on information available on the Internet, the UNH LFGTE processing plant cost is $18 million. The Mercury 50 turbine at the UNH is limited to NO_x of 5 ppm @15% O_2, but the project does not consider any post-combustion NO_x control system like SCR. The primary reason UNH and the turbine manufacturer believe this limit is achievable is because of the expensive pre-combustion gas processing to convert the LFG to natural gas quality. However, the UNH LFGTE facility is not operational yet and no operational data are available.

Ridgewood Power Facility LFGTE Project, Johnson, RI

The Rhode Island Department of Environmental Management (RIDEM) Office of Air Resources issued a preliminary determination in March 2009, and has now issued a final permit, to construct and operate five Solar Taurus 60 LFG-fired CTs at the existing Ridgewood Power facility owned by Rhode Island Central Genco, LLC. This project is also subject to nonattainment NSR permitting and the NO_x emissions from the CTs are subject to LAER. NO_x emissions from each turbine are controlled by SCR and are limited to 25 ppm @15% O_2.

According to RIDEM Office of Air Resources, 25 ppm @15% O_2 is the most stringent emission limitation required by any preconstruction permit for a LFG-fired engine project, which is also the BACT guideline of the South Coast Air Quality Management District and the Bay Area Air Quality Management District in California for NO_x emissions from a LFG-fired turbine. Table 1 of the preliminary determination (see Attachment A) issued by the Office of Air Resources presents the NO_x limitations of recently permitted LFG-fired turbines. As shown, the NO_x emissions limit for the most recently permitted Solar Centaur is 42 ppm @15% O_2, the same limit proposed by OLI for the proposed Solar Centaur CTs.

An important conclusion presented in the preliminary determination is that the Solar Mercury 50 turbine is unsuitable for the project. This is the only commercially available LFG-fired turbine for which a 25 ppm @15% O_2 warranty is available from the manufacturer. However, no details are available regarding the reasons the Mercury 50 was considered unsuitable. Rhode Island Central Genco has chosen the Solar Taurus turbines and proposed to meet the 25 ppm NO_x LAER emission limit by using SCR and treating the LFG to remove siloxanes and sulfur prior to burning in the CTs.

The Office of Air Resources has also stated in the preliminary determination that they are unaware of any successful installation of SCR in a LFG application.

Since the project has not been constructed yet, no operational data are available. Further, according to Solar, no equipment for this project has yet been ordered.

Review of Information

The following conclusions are drawn based on research on the above projects and other related documents:

- Currently there are no operational data available for a LFG-fired Mercury 50 turbine.
- The NO_x emissions guarantee for a LFG-fired Mercury 50 turbine is 25 ppm @15% O_2. A lower NO_x limit has been permitted only for a Mercury 50 using pipeline quality gas (treated landfill gas).

- LAER for NO_x from a LFG-fired turbine is 25 ppm based on vendor guarantee on a Mercury 50. Since this project is not yet operational, it is not known whether it can be achieved in practice.
- The lowest permitted NO_x emission rate for a LFG-fired turbine other than a Mercury 50 is 32 ppm @15% O_2.
- The most recent permitted NO_x emission rate for a Solar Centaur LFG-fired turbine is 42 ppm @15% O_2.
- SCR has been proposed on a LFG-fired Solar Taurus turbine only to achieve the LAER limit of 25 ppm. It is not known whether this limit can be achieved in practice.

The request for additional information (RAI) response sent to the FDEP regarding the Okeechobee landfill project included cost analysis for adding SCR to control NO_x emissions from the proposed Solar Centaur and Solar Titan turbines. This cost analysis (see Table 7 of the April 7, 2009 RAI response) assumed an overly conservative SCR NO_x control efficiency of 90 percent, which means the Centaur 40 turbine NO_x emissions were assumed to be reduced to 4.2 ppm from 42 ppm and the Titan 130 turbine NO_x emissions were assumed to be reduced to 7.2 ppm from 72 ppm. No LFG-fired turbines have been permitted with lower than 25 ppm NO_x emissions limit, even those with SCR.

Note that if the SCR cost analysis for the OLI turbines were based on a controlled NO_x limit of 25 ppm, the cost effectiveness numbers in dollars per ton ($/ton) of NO_x reduction would be significantly higher. To demonstrate this, a revised Table 7 is attached, which is a revised version of the original Table 7 submitted with the April 7, 2009 RAI response.

In the April 7 RAI response, Golder presented a detailed cost analysis for a siloxane removal system for the design LFG flow of the landfill, SCR for NO_x control from each turbine, and an oxidation catalyst system for CO control from each turbine. These costs were summarized in Table 7 to calculate the cost effectiveness numbers for different scenarios such as one Titan turbine, one Centaur turbine, one Titan and four Centaurs for the first phase of the project, and one Titan and fifteen Centaurs for the full project buildout. The cost effectiveness numbers presented in the April 7th version of Table 7 were for both NO_x and CO emissions reduction by an overly conservative 90 percent and for an annualized (spread over 20 years at 7 percent interest) cost of $7.3 million per year for the first phase and $20 million per year for the full project. The annualized costs calculated were $1.2 million for a siloxane removal system, $1.17 million for the SCR system for a Titan turbine, and $780,000 for the SCR system for a Centaur turbine. The initial capital investment was $15 million for one siloxane removal system and five SCRs just in the first phase of the project.

In the June 4, 2009 RAI response, Golder explained why the SCR basic equipment costs considered for the Titan and Centaur turbines are reasonable. In support of the siloxane removal system cost, Golder has collected information from Green Energy Solutions (GES) (www.gesbyparker.com), which is attached with this letter (Attachment B). According to GES, the cost of siloxane removal is 0.2 to 0.6 cents per kilowatt-hour (kWh), which is $1.13 million to $3.39 million for the proposed 64.5-megawatt (MW) Okeechobee Landfill project. Golder used a basic equipment cost of $0.96 million and a total capital investment of $2.27 million for the siloxane removal system considered for the Okeechobee Landfill. Therefore, the siloxane removal system costs presented in the June 4 response are confirmed.

As shown in the attached revised Table 7, the cost effectiveness to control NO_x emissions using SCR is $29,000 per ton of NO_x in the first phase of the project, which is based on controlling the NO_x emissions to the manufacturer's guaranteed level of 25 ppm @15% O_2. These costs are excessive and would render this 64-MW renewable energy project economically unviable.

Based on the findings of the information search, Golder requests the following to be considered:

- The Solar Mercury 50 turbine is untested at this time and is not suitable for the Okeechobee Landfill project. OLI does not want to use a new brand of turbines for which no operational data are available. The Mercury 50 has been used as LAER, but was based on pipeline-quality gas. Also, siloxane removal systems are required for the Mercury 50, but OLI is not sure if they will work. The Mercury 50 has a recuperator system, whereas the Titan and Centaurs do not. Waste Management (WM), the parent company of OLI, previously tried to operate the Saturn turbines with recuperator systems and they did not work, and OLI is not willing to use those types of turbines again until they are proven. Since OLI is proposing a phased PSD project, BACT will have to be re-evaluated for NO_x for later phases (every 7 years as necessary); the Mercury 50 will be evaluated as part of the NO_x BACT at that time, which may have a proven track record at that time that may result in a different BACT determination.
- SCR is not suitable for LFG-fired turbines. No data are available on a successful installation of SCR on a LFG-fired turbine. NO_x emissions from the Okeechobee Landfill project are subject to BACT, not LAER, and OLI should not be forced to use a control technology that is both untested and cost prohibitive.
- WM operates numerous LFGTE facilities nationwide and siloxane poses no problem to turbine operation for turbines that do not have recuperators. Siloxane is a major concern for application of SCR, but not for the turbines without recuperators.
- The Virginia Department of Environmental Quality has recently issued a draft permit to King George Landfill, Inc. to construct and operate a landfill gas electric generation facility in King George, VA, which will consist of four Solar Centaur turbines with NO_x emissions limited to 96 ppm @15% O_2. NO_x emissions limits proposed for the Okeechobee Landfill turbines are 72 ppm for the Titan and 42 ppm for each of the fifteen Centaurs.
- The only turbine at a LFGTE application with a permitted NO_x limit lower than 25 ppm is the Mercury 50 turbine at UNH. However, this turbine will be burning a near natural gas quality gas after a very expensive pretreatment of the LFG. The gas treatment plant at UNH costs $18 million and processes 7,000 scfm of gas. The design flow of Okeechobee Landfill is 32,400 scfm.
- FDEP has approved major power plant applications with NO_x control cost effectiveness figures much higher than $2,500 per ton of NO_x removed. However, these costs are for much larger power plants (i.e., 300 MW to thousands of MW), and thus are much more able to absorb the cost of expensive control equipment. These costs can also be passed on to the electric rate-payer. OLI is a private enterprise proposing small renewable energy projects (20 to 65 MW), and therefore the cost impacts are proportionately higher.
- For OLI, the Lo-Cat sulfur removal system cost and operational costs have greatly increased since the permit application was originally submitted. The Lo-Cat cost is now in the neighborhood of $14 million and operational costs are more than $900,000 just for the chemicals and electricity. Additionally, the Lo-Cat system may require a water treatment plant, which was not included in the original BACT analysis. Having to install a SCR system with

an associated siloxane removal system at OLI will render the project economically infeasible. This would stop a project that is a renewable energy source, which would affect Florida's ability to meet its renewable energy goals.

