TECHNICAL EVALUATION

&

PRELIMINARY DETERMINATION

APPLICANT

Waste Management, Inc. of Florida
2700 Northwest 48th Street
Pompano Beach, FL 33073

Medley Landfill
ARMS Facility ID No. 0250615

PROJECT

Draft Permit No. PSD-FL-414
Project No. 0250615-012-AC

Landfill Gas-to-Energy Project

COUNTY

Miami-Dade County, Florida

PERMITTING AUTHORITY

Florida Department of Environmental Protection
Division of Air Resource Management
Bureau of Air Regulation
New Source Review Section
2600 Blair Stone Road, MS#5505
Tallahassee, Florida 32399-2400

May 25, 2011

1. GENERAL INFORMATION

State Regulations

This project is subject to the applicable environmental laws specified in Section 403 of the Florida Statutes (F.S.). The Florida Statutes authorize the Department of Environmental Protection to establish rules and regulations regarding air quality as part of the Florida Administrative Code (F.A.C.). This project is subject to the applicable rules and regulations defined in the following Chapters of the F.A.C.: 62-4 (Permitting Requirements); 62-204 (Ambient Air Quality Requirements, PSD Increments, and Federal Regulations Adopted by Reference); 62-210 (Permits Required, Public Notice, Reports, Stack Height Policy, Circumvention, Excess Emissions, and Forms); 62-212 (Preconstruction Review, PSD Review and BACT, and Non-attainment Area Review and LAER); 62-213 (Title V Air Operation Permits for Major Sources of Air Pollution); 62-296 (Emission Limiting Standards); and 62-297 (Test Methods and Procedures, Continuous Monitoring Specifications, and Alternate Sampling Procedures). PSD applicability and the preconstruction review requirements of Rule 62-212.400, F.A.C. are discussed in Section 2 of this report. Additional details of the other state regulations are provided in Section 3 of this report.

Federal Regulations

The Environmental Protection Agency (EPA) establishes air quality regulations in Title 40 of the Code of Federal Regulations (CFR). Part 60 identifies New Source Performance Standards (NSPS) for a variety of industrial activities. Part 61 specifies National Emissions Standards for Hazardous Air Pollutant (NESHAP) based on specific pollutants. Part 63 specifies NESHAP provisions based on the Maximum Achievable Control Technology (MACT) for given source categories. Federal regulations are adopted in Rule 62-204.800, F.A.C. Additional details of the applicable federal regulations are provided in Section 3 of this report.

Facility Description and Location

The facility is a municipal solid waste landfill with a Standard Industrial Classification Code of SIC No. 4911. The facility is located at 9350 Northwest 89th Avenue in Medley, Florida. The UTM coordinates are Zone 17, 565.04 kilometers (km) East, and 2,860.02 km North. This existing facility is located in Miami-Dade County, an area designated as “attainment/maintenance” for the pollutant ozone, and attainment for all other criteria pollutants in accordance with Rule 62-204.340, F.A.C.

The Medley Landfill is an open Class I Landfill with a design capacity greater than 2.5 million megagrams by mass or 2.5 million cubic meters by volume. This landfill commenced construction prior to 1980 as a lime rock quarry that was backfilled with fill and municipal solid waste (MSW) placed above the groundwater table. The landfill started receiving waste prior to 1980 and was modified or reconstructed between 1987 and 1993 when Cells 1, 2, and 3 were constructed with geosynthetic liners to accept an estimated 5 million cubic yards of MSW. Between 1997 and 2000, Phase 1, 2, and 3 were developed with geosynthetic liners to accept an estimated 7 million cubic yards. In 2003, the saddle fill was constructed with a geosynthetic liner to provide an additional 2 million cubic yards. Yearly waste acceptance is approximately 700,000 tons.

The nonmethane organic compounds (NMOC) emissions are calculated to be greater than 50 megagrams per year, based on EPA’s uncontrolled emission rate estimates. This landfill does not contain a bioreactor and is an active asbestos waste disposal site. Landfill gas emissions are collected and controlled through an extraction well-field system with open and closed flares.

The facility currently operates two flares – one 3,000 standard cubic feet per minute (scfm) open utility flare (EU 001) used primarily as backup, and one 6,000 scfm enclosed flare (EU 005) used as the primary flare. The first flare (EU 001) was installed in 1990. A second flare (EU 005) was installed in October of 2003 and started operation November 5, 2003. Neither the enclosed flare nor the open flare is equipped with a bypass in which landfill gas can bypass the control device in a un-combusted manner.

Primary Regulatory Categories

- The existing facility is not a major source of hazardous air pollutants (HAP).
- The existing facility has no units subject to the acid rain provisions of the Clean Air Act.
- The existing facility is a Title V major source of air pollution in accordance with Chapter 213, F.A.C.
- The existing facility is a major stationary source in accordance with Rule 62-212.400, F.A.C. for the Prevention of Significant Deterioration (PSD) of Air Quality.
- The landfill is subject to applicable New Source Performance Standards (NSPS) in Title 40, Part 60 of the Code of Federal Regulations.
- The existing facility is subject to applicable National Emissions Standards for Hazardous Air Pollutants (NESHAP) in Title 40, Part 63 of the Code of Federal Regulations.