I hope that the above information will be helpful to you in making the BACT determination for the proposed LFG-fired turbines at the Okeechobee Landfill. If you have any questions, please do not hesitate to call me at (352) 336-5600.

Sincerely,

GOLDER ASSOCIATES INC.

David A. Buff, P.E., Q.E.P.
Principal Engineer

DB/SKM/tz

Enclosures

cc: D. Thorley, WM
M. Lersch, WM
J. Christiansen, WM

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TABLE 7 (Revised July 23, 2009)
COST EFFECTIVENESS CALCULATION FOR NO_x CONTROL SCENARIOS, OKEECHOBEE LANDFILL FACILITY

Cost Items	Comments/Reference	Value	NO_x Control Scenarios			
			1 Titan 130	1 Centaur 40	1 Titan 130 + 4 Centaur 40	1 Titan 130 + 15 Centaur 40
Annualized Cost for Siloxane System ($/yr)	Table 1	1,213,219	1,213,219	1,213,219	1,213,219	1,213,219
Annualized Cost of SCR System for Titan 130 ($/yr)	Table 2	1,165,516	1,165,516	--	1,165,516	1,165,516
Annualized Cost of SCR System for Centaur 40 ($/yr)	Table 3	777,761	--	777,761	3,111,045	11,666,420
Total Annualized Cost (AC)($/yr):			2,378,735	1,990,980	5,489,780	14,045,155
Uncontrolled NO_x Emissions (TPY):						
Titan 130 Baseline NO_x Emissions (TPY):	72 ppm, Emission Guarantee	203.0	203.0	--	203.0	203.0
Centaur 40 Baseline NO_x Emissions (TPY):	42 ppm, Emission Guarantee	35.0	--	35.0	140.0	525.0
Controlled NO_x Emissions (TPY):						
Titan 130 Controlled NO_x Emissions (TPY):	Assumed 25 ppm BACT Limit		70.5	--	70.5	70.5
Centaur 40 Controlled NO_x Emissions (TPY):	Assumed 25 ppm BACT Limit		--	20.8	83.3	312.5
Total Reduction in NO_x Emissions (TPY):	Baseline - Controlled		132.5	14.2	189.2	345.0
Cost Effectiveness (AC/Total Reduction)	$ per ton Removed				29,019	40,709

Professional Engineer Certification

1. Professional Engineer Name: **David A. Buff**
   Registration Number: **19011**
2. Professional Engineer Mailing Address...
   Organization/Firm: **Golder Associates Inc.****
   Street Address: **6026 NW 1st Place**
   City: **Gainesville** State: **FL** Zip Code: **32607-6018**
3. Professional Engineer Telephone Numbers...
   Telephone: **(352) 336-5600** ext. **21145** Fax: **(352) 336-6603**
4. Professional Engineer E-mail Address: **dbuff@golder.com**
5. Professional Engineer Statement:

I, the undersigned, hereby certify, except as particularly noted herein, that:*

(1) To the best of my knowledge, there is reasonable assurance that the air pollutant emissions unit(s) and the air pollution control equipment described in this application for air permit, when properly operated and maintained, will comply with all applicable standards for control of air pollutant emissions found in the Florida Statutes and rules of the Department of Environmental Protection; and

(2) To the best of my knowledge, any emission estimates reported or relied on in this application are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions unit addressed in this application, based solely upon the materials, information and calculations submitted with this application.

(3) If the purpose of this application is to obtain a Title V air operation permit (check here ☐, if so), I further certify that each emissions unit described in this application for air permit, when properly operated and maintained, will comply with the applicable requirements identified in this application to which the unit is subject, except those emissions units for which a compliance plan and schedule is submitted with this application.

(4) If the purpose of this application is to obtain an air construction permit (check here ☒, if so) or concurrently process and obtain an air construction permit and a Title V air operation permit revision or renewal for one or more proposed new or modified emissions units (check here ☐, if so), I further certify that the engineering features of each such emissions unit described in this application have been designed or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering principles applicable to the control of emissions of the air pollutants characterized in this application.

(5) If the purpose of this application is to obtain an initial air operation permit or operation permit revision or renewal for one or more newly constructed or modified emissions units (check here ☐, if so), I further certify that, with the exception of any changes detailed as part of this application, each such emissions unit has been constructed or modified in substantial accordance with the information given in the corresponding application for air construction permit and with all provisions contained in such permit.

David a. Buff — Signature

7/28/09 — Date

(Seal)

* Attach any exception to certification statement.

**Board of Professional Engineers Certificate of Authorization #00001670.

ATTACHMENT A

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR RESOURCES

PRELIMINARY DETERMINATION FOR A MAJOR MODIFICATION OF THE RIDGEWOOD POWER FACILITY

MARCH 2009

NAME OF SOURCE:	Rhode Island Central Genco, LLC
LOCATION:	65 Shun Pike Johnston, Rhode Island
CONTACT:	Kevin Hubanks Ridgewood Power Management 160B Guthrie Lane, Suite 3 Brentwood, California 94513 (201) 447-9000
APPLICATION PREPARED BY:	GZA GeoEnvironmental, Inc. 380 Harvey Road Manchester, NH 03103 (603) 623-3600
OWNER OF SOURCE:	Rhode Island Central Genco, LLC

I. Description of the Proposed Project

Rhode Island Central Genco, LLC (RICG) proposes to install five, landfill gas-fired combustion turbines and three flares at its existing facility in Johnston, RI.

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% O_2. 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, dewaters 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.

Potential Emissions from the Existing Facility

POLLUTANT	LB/HR/ENGINE			TONS/YR
	WAUKESHA	CATERPILLAR	DEUTZ	
Nitrogen oxides	5.29[1]	2.46	2.30	148.1
Carbon monoxide	10.58	13.51	9.56	691.2
PM-10/Particulates	1.02	0.49	0.38	47.7
VOC/Nonmethane hydrocarbons	2.65	0.76	0.62	111.7
Sulfur dioxide[2]	17.26	15.53	12.57	1062.59
Hydrogen sulfide[2]	0.52	0.19	0.15	25.14
Hydrogen chloride	4.18 E-02	3.74 E-02	3.02 E-02	2.38

[1]Nitrogen oxides emissions are limited to 14,166 lbs per month
[2]Assumes 3000 ppm H_2S in landfill gas

The existing facility is classified as a major stationary source under the requirements for major stationary sources in nonattainment areas (Section 9.4 of Air Pollution Control Regulation No. 9) because potential emissions of nitrogen oxides and volatile organic compounds exceed 50 tons per year. The existing facility is also classified as a major stationary source under the requirements for major stationary sources in attainment or unclassifiable areas, also known as the PSD requirements (Section 9.5 of Air Pollution Control Regulation No. 9) because potential emissions of carbon monoxide exceed 100 tons per year and potential emissions of sulfur dioxide exceed 250 tons per year.

The proposed project is considered a major modification because the existing facility is a major stationary source and the emissions increase from the proposed modification of nitrogen oxides (162.1 tpy), carbon monoxide (705.7 tpy) and VOC (41.6) exceed the significant thresholds for those pollutants (25 tpy for nitrogen oxides, 100 tpy for carbon monoxide and 25 tpy for VOC).

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

Potential Emissions from the Proposed Flares

POLLUTANT	LB/HR/FLARE		TONS/YR[1]
	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

[1]Potential emissions from the flares are based on the regen flare emissions, except for nitrogen oxides, carbon monoxide and VOC, where potential emissions are based on the backup flares being used in place of the regen flare for 2000 hours per year.

Potential Emissions from the Existing Remaining Engines

POLLUTANT	LB/HR/ENGINE	TONS/YR
	CATERPILLAR	
Nitrogen oxides	2.46	43.1
Carbon monoxide	13.51	236.7
PM-10/Particulates	0.49	8.58
VOC/Nonmethane hydrocarbons	0.76	13.32
Sulfur dioxide	0.51	8.94
Ammonia	-	-
Hydrogen sulfide	0.0055	0.1
Hydrogen chloride	0.0375	0.66

Facility-Wide Potential Emissions from the Modified Facility

POLLUTANT	TONS/YR
Nitrogen oxides	205.2
Carbon monoxide	942.5
PM-10/Particulates	52.6
VOC/Nonmethane hydrocarbons	54.9
Sulfur dioxide	65.8
Ammonia	47.1
Hydrogen sulfide	0.73
Hydrogen chloride	4.8

II. Requirements for Major Stationary Sources in Nonattainment Areas

The nonattainment area provisions of APC Regulation No. 9 are applicable to the pollutants nitrogen oxides (NO_x) and volatile organic compounds (VOC). The following is a discussion of the various provisions of Section 9.4 of APC Regulation No. 9 and how the applicant has demonstrated compliance with those provisions.

A. Lowest Achievable Emission Rate (LAER) (Subsection 9.4.2(a))

Subsection 9.4.2 (a)(2) requires that a major modification must meet an emission limitation that is considered the lowest achievable emission rate (LAER). The lowest achievable emission rate will be based on technological factors and can be in the form of a numerical emission standard or a design, operational or equipment standard. It is the responsibility of the applicant to present and defend the technology chosen to represent LAER.

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).

- *Combustion Turbines*

  1. Nitrogen Oxides

  In California, BACT is defined as the most stringent limitation or control technique:

  1) which has been achieved in practice,
  2) is contained in any State Implementation Plan (SIP) approved by the United States Environmental Protection Agency, or
  3) any other emission control technique, determined by the Air Pollution Control Officer to be technologically feasible and cost effective.

  This definition of BACT is very similar to the definition of LAER contained in APC Regulation No. 9.

The BACT Guidelines of the South Coast Air Quality Management District and the Bay Area Air Quality Management District in California for nitrogen oxides emissions from a landfill gas fired turbine are 25 ppmv, dry corrected to 15% O_2. Additionally, the California Air Resources Board has issued a guidance document for permitting electrical generation technologies. The document, entitled "Guidance for the Permitting of Electrical Generation Technologies", includes recommendations for Best Available Control Technology (BACT) for engines and turbines using waste gas.

The Air Resources Board has recommended a NO_x emission level of 25 ppmvd corrected to 15% O_2 as representing BACT for gas turbines using waste gas.

The Office of Air Resources believes that a nitrogen oxides emission limit of 25 ppmvd corrected to 15% O_2 is the most stringent emission limitation required by any rule or regulation.

As part of the review of this permit application, the Office of Air Resources reviewed several recently issued permits by state and local air pollution control agencies for landfill gas-fired engine projects. Table 1 summarizes our findings.

Table 1
NO_x Emission Limitations for Recently Permitted Projects

FACILITY	TURBINE	DATE	STATE	NO_X
Chiquita Canyon Landfill	Solar Mercury 50		CA	25 ppm@15%O_2
Gas Recovery Systems, Inc.	Solar Taurus 60	3/2007	MI	32 ppm@15%O_2
Bethlehem Renewable Energy	Solar Taurus 60	12/2006	PA	32 ppm@15%O_2
Resource Technology Corporation	Solar Taurus 60	9/2002	IL	32 ppm@15%O_2
DQE Services-Monmouth Energy	Solar Taurus	6/2001	NJ	32 ppm@15%O_2
MCUA Landfill Gas Project	Solar Taurus 60	3/1999	NJ	32 ppm@15%O_2
Green Knight/Plainfield	Solar Centaur	8/2001	PA	35 ppm@15%O_2
Gas Recovery Systems, Inc.	Solar Centaur T-4500	12/2006	MI	42 ppm@15%O_2
Resource Technology Corporation	Solar Taurus 60	9/2001	IL	65 ppm@15%O_2
Riverview Energy Systems	Solar Centaur T-4701	2/2005	MI	71 ppm@15%O_2
Riverview Energy Systems	Solar Centaur T-4701	5/2002	MI	71 ppm@15%O_2
Resource Technology Corporation	Solar Titan 130	12/01	IL	75 ppm@15%O_2
Resource Technology Corporation	Solar Taurus 60	3/2001	IL	150 ppm@15%O_2
Waste Management of Illinois	Solar Centaur	1995/1999	IL	

The Office of Air Resources believes that a nitrogen oxides emission limit of 25 ppmvd corrected to 15% O_2 is the most stringent emission limitation required by any preconstruction permit.

The applicant maintains that the only commercially available turbine for which the manufacturer will warranty a nitrogen oxides emission limitation of 25 ppmvd corrected to 15% O_2 when firing landfill gas is the Solar Mercury 50. The applicant has determined that the Mercury 50 turbine is unsuitable for this project. The Department, based on its review, has found no evidence that an emission limitation lower than 25 ppmvd corrected to 15% O_2 has been achieved in practice on a consistent basis.

Therefore the Office of Air Resources believes that LAER for the proposed gas turbines is a NO_x emission limitation of 25 ppmvd corrected to 15% O_2.

The applicant proposes to meet this emission limitation by using selective catalytic reduction (SCR) to reduce the concentration of NOx in the exhaust gases from the turbines to a concentration of 25 ppmvd corrected to 15% O_2. Selective catalytic reduction (SCR) is a post combustion or flue gas treatment technique. The process involves the injection of ammonia into the flue gases upstream of a catalyst bed. The ammonia, mixed with the combustion products, passes over a catalyst bed and the nitrogen oxides (NO_x) in the flue gas are reduced to nitrogen (N_2) and water vapor (H_2O).

The Department is not aware of any successful installations of SCR in a landfill gas application. Landfill gas contains siloxanes, a commercially produced, man-made compound found in consumer products. Combustion of landfill gas containing siloxanes produces silica which can blind catalyst surfaces. To make it possible for the SCR installation to be successful, the applicant proposes to install a landfill gas treatment system to remove landfill gas contaminants such as siloxanes and sulfur.

LAER for nitrogen oxides is therefore represented by combustor design and good combustion practices with post combustion treatment (SCR). The emission limit chosen to represent LAER for NO_x is:

25 ppmvd corrected to 15% O_2

2. Volatile Organic Compounds

The most stringent control technology identified for reducing VOC emissions was catalytic oxidation. As stated previously, landfill gas contains impurities that, when combusted, have been shown to poison catalyst based post combustion treatment technologies such as SCR and an oxidation catalyst. It is the Office of Air Resources' position that there is no technically feasible, post combustion treatment technology for reducing volatile organic compound emissions, from landfill gas-fired turbines. We are not aware of any successful installation of post combustion treatment technologies to landfill gas-fired turbines. Therefore, the technically feasible control

techniques for VOC emissions from landfill gas fired turbines are combustor design and good combustion practices to minimize NMHC emissions.

The Department believes that the only rule or regulation that limits VOC emissions from landfill gas-fired turbines is the New Source Performance Standard for Municipal Solid Waste Landfills (40 CFR 60, Subpart WWW). If the turbine is used as a "control system" for collected landfill gas, VOC emissions must be either reduced by 98 weight percent or the outlet VOC concentration must be less than 20 parts per million by volume, dry basis as hexane corrected to 3 percent oxygen.

As part of the review of this permit application, the Office of Air Resources reviewed several recently issued permits by state and local air pollution control agencies for landfill gas-fired engine projects. Table 2 summarizes our findings:

Table 2
VOC Emission Limitations for Recently Permitted Projects

FACILITY	TURBINE	DATE	STATE	VOC
Green Knight/Plainfield	Solar Centaur	8/2001	PA	10 ppmvd@15%O_2 (as methane)
DQE Services-Monmouth Energy	Solar Taurus	6/2001	NJ	10 ppmvd@15%O_2 (as methane)
MCUA Landfill Gas Project	Solar Taurus 60	3/1999	NJ	5 ppmvd@15%O_2 (as hexane)
Bethlehem Renewable Energy	Solar Taurus 60	12/2006	PA	20 ppmvd@3%O_2 (as hexane)
Riverview Energy Systems	Solar Centaur T-4701	2/2005	MI	20 ppmvd@3%O_2 (as hexane)
Riverview Energy Systems	Solar Centaur T-4701	5/2002	MI	20 ppmvd@3%O_2 (as hexane)
Resource Technology Corporation	Solar Titan 130	12/2001	IL	20 ppmvd@3%O_2 (as hexane)
Resource Technology Corporation	Solar Taurus 60	3/2001	IL	20 ppmvd@3%O_2 (as hexane)
Gas Recovery Systems, Inc.	Solar Taurus 60	3/2007	MI	0.08 lbs/hr
Resource Technology Corporation	Solar Taurus 60	9/2002	IL	1.71 lbs/hr
Resource Technology Corporation	Solar Taurus 60	9/2001	IL	1.64 lb/hr
Gas Recovery Systems, Inc.	Solar Centaur T-4500	12/2006	MI	2.5 tpy
Waste Management of Illinois	Solar Centaur	1995/1999	IL	1.9 lb/hr

A VOC emission rate of 5 ppmvd corrected to 15% O_2 (as hexane) is roughly equivalent to 27 ppmvd corrected to 15% O_2 (as methane). A VOC emission rate of 20 ppmvd corrected to 3% O_2 (as hexane) is roughly equivalent to 35 ppmvd corrected to 15% O_2 (as methane). Therefore the most stringent VOC emission

rate required in any preconstruction permit is 10 ppmvd corrected to 15% O_2 (as methane).

Based on vendor guarantees the applicant has proposed that the emission limitation that represents LAER for VOC is 10 ppmvd corrected to 15% O_2 (as methane) measured at full load operation. This is consistent with the lowest reported values for recently permitted projects.

LAER for volatile organic compounds is therefore represented by combustor design and good combustion practices to minimize VOC emissions. The emission limit chosen to represent LAER for VOC is:

10 ppmvd corrected to 15% O_2 (as methane)

- *Flares*

The regen flare is to be an Ultra Low Emission (ULE) flare. ULE flares have the lowest NO_x emissions and the highest VOC destruction efficiency compared to the alternative flare types. Therefore it is the Department's position that LAER for nitrogen oxides and volatile organic compounds from flaring is represented by the use of ultra low emission flares. The emission limits chosen to represent LAER are:

Nitrogen oxides:	*0.025 lb/MMBTU*
Volatile Organic Compounds:	*99% destruction efficiency*

The backup flares will only be used in the event that an engine, turbine or the regen flare is not operating. The applicant has proposed to use enclosed flares instead of ULE flares because the flares are to be used as backup devices and are not expected to be used on a regular basis. Enclosed flares have a slightly lower VOC destruction efficiency and higher emissions of NO_x and CO than ULE flares.