Project Description

On August 16, 2010, the Department received an application from Waste Management, Inc. of Florida to construct and operate a landfill gas-to-energy facility at the existing Medley Landfill. The applicant proposes to install six Caterpillar (CAT) Model G3520C reciprocating internal combustion engine/electrical generator sets. The six engines will fire landfill gas to generate a total of 9.6 megawatts (MW, nominal) of power (1.6 MW per engines).

The landfill currently generates 4,000 standard cubic feet per minute (scfm) of landfill gas. Each engine uses approximately 588 scfm of landfill gas, giving a total of 3,528 scfm of landfill gas for all six engines. The two existing flares will be retained and relocated adjacent to the engines as backup control devices or to control emissions when more landfill gas is generated than can be handled by the engines. The landfill gas will be transported from the landfill gas collection system to a landfill gas treatment system consisting of: a knock-out vessel to remove water; air-to-gas coolers to remove moisture and control the landfill gas temperature; a filtration system to remove particles larger than 1 micron from the landfill gas; and a gas compressor and blower system. Only treated landfill gas will be delivered to the engines; any excess landfill gas will not be treated, but directly routed to the flares.

The following existing emissions units will be affected by this project.

EU ID	Emission Unit Description
001	Flare #1 – 3,000 scfm open utility (candle type) flare
002	Fugitive non-methane organic compounds (NMOC) and hazardous air pollutant (HAP) emissions from the natural decomposition reactions associated with the landfill, which are not collected by the landfill gas collection system.
005	Flare #3 – 6,000 scfm enclosed flare

The following new emissions units will be added by this project.

EU ID	Emission Unit Description
006	Six Caterpillar (CAT) Model G3520C (CAT 3520) lean-burn internal combustion engines and generator sets

Processing Schedule

08/16/2010 Department received the application for an air pollution construction permit.

09/15/2010 Department requested additional information.

11/22/2010 Department received additional information; however, information relating to the hydrogen sulfide (H_2S) content of the landfill gas and Air Quality Modeling Analysis was not included.

12/15/2010 Department requested additional information.

03/15/2011 Department received additional information; application complete.

2. PSD APPLICABILITY REVIEW

General PSD Applicability

The Department regulates major stationary sources in accordance with Florida's PSD program pursuant to Rule 62-212.400, F.A.C. PSD preconstruction review is required in areas that are currently in attainment with the state and federal Ambient Air Quality Standards (AAQS) or areas designated as "unclassifiable" for these regulated pollutants. As defined in Rule 62-210.200, F.A.C., a facility is considered a "major stationary source" if it emits or has the potential to emit 5 tons per year of lead, 250 tons per year or more of any PSD pollutant, or 100 tons per year or more of any PSD pollutant and the facility belongs to one of the 28 listed PSD major facility categories. PSD pollutants include: carbon monoxide (CO); nitrogen oxides (NO_X); sulfur dioxide (SO_2); particulate matter (PM); particulate matter with a mean particle diameter of 10 microns or less (PM_{10}); volatile organic compounds (VOC); lead (Pb); Fluorides (F); sulfuric acid mist (SAM); hydrogen sulfide (H_2S); total reduced sulfur (TRS), including H_2S; reduced sulfur compounds, including H_2S; municipal waste combustor organics measured as total tetra- through octa-chlorinated dibenzo-p-dioxins and dibenzofurans; municipal waste combustor metals measured as particulate matter; municipal waste combustor acid gases measured as SO_2 and hydrogen chloride (HCl); municipal solid waste landfills emissions measured as nonmethane organic compounds (NMOC); and mercury (Hg).

For major stationary sources, PSD applicability is based on emissions thresholds known as the "significant emission rates" as defined in Rule 62-210.200, F.A.C. Emissions of PSD pollutants from the project exceeding these rates are considered "significant" and the Best Available Control Technology (BACT) must be employed to minimize emissions of each PSD pollutant. Although a facility may be "major" for only one PSD pollutant, a project must include BACT controls for any PSD pollutant that exceeds the corresponding significant emission rate. Rule 62-210.200, F.A.C. defines "BACT" as:

> *An emission limitation, including a visible emissions standard, based on the maximum degree of reduction of each pollutant emitted which the Department, on a case by case basis, taking into account:*
>
> 1. *Energy, environmental and economic impacts, and other costs;*
> 2. *All scientific, engineering, and technical material and other information available to the Department; and*
> 3. *The emission limiting standards or BACT determinations of Florida and any other state;*
>
> *determines is achievable through application of production processes and available methods, systems