The capital cost of an ULE flare can be twice that of a comparably sized enclosed flare. ULE flares also tend to be less reliable than enclosed flares.

Although enclosed flares have higher emissions of NO_x, CO and VOC than ULE flares, the emissions will be lower than that of the engines or turbines that they would backup. The enclosed flare, if needed as a backup for the regen flare, will have higher emissions of these pollutants. Based on reliability estimates for a ULE flare, the applicant estimates that the ULE flare would be out of service for no more than 2000 hours/year.

Considering the difference in capital costs, reliability issues and the fact that the flares will be used as backup devices, it is the Department's position that enclosed

flares are an acceptable choice for the backup flares. The emission limits chosen to represent LAER for an enclosed flare are:

Nitrogen oxides:	*0.06 lb/MMBTU*
Volatile Organic Compounds:	*98% destruction efficiency*

B. Compliance Status of Existing Major Stationary Sources (Subsection 9.4.2(b))

Subsection 9.4.2 (b) requires that the applicant certify that all existing major stationary sources owned or operated by the applicant located within the state are in compliance with all applicable state and federal air pollution rules and regulations under the Clean Air Act and federally enforceable compliance schedules.

The applicant, Rhode Island Central Genco, LLC, has provided a certification that all of the facilities owned or operated by Rhode Island Central Genco, LLC or operated under common control with Rhode Island Central Genco, LLC are in compliance with all applicable state and federal air pollution rules and regulations under the Clean Air Act and federally enforceable compliance schedules. The Shun Pike facility is the only facility owned or operated by Ridgewood in Rhode Island.

C. Emission Offsets (Subsection 9.4.2(c))

Subsection 9.4.2 (c) requires the applicant to provide evidence that the total tonnage of emissions of the nonattainment air pollutant allowed from the proposed new source shall be offset by a greater reduction in the actual emissions of such air pollutant from the same or other sources.

Rhode Island Central Genco, LLC has entered into a purchase agreement for 117 tons of NO_x offsets and 36 tons of VOC offsets to satisfy this requirement. The NO_x 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 VOC offsets were generated by the shutdown of the Quebecor Printing Providence, Inc. facility in Providence, RI in 1998.

Subsection 9.4.2 (d) lists 6 criteria that emission offsets must satisfy. The emission offsets must:

> *(1) be approved by the Director, and be part of a federally enforceable permit, or part of an operating permit issued pursuant to 40 CFR Part 71 or under regulations approved pursuant to 40 CFR Part 70, or made part of the federally approved State Implementation Plan.*

The Massachusett Department of Environmental Protection (MADEP) issued BWP AQ 21 Final Approval to the Medical Area Total Energy Plant (MATEP) facility. This permit limits allowable NO_x emissions from the facility. The voluntary installation of air pollution controls (selective catalytic reduction) is federally enforceable through this permit.

The Massachusetts Department of Environmental Protection (MADEP) emission trading and banking rule (310 CMR 7.00: Appendix B) is part of the Massachusetts State Implementation Plan (SIP). Emission Reduction Credit Approvals issued pursuant to this rule are federally enforceable. MADEP issued Approval Numbers MBR-99-ERC-007 for the MATEP project, MBR-98-ERC-003 for the Lawrence RDF plant shutdown and MBR-99-ERC-009 for the Ogden Martin Systems of Haverhill Plant shut down. Therefore all of these emission reduction credits are federally enforceable.

The Rhode Island Department of Environmental Management, Office of Air Resources approved the creation and banking of 708.5 tons of VOC from the shutdown of the Quebecor Printing Providence Inc. facility pursuant to the Banking of Emissions section of Air Pollution Control Regulation No. 9. Air Pollution Control Regulation No. 9 is part of the Rhode Island State Implementation Plan.

(2) be federally enforceable prior to the issuance of the Major Source Permit

BWP AQ 21 and MBR-99-ERC-007 for the MATEP project were issued on January 6, 2000. MBR-98-ERC-003 for the Lawrence RDF Plant was issued on September 30, 1999. MBR-99-ERC-009 for the Ogden Martin Systems of Haverhill facility was issued on March 7, 2000.

The creation and banking of 708.5 tons of VOC from the shutdown of the Quebecor Printing Providence Inc. facility was approved on November 8, 2001.

(3) actually occur at the source of the offsets prior to the start-up of the new source

The installation of selective catalytic reduction at the MATEP facility has already occurred.

The shutdowns of the Lawrence RDF Plant, the Ogden Martin Systems of Haverhill facility and the Quebecor Printing Providence Inc. facility have already occurred.

(4) be at an offset ratio of at least 1.2 to 1

The net emissions increase of nitrogen oxides from the proposed modification to the Ridgewood facility is 96.64 tons per year. Rhode Island Central Genco, LLC must purchase 116 tons of offsets. Their planned purchase is 117 tons. This will be a

requirement in any permit issued pursuant to this preliminary determination. The offset ratio is 117/96.64 = 1.2.

The net emissions increase of volatile organic compounds from the proposed modification to the Ridgewood facility is 29.76 tons per year. Rhode Island Central Genco, LLC must purchase 36 tons of offsets. This will be a requirement in any permit issued pursuant to this preliminary determination. The offset ratio is 36/29.76 = 1.2.

(5) be obtained from a source in the same nonattainment area or in another nonattainment area provide that:

a) The other nonattainment area has an equal or higher nonattainment area classification than the area in which the source is to be located; and

b) Emissions from such other area contribute to a violation of the national ambient air quality standard in the nonattainment area in which the source is to be located.

The MATEP facility, Lawrence RDF Plant and Ogden Martin Systems of Haverhill facility are located in an area designated serious nonattainment with respect to the one-hour standard for ozone and moderate nonattainment with respect to the eight-hour standard for ozone. These are the same classifications as the entire state of Rhode Island.

In Chapter V of EPA's proposed rule to "Reduce Interstate Transport of Fine Particulate Matter and Ozone" (69 FR 4565, dated January 30, 2004), EPA provides a Table V-3, titled "Upwind States That Contain Emission Sources That Contribute Significantly (Before Considering Cost) to Projected 8-hour Nonattainment in Downwind States" that summarizes the projected downwind counties to which sources in upwind states contribute significantly. This table indicates that sources in Connecticut, Massachusetts, New Jersey, New York, Ohio, Pennsylvania and Virginia contribute to Rhode Island's ozone violation.

The Quebecor Printing Providence Inc. facility was located in Rhode Island.

(6) when considered in conjunction with the proposed emissions increase, have a net air quality benefit in the area.

Since the offset ratio is greater than 1:1 there will be a net reduction in NO_x and VOC emissions.

Therefore all of the requirements of section 9.4.2(c) & 9.4.2(d) pertaining to emission offsets are satisfied.

D. Alternatives Analysis (Subsection 9.4.2(e))

Subsection 9.4.2 (e) requires the applicant to prepare an analysis of alternative sites, sizes, production processes, and environmental control techniques that demonstrate the benefits of the proposed source significantly outweigh the environmental and social cost imposed as a result of its location, construction or modification.

The applicant has satisfied this requirement with the analysis contained in Section 5.0 of the application.

The New Source Performance Standards for Municipal Solid Waste Landfills (40 CFR 60, Subpart WWW) requires that the landfill gas be collected and routed to:

1. An open flare; or,

2. An enclosed combustion device or a control system that reduces VOC emissions by 98%; or,

3. A treatment system that processes the collected gas for subsequent sale or use.

The proposed facility is sighted at the Central Landfill to satisfy this requirement; therefore there is no consideration of alternative sites.

The applicant evaluated two alternative technologies; (1) the use of dedicated pollution control equipment such as a flare; and (2) the use of a reciprocating engine instead of the combustion turbine. This evaluation concluded that the chosen technology (combustion turbine) is superior to each of the identified alternatives in terms of cost and environmental impact.

The project has been sized for five turbines based on the current landfill gas projections for Phase V and the proposed Phase VI. The alternate size analysis concluded that the modular design of the project would allow for future expansion should the markets for renewable power and the availability of gas make a larger plant economically feasible.

E. NO_x Air Quality Impact (Subsection 9.4.2(f))

Subsection 9.4.2 (f) requires that the applicant demonstrate compliance with the conditions in subsections 9.5.2(b)-(d) and 9.5.3(a)-(c) for the pollutant nitrogen oxides. See section III.B-D of this document for a complete discussion of these requirements.

F. Air Toxics Regulation (Subsection 9.4.2(g))

Subsection 9.4.2(g) requires the applicant to demonstrate that the emissions from the proposed facility will not cause an increase in the ground level ambient concentration at or beyond the property line in excess of that allowed by Air Pollution Control Regulation No. 22 ("Air Toxics") and any Calculated Acceptable Ambient Levels. See section III.E of this document for a complete discussion of these requirements.

G. Health Risks from Proposed Air Pollution Sources (Subsection 9.4.2(h))

Subsection 9.4.2 (h) requires the applicant to conduct any studies required by the Guidelines for Assessing Health Risks from Proposed Air Pollution Sources and meet the criteria therein.

The proposed source does not meet the applicability criteria in this document and therefore is not required to perform this type of study.

H. Applicable Air Pollution Control Regulations (Subsection 9.4.2(i))

Subsection 9.4.2 (i) requires the applicant to demonstrate that the facility will be in compliance with all applicable state and federal air pollution control regulations at the time the source commences operation. See section III.G of this document for a complete discussion of these requirements.

III. Requirements for Major Stationary Sources in Attainment or Unclassifiable Areas

The following is a discussion of the various provisions of Section 9.5 of APC Regulation No. 9 and how the applicant has demonstrated compliance with those provisions.

A. Best Available Control Technology (BACT) (Subsection 9.5.2(a))

Subsection 9.5.2 (a) of APC Regulation No. 9 requires that a stationary source shall apply BACT for each pollutant it would have the potential to emit. 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. In no event shall application of best available control technology result in emissions of any pollutant which would exceed the emissions allowed by any applicable state or federal air pollution control rule or regulation. If the Director determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of air emissions standards infeasible, a design, equipment, work practice, operational standard or combination thereof, may be prescribed instead to satisfy the requirement of best available control technology. Such standard shall to the degree possible set forth the emission reduction achievable by implementation of such design, equipment, work practice or operation and shall provide for compliance by means which achieve equivalent results."

The Office of Air Resources requires the use of the "top down" approach in a BACT analysis. The first step in the "top down" approach is to determine, for the source category being evaluated, the most stringent level of control available. If it can be shown that this level of control is technically or economically infeasible, then the next most stringent level of control is determined and similarly evaluated. Such an evaluation would continue until the level of control under consideration could not be ruled out by any technical, environmental or economic considerations.

The purpose of the BACT analysis is to determine the lowest emission limits that can be met by the source, in light of energy, economic and environmental impacts. The following is an evaluation of the applicant's BACT analysis.

- *Combustion Turbines*

1. Carbon Monoxide (CO)

The most stringent control technology identified for reducing CO emissions was catalytic oxidation. As stated previously, landfill gas contains impurities that, when combusted, have been shown to poison catalyst based post combustion treatment technologies such as SCR and an oxidation catalyst. It is the Office of Air Resources' position that there is no technically feasible, post combustion treatment technology for reducing carbon monoxide emissions, from landfill gas-fired turbines. We are not aware of any successful installation of post combustion treatment technologies to landfill gas-fired turbines. Therefore, the technically feasible control techniques for CO emissions from landfill gas fired turbines are combustor design and good combustion practices to minimize CO emissions.

The BACT Guidelines of the South Coast Air Quality Management District and the Bay Area Air Quality Management District in California for carbon monoxide emissions from a landfill gas fired turbine are 130 ppmv, dry corrected to 15% O_2 and 200 ppmv, dry corrected to 15% O_2 respectively. The Pennsylvania DEP's General Permit for landfill gas fired turbines includes a CO emission limitation of 100 ppmv, dry corrected to 15% O_2.

As part of the review of this permit application, the Office of Air Resources reviewed several recently issued permits by state and local air pollution control agencies for landfill gas-fired turbine projects. Table 3 summarizes our findings:

Table 3
CO Emission Limitations for Recently Permitted Projects

FACILITY	TURBINE	DATE	STATE	CO
Green Knight/Plainfield	Solar Centaur	8/2001	PA	28 ppm@15% O_2
Waste Management of Illinois	Solar Centaur	1995/1999	IL	50 ppm@15% O_2
DQE Services-Monmouth Energy	Solar Taurus	6/2001	NJ	72 ppm@15% O_2
MCUA Landfill Gas Project	Solar Taurus 60	3/1999	NJ	72 ppm@15% O_2
Bethlehem Renewable Energy	Solar Taurus 60	12/2006	PA	100 ppm@15% O_2
Chiquita Canyon Landfill	Solar Mercury 50		CA	
Gas Recovery Systems, Inc.	Solar Taurus 60	3/2007	MI	13.2 lbs/hr
Resource Technology Corporation	Solar Taurus 60	9/2002	IL	15.00 lbs/hr
Gas Recovery Systems, Inc.	Solar Centaur T-4500	12/2006	MI	89 tpy
Resource Technology Corporation	Solar Taurus 60	9/2001	IL	34.86 lbs/hr
Riverview Energy Systems	Solar Centaur T-4701	2/2005	MI	15.78 lbs/hr
Riverview Energy Systems	Solar Centaur T-4701	5/2002	MI	15.78 lbs/hr
Resource Technology Corporation	Solar Titan 130	12/01	IL	10.36 lbs/hr
Resource Technology Corporation	Solar Taurus 60	3/2001	IL	9.53 lbs/hr

The most stringent CO emission rate required in any preconstruction permit is 28 ppmvd corrected to 15% O_2. In 2006, the Pennsylvania Department of Environmental Protection reviewed more than 60 stack test results for carbon monoxide emissions from landfill gas-fired turbines. The measured emissions ranged from 15 to 82 ppmvd corrected to 15% O_2. They concluded that since CO emissions from landfill gas fired turbines can vary significantly due to both combustor design and the varying composition of landfill gas, a buffer should be added to the achievable CO emission levels for turbines. They concluded that a CO emission rate of 100 ppmvd corrected to 15% O_2 represents Best Available Technology (BAT). The term "best available technology" is defined in the DEP rules as *"...equipment, devices, methods or techniques as determined by the Department which will prevent, reduce or control emissions of air contaminants to the maximum degree possible and which are available or may be made available..."*.

Based on vendor guarantees the applicant has proposed that the emission limitation that represents BACT for CO is 100 ppmvd corrected to 15% O_2 measured at full load operation.

The Office of Air Resources has concluded that BACT for carbon monoxide is represented by combustor design and good combustion practices to minimize CO emissions. The emission limit chosen to represent BACT for CO is:

100 ppmvd corrected to 15% O_2

2. Sulfur dioxide (SO_2)

Landfill gas can contain a variety of sulfur compounds. The only means of controlling SO_2 emissions from a landfill gas fired turbine is to limit the sulfur content of the landfill gas. Post combustion control techniques have not been applied to landfill gas-fired turbines. The landfill gas will be treated prior to combustion to remove hydrogen sulfide down to 100 ppmv.

The NSPS for stationary combustion turbines (40 CFR 60, Subpart KKKK) requires that turbines must not burn any fuel which contains total potential sulfur emissions in excess of 26 ng SO_2/J (0.060 lb SO_2/MMBtu) heat input. The treated landfill gas will have potential sulfur emissions less than 0.034 lb SO_2/MMBTU.

The Office of Air Resources has concluded that BACT for sulfur dioxide is landfill gas pretreatment to remove hydrogen sulfide down to 100 ppmv. The emission limit chosen to represent BACT is:

0.034 lb/MMBTU

3. Particulate Matter less than 10 microns (PM-10)

The Office of Air Resources is not aware of any landfill gas-fired turbine installations where flue gas controls are used to reduce particulate emissions. Additionally, the Office of Air Resources believes that the concentration of particulate matter in the flue gases from a turbine, during combustion of landfill gas is not sufficient to warrant consideration of flue gas controls as a BACT option. Particulate loading is calculated to be on the order of 0.07 grains/acf. The effectiveness of flue gas controls at this loading would be minimal. Therefore, flue gas controls are not considered a practical option.

The use of SCR will increase particulate emissions slightly. SCR catalysts can increase the conversion rate of sulfur dioxide in the exhaust gases to sulfur trioxide. Sulfur trioxide reacts with ammonia in the exhaust gases to form ammonium salts, a particulate. The applicant estimates that the use of SCR will increase particulate emissions by 0.0028 lb/MMBTU.

The turbine vendor has provided an emission warranty of 0.021 lb/MMBTU for the turbines without the SCR. Particulate emissions with the SCR system would increase to 0.0238 lb/MMBTU.

The Office of Air Resources has concluded that BACT for particulate emissions is good combustion practices to minimize particulate emissions. The emission limits chosen to represent BACT for PM-10 emissions is:

0.0238 lb/MMBTU

4. Ammonia (NH_3)

The SCR process involves the injection of ammonia into the flue gases. Due to a number of factors, it is impractical to inject ammonia at the theoretical quantity needed to remove all the NO_x and therefore an excess of ammonia over the theoretical quantity is necessary to achieve high conversion efficiencies. As a result, some unreacted ammonia passes through the system and is discharged to the atmosphere. This unreacted ammonia emission is commonly referred to as "ammonia slip."

Ammonia slip could, theoretically, be reduced through the use of flue gas controls such as a specially designed ammonia decomposition catalyst. However, the Office of Air Resources is not aware of any commercial applications of this technology, or any other flue gas control technique, for combustion turbines. Therefore, we do not consider flue gas controls an available BACT option.

The Department is not aware of any successful installations of SCR in a landfill gas application. Therefore there is no operating experience upon which to determine an achievable emission limitation. The applicant has proposed to limit ammonia slip to 20 ppmvd corrected to 15% O_2.

Therefore the Office of Air Resources concluded that BACT for ammonia slip is represented by an SCR system design and good operating practices to minimize emissions. The emission limit chosen to represent BACT for ammonia emissions is:

20 ppmvd, corrected to 15 percent O_2

- *Flares*

1. Carbon Monoxide

The regen flare is to be an Ultra Low Emission (ULE) flare. The applicant identified one enclosed flare used to treat landfill gas that had a lower emission limitation (0.01 lb/MMBTU) than the manufacturer's warranty (0.06 lb/MMBTU) for the ULE flare. The flare is located at the Lopez Canyon Sanitary Landfill in Los Angeles, CA. The entry for this facility in the South Coast Air Quality Management District's BACT determinations states that the CO limit may not be achievable in all cases. Therefore this emission limit is not considered to have been demonstrated as achievable in practice. The Office of Air Resources concluded that the emission limit chosen to represent BACT for carbon monoxide emissions is the manufacturer's warranty:

0.06 lb/MMBTU

The backup flares will only be used in the event that an engine, turbine or the regen flare is not operating. The applicant has proposed to use enclosed flares instead of ULE flares because the flares are to be used as backup devices and are not expected to be used on a regular basis. The applicant identified four enclosed flares used to treat landfill gas that had a lower emission limitation than the manufacturer's warranty (0.2 lb/MMBTU) for the enclosed flare.

The enclosed flares at the Edgeboro Disposal site in New Jersey and at the Fresh Kills landfill in New York both have lower carbon monoxide emission limits but have higher nitrogen oxide emission limits. In an enclosed flare carbon monoxide emissions can be reduced by increasing the flare operating temperature. However, in doing so, nitrogen oxides emissions will increase. Nitrogen oxides are an ozone precursor and Rhode Island is nonattainment for the ozone standard. Therefore the Office of Air Resources would prefer to have a source maximize the reductions in nitrogen oxides at the expense of increased emissions of carbon monoxide. For these reasons we don't consider either the Edgeboro Disposal site or Fresh Kills Landfill as representative.

The flares operated by the Los Angeles Bureau of Sanitation have only been tested at low loads and the South Coast Air Quality Management District BACT entry states that the CO limits may not be achievable under all operating conditions. Therefore we do not consider this emission limit as having been achieved in practice.

The flare at the Northwest Regional Landfill is located in the desert and flare performance in the desert is different than flare performance in the eastern United States. According to the manufacturer (Perennial Energy), the flare at Northwest Regional Landfill would not be able to achieve the same emission level (0.13 lb/MMBTU) at the Ridgewood site. Therefore we do not consider the Northwest Landfill as representative.

The Office of Air Resources concluded that the emission limit chosen to represent BACT for carbon monoxide emissions is the manufacturer's warranty:

0.20 lb/MMBTU

2. Sulfur dioxide (SO_2)

Landfill gas can contain a variety of sulfur compounds. The only means of controlling SO_2 emissions from a landfill flare is to limit the sulfur content of the landfill gas. The landfill gas will be treated prior to combustion to remove hydrogen sulfide down to 100 ppmv.

The Office of Air Resources has concluded that BACT for sulfur dioxide is landfill gas pretreatment to remove hydrogen sulfide down to 100 ppmv.

B. Air Quality Impact Analysis (Subsection 9.5.2(b))

Subsection 9.5.2(b)(1) requires the applicant to demonstrate, by means of air quality modeling, that allowable emissions from the proposed source would not cause or contribute to:

a. air pollution in violation of any national ambient air quality standard; or,

b. any increase in ambient concentrations exceeding the remaining available increment for the specified air contaminant.

The Office of Air Resources' review of the applicant's air quality impact analysis consists of three parts:

1. A review of the modeling methodology used to predict the ambient impacts of the facility;

2. A review of the emission rates used as input to the air quality models to predict the ambient impacts of the facility; and

3. A comparison of the predicted impacts for criteria pollutants to the applicable significant impact levels and a comparison of the predicted impacts for non-criteria pollutants to Acceptable Ambient Levels.

Therefore, the following is a summary of the Office of Air Resources findings with respect to each of these reviews.

1. Modeling Methodology

   a. Discussion of Emission Sources

      The applicant identified 18 emission sources located at either the Ridgewood Power facility, the Central Landfill or the Rhode Island State Energy Center that have the potential to cause a significant impact on surrounding air quality. The sources consist of 1-6000 cfm ultra low emissions flare, 1-400 scfm flare, 2-2000 scfm flares, 1-630 cfm regen flare, 2-6000 cfm enclosed flares, 2-Deutz landfill gas-fired engines, 4-Caterpillar landfill gas-fired engines, a steam boiler located at the Administration Building of the Central Landfill, 2-turbines located at Rhode Island State Energy Center, 3-engines serving grinders, the 5-proposed combustion turbines and the two cooling towers associated with the landfill gas power plant. The 2-1300 scfm flares were not included in the modeling because they will be removed from service at the same time that the existing Waukesha engines are removed from service..

      The flares, steam boiler, engines and turbines were modeled as point sources. Flares were modeled using the default parameters generated by the SCREEN3 model.

   b. Model Selection

      The applicant used EPA's AERMOD model to predict air impacts from the proposed facility at simple, intermediate and complex terrain.

c. Meteorology

The meteorological data used by the applicant to predict air impacts for criteria pollutants is consistent with EPA recommended procedures. The data covered a five-year period from 1986 to 1990. Surface data was collected at T. F. Green Airport and upper air data was collected at Chatham, Mass. These stations are the closest and most representative national weather service stations to the site of the proposed facility.

The meteorological data used by the applicant to predict air impacts for listed toxic air contaminants is consistent with RIDEM recommendations. The data covered five-years of data, 1972, 1976, 1980, 1984 and 1988. Surface data was collected at T. F. Green Airport and upper air data was collected at Chatham, Mass. These stations are the closest and most representative national weather service stations to the site of the proposed facility.

d. Receptor Locations

The applicant placed receptors at 10-meter intervals along the property boundary of the Central Landfill. A main polar grid of receptors was placed at distances of 25 meters out to 1000 meters, 100 meters out to 5000 meters and 500 meters out to 6000 meters. A supplemental polar grid centered on the Caterpillar engines, with receptors at distances of 25 meters out to 1000 meters was also included. A third polar grid centered on the regen flare and backup flares, with receptor rings at 25-meter intervals out to 500 meters was included to address impacts form the flares. All radials were placed at 10 degree intervals. The construction of the receptor network and the selection of distances are consistent with procedures specified in EPA's Guideline on Air Quality Models (40 CFR Part 51, Appendix W).

e. Model Options

The options chosen by the applicant are consistent with those recommended for regulatory use in EPA's Guideline for Air Quality Models (40 CFR Part 51, Appendix W).

f. Good Engineering Practice (GEP) Stack Height and Building Downwash Parameters

A GEP stack height analysis was conducted for all emission sources modeled as point sources. The stack heights of the steam boiler, the 2-RISEC turbines, the Recovermat engine/grinder and the 2-cooling towers were less than the calculated GEP stack height. Therefore building downwash effects were considered in the modeling for these sources. The applicant's GEP

analysis and determination of direction specific building dimensions is consistent with EPA's Guideline for Determination of Good Engineering Practice Stack Height (EPA 450/4-80-023R) and the Building Profile Input Program User's Guide (EPA 454/R-93-038).

g. Cavity Impacts

Refined air quality modeling was conducted using the AERMOD model, which accounts for building cavity impacts.

h. Class I Areas

The nearest Class I area is the Lye Brook Wilderness Area in southern Vermont located approximately 190 km northwest of the facility. The applicant evaluated the impact on this Class I area using EPA's VISCREEN model. The model predicts that visibility will not be impacted by the proposed project.

i. Background Concentrations

Background air quality data, to represent sources that were not included in the modeling, were based on the highest, second high for short-term concentrations (1-hr, 3-hr, 8-hr or 24-hr) and on the highest annual concentrations measured at any site in Rhode Island for the period 2004-2006.

The modeling methodology used in the permit application is acceptable for predicting impacts of the facility on the surrounding air quality.

2. Emission Rates

a. Criteria Pollutants

The sources of the emission factors for the emission points at Central landfill used to calculate the emission rates for the pollutants NO_x, CO and PM-10 were either permit limitations, test data, EPA's AP-42 "Compilation of Air Pollutant Emission Factors" or vendor supplied information/performance guarantees.

The emission rates for SO_2 for all emission points combusting landfill gas from the gas treatment system were based on a maximum sulfur content of the landfill gas of 100 ppm. This is the performance level of the proposed gas treatment system. Remote flares 1, 2 and 3 will combust landfill gas that is not treated. The assumed sulfur content of the landfill gas combusted in

these flares is 3000 ppmv, 600 ppmv and 2000 ppmv for Remote flares 1, 2 and 3 respectively. The emission rate for SO_2 for the steam boiler was calculated using an AP-42 emission factor.

Emission rates for the RISEC power plant were obtained from the facility's preconstruction permit.

b. Air Toxics

Emission rates for all listed toxic air contaminants were calculated based on maximum concentrations observed in samples of the landfill gas collected and analyzed during the first three quarters of 2007.

The Office of Air Resources finds the applicant's emission estimates to be acceptable for use in predicting air quality impacts.

3. Impact Analysis

The criteria pollutants evaluated in the modeling analysis are nitrogen oxides, sulfur dioxide, particulate matter, and carbon monoxide. The maximum predicted impacts due to the proposed modification combined with the other emissions sources at the Central Landfill, Ridgewood Power and RISEC facility when added to background concentrations are below the applicable NAAQS. The maximum predicted impacts of criteria pollutants due to the facility and the other emission sources are summarized in Table 4 and compared to the NAAQS.

The maximum predicted impacts due to the proposed modification combined with the other new or modified emissions sources at the Central Landfill, Ridgewood Power and RISEC facility are below the applicable PSD increments. The maximum predicted impacts of criteria pollutants due to the facility and the other emission sources are summarized in Table 5 and compared to the PSD increments.

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 6 is a summary of the maximum predicted impacts of nitrogen oxides for the proposed facility in comparison to the allowable remaining PSD increment.

The applicant has satisfactorily demonstrated that the proposed facility will not cause or contribute to air pollution in violation of the NAAQS for these pollutants or in excess of the allowable PSD increments for criteria pollutants.

Subsection 9.5.2(b)(2) requires the applicant to prepare an analysis of the ambient air quality in the area that the source would affect for each pollutant for which it would result in a

significant net emissions increase. Nitrogen oxides, carbon monoxide and particulate matter less than 10 microns in diameter (PM-10) are the only pollutants for which there would be a significant net emissions increase. The maximum predicted air quality impacts of nitrogen dioxide, carbon monoxide and PM-10, due to the proposed modification alone, are below the threshold levels in subsection 9.5.2(b)(2)d. As a result, no preconstruction ambient monitoring program is deemed to be necessary for these pollutants.

The maximum predicted impacts of these three pollutants due to the modification alone are summarized in Table 7 and compared to the threshold levels.

TABLE 4
Summary of Maximum Predicted Impacts of
Criteria Pollutants and Comparison to NAAQS ($\mu g/m^3$)

Pollutant	Averaging Time	Maximum Predicted Impact ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
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

TABLE 5
Summary of Maximum Predicted Impacts of
Criteria Pollutants and Comparison to PSD Increments ($\mu g/m^3$)

Pollutant	Averaging Time	Maximum Predicted Impact All Sources ($\mu g/m^3$)	Full PSD Increment ($\mu g/m^3$)
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

TABLE 6
Maximum Predicted Impacts of Nitrogen Oxides and
Comparison to Allowable Remaining PSD Increments ($\mu g/m^3$)

Pollutant	Averaging Time	Maximum Predicted Impact All Existing Sources ($\mu g/m^3$)	Full PSD Increment ($\mu g/m^3$)	Maximum Predicted Impact from Modification ($\mu g/m^3$)	Allowable Remaining PSD Increment ($\mu g/m^3$)
NO_2	Annual	11.0	25	3.0	3.5

TABLE 7

Summary of Maximum Predicted Impacts of Proposed Modification
and Comparison to Ambient Air Monitoring Threshold Levels ($\mu g/m^3$)

Pollutant	Averaging Time	Maximum Predicted Impact ($\mu g/m^3$)	Threshold Level ($\mu g/m^3$)
CO	8-hour	176	575
NO_2	Annual	3.0	14
PM-10	24-hour	9.9	10

C. Additional Impacts Analysis (Subsection 9.5.2(c))

Subsection 9.5.2(c) requires the applicant to provide an analysis of the impairment to visibility, soils and vegetation that would occur as a result of the modification and general commercial, residential, industrial and other growth associated with modification. Additionally, this subsection requires the applicant to provide an analysis of the air quality impact projected for the area as a result of general commercial, residential, industrial and other growth associated with the modification.

1. Visibility Analysis

   The applicant conducted a Level 1 visibility impairment analysis using the VISCREEN program, as specified in the "Workbook for Plume Visual Impact Screening and Analysis" (EPA-450/4-88-015). The results of the VISCREEN program satisfactorily demonstrate that this modification should not cause visibility impairment at the Lye Brook Wilderness Area in Vermont, the nearest Class I area to this facility.

2. Soils and Vegetation Analysis

   The applicant has presented an assessment of the impacts on soils and vegetation as a result of emissions from the proposed modification. This assessment compared predicted project impacts with screening levels presented in the 1980 EPA document "A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils and Animals" (EPA 450/2-81-078).

   This analysis concluded that emissions from the proposed modification will not cause or contribute to air pollution that would adversely impact soils and vegetation in the area.

3. Growth Analysis

   The applicant's analysis concluded that there is not expected to be any significant, direct, industrial, commercial or residential growth associated with this modification that would adversely affect air quality in the vicinity of the project. It is not anticipated that any industrial, commercial, or residential growth will occur to support the 50 or so people whom will constitute the peak construction work force.

D. Welfare Impacts (Subsection 9.5.2(d))

Subsection 9.5.2(d) requires the applicant to apply the applicable procedures of the Guidelines for Assessing the Welfare Impacts of Proposed Air Pollution Sources and meet the criteria therein.

The Office of Air Resources "Guidelines for Assessing the Welfare Impacts of Proposed Air Pollution Sources" specifies the procedures to be followed for evaluating a facility's impact on plants, animals and soil. Applicants must apply the procedures and comply with the screening concentrations in A Screening Procedure for the Impacts of Air Pollution on Plants, Soils and Animals (EPA 450/2-81-078, December 12, 1980). The applicant has correctly applied the procedure in this assessment and met the criteria therein.

E. Air Toxics Regulation and CAALs (Subsection 9.4.2(g))

Subsection 9.4.2(g) requires the applicant to demonstrate that the emissions from the facility will not cause an increase in the ground level ambient concentration at or beyond the property line in excess of that allowed by Air Pollution Control Regulation No. 22 ("Air Toxics") and any Calculated Acceptable Ambient Levels.

The applicant evaluated 38 compounds that are possible constituents in landfill gas and are listed toxic air contaminants in Air Pollution Control Regulation No. 22. Fourteen of the thirty-eight compounds that are listed toxic air contaminants in Air Pollution Control Regulation No. 22 were not detected in the landfill gas sampled and analyzed at Central Landfill.

Potential emissions of the remaining twenty-four compounds were calculated and compared to the minimum quantities in Table III of Air Pollution Control Regulation No. 22 (see Table 8). Potential emissions of seventeen of the twenty-four compounds are less than the Table III minimum quantities and therefore no further analysis is necessary for these compounds.

The maximum predicted impacts of the seven remaining compounds, due to the proposed modification combined with the other emissions sources at Ridgewood Power, are below the applicable AALs. The maximum predicted impacts of the seven listed toxic air contaminants due to the RPPP facility are summarized in Table 9 and compared to the applicable AALs.

Additionally, unreacted ammonia will be discharged from the SCR system used to reduce emissions of nitrogen oxides. Potential emissions of the ammonia were calculated and compared to the minimum quantities in Table III of Air Pollution Control Regulation No. 22 (see Table 8). The maximum predicted impacts of ammonia due to the RICG facility are summarized in Table 9 and compared to the applicable AALs.

TABLE 8

Potential emissions of listed toxic air contaminants
compared to Table III minimum quantities

Listed toxic air contaminant	CAS Number	Potential emissions (lbs/year)	Table III Minimum Quantity (lbs/year)
Acetone	67641	520.2	20,000
Ammonia	**7664417**	**94,200**	**300**
Benzene	**71432**	**44.8**	**10**
Carbon Disulfide	75150	123.6	2000
Chlorodifluoromethane	75456	126.8	36,500
Cyclohexane	110827	85.4	20,000
1,4 Dichlorobenzene	**106467**	**14.8**	**10**
cis-1,2-Dichloroethene	156592	25.6	1000
Ethyl benzene	100414	339	9000
Ethylidene dichloride (1,1 Dichloroethane)	75343	10	70
Hexane	110543	144	20,000
Hydrogen Chloride	**7647010**	**11,165**	**700**
Hydrogen Sulfide	**7783064**	**1632**	**10**
Isopropanol (2-Propanol)	67630	176.4	1000
Mercury (total)		**45.4**	**0.3**
Methyl Ethyl Ketone	78933	332.6	4000
Methyl Isobutyl Ketone	108101	37	9000
Methylene Chloride	75092	24.6	200
Styrene	100425	33	3000
Tetrachloroethylene	**127184**	**69**	**20**
Toluene	108883	1432.6	3000
Trichloroethylene	79016	30.8	50
Trichlorofluoromethane	75694	102.6	3000
Vinyl Chloride	**75014**	**20.4**	**20**
Xylene	1330207	903.8	1000

TABLE 9

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

Pollutant	Averaging Time	Maximum Predicted Source Impact ($\mu g/m^3$)	Acceptable Ambient Level ($\mu g/m^3$)
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	0.0215	2
	24-hour	0.0088	0.3
	Annual	0.001	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

F. Health Risks from Proposed Air Pollution Sources (Subsection 9.5.2(f))

Subsection 9.5.2 (f) requires the applicant to conduct any studies required by the Guidelines for Assessing Health Risks from Proposed Air Pollution Sources and meet the criteria therein.

The proposed source does not meet the applicability criteria in this document and therefore is not required to perform this type of study.

G. Applicable Air Pollution Control Regulations (Subsection 9.5.2(g))

Subsection 9.5.2 (g) requires the applicant to demonstrate that the facility will be in compliance with all applicable state and federal air pollution control regulations at the time the source commences operation. The following is a discussion of the applicable state and federal air pollution control rules and regulations and how compliance with each rule or regulation is addressed:

1. State Air Pollution Control Rules and Regulations

   a. APC Regulation No. 1 "Visible Emissions"

   This regulation limits visible emissions to less than 20% except for a period or periods aggregating more than three minutes in any one hour. The Office of Air Resources will limit opacity to less than 10% except for a period or periods aggregating more than three minutes in any one hour. The landfill gas fired turbines are not expected to create visible emissions and therefore, compliance with this regulation should be assured.

   b. APC Regulation No. 7 "Emission of Air Contaminants Detrimental to Person or Property"

   The applicant has demonstrated in the air quality impact analysis that this facility will not cause or contribute to air pollution in violation of any National Ambient Air Quality Standard.

   Additionally, the applicant has demonstrated that emissions from the facility will not adversely impact soils, vegetation, wildlife or human health.

   Therefore, based on the foregoing, compliance with this regulation is expected.

   c. APC Regulation No. 8 "Sulfur Content of Fuels"

   This regulation would limit the sulfur content of the fuel used at this facility to less than 0.55 lbs/million BTU heat release potential.

The sulfur content of the landfill gas used at this facility, after treatment, is on the order of 0.017 lbs/MMBTU. Therefore compliance with the provisions of this regulation would be expected.

d. APC Regulation No. 14 "Recordkeeping and Reporting"

This regulation would require the applicant to maintain certain records and submit this information to the Office of Air Resources as requested. Any recordkeeping or reporting requirements will be made a part of any permit issued pursuant to this application. See Section E. of the draft permit.

e. APC Regulation No. 17 "Odors"

This regulation states that a source cannot emit an objectionable odor beyond its property line. The landfill gas-fired turbines would not be expected to generate odors that would be objectionable beyond the property line. However, unreacted ammonia is emitted from the SCR system used to control nitrogen oxides emissions.

The ability to detect an odor varies from person to person. There can be huge differences in the odor sensitivity of different individuals. At a given concentration, one person may smell and recognize the odor, while another person may barely notice it. Odor thresholds reported in the literature can vary by orders of magnitude. In the field, a staff member of the Department determines if an odor is objectionable by personal observation, taking into account its nature, concentration, location, duration and source.

The following are the reported odor thresholds for ammonia from a number of different sources:

CHRIS:	Chemical Hazards Response Information System (CHRIS) Manual, U.S. Coast Guard – **46.8 ppm**
AAR:	Emergency Action Guides, Bureau of Explosives, American Association of Railroads 1996 – **0.037-20 ppm**
AIHA:	Odor Thresholds for Chemicals with Established Occupational Standards, American Industrial Hygiene Association, 1989 – **0.043-53 ppm**
TOXNET:	Hazardous Substances Data Bank, Toxicology Data Network, United States National Library of Medicine – **0.37-56 ppm**
3M:	2004 Respirator Selection Guide – **5.75 ppm**

The maximum predicted 1-hour average impact of ammonia from the air quality modeling was 15.324 $\mu g/m^3$ (0.021 ppm). This impact is less than the lowest reported odor threshold. Therefore compliance with this regulation is expected.

f. APC Regulation No. 22 "Air Toxics"

The air quality modeling conducted by the applicant has demonstrated that the emissions from the facility will not cause an increase in the ground level ambient concentration at or beyond the property line in excess of that allowed by Air Pollution Control Regulation No. 22 ("Air Toxics"). Therefore compliance with this regulation can be expected.

2. Federal Air Pollution Control Rules and Regulations

40 CFR 60, Subpart WWW, "Standards of Performance for Municipal Solid Waste Landfills"

The applicant must comply with the requirements of 40 CFR 60.752(b)(2)(iii)(C). This requires that the landfill gas be treated prior to use in the turbines. The landfill gas treatment system to be used at this facility will filter, de-water and compress the landfill gas prior to use in the turbines and meets the requirements for a "treatment system" in 40 CFR 60.752(b)(2)(iii)(C).

The regen flare and backup flares must comply with the requirements of 40 CFR 60.752(b)(2)(ii)(B). This requires that the flares either reduce nonmethane organic compounds (NMOC) by 98 weight percent or reduce the outlet NMOC concentration to less than 20 parts per million by volume, dry basis as hexane at 3 percent oxygen. All three flares are capable of meeting this requirement.

The standard also contains requirements for monitoring of operations, compliance testing, recordkeeping and reporting. Those requirements applicable to this facility will be made a part of the draft permit issued pursuant to this application to ensure compliance with these provisions.

Therefore compliance with the NSPS can be expected.

40 CFR 60, Subpart KKKK, Standards of Performance for Stationary Combustion Turbines"

This NSPS is applicable to the combustion turbines for the proposed project. The standard contains the following emission limitations for nitrogen oxides and sulfur dioxide:

Nitrogen oxides:	74 ppmv, dry basis corrected to 15% O_2 or 3.6 lb/MW-hr
Sulfur dioxide:	0.9 lb/MW-hr or combust fuel with potential SO_2 emissions less than 0.06 lb/MMBTU or less.

The emission limitations determined to represent LAER or BACT in this application are well below these requirements under all operating conditions. Therefore, compliance with these limitations will be assured.

The standard also contains requirements for monitoring of operations and compliance testing. Those requirements applicable to this facility will be made a part of the draft permit issued pursuant to this application to ensure compliance with these provisions.

In conclusion, the facility should be fully capable of complying with the provisions of 40 CFR 60 Subpart KKKK.

V. Conclusion

Based on the information supplied by the applicant and the Office of Air Resources' review of the proposed project, the Office of Air Resources believes that the applicant has satisfied all of the applicable provisions of APC Regulation No. 9, Section 9.4 relative to the requirements for issuance of a Major Source Permit for a major modification in a nonattainment area and Section 9.5 relative to the requirements for issuance of a Major Source Permit for a major modification in an attainment area. As such, the Office of Air Resources is proposing approval of the application for a major modification of the Ridgewood Power facility subject to the permit conditions and emission limitations contained in the draft permit.

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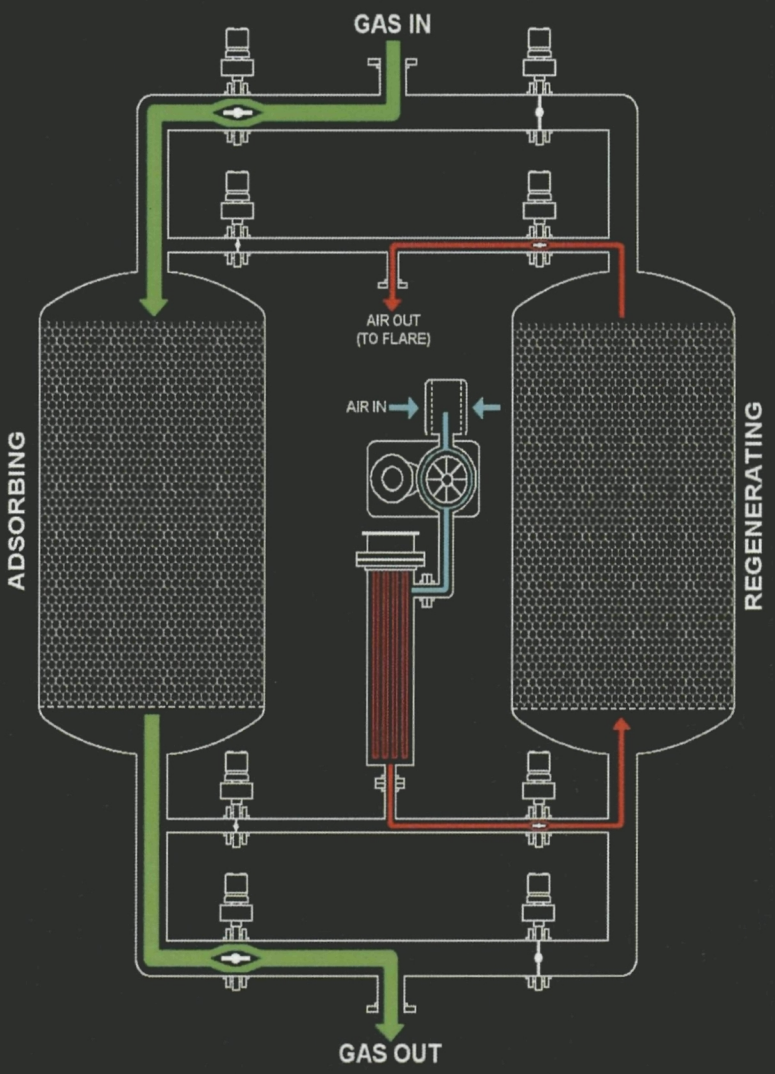

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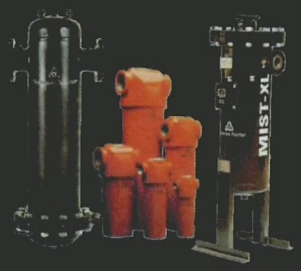

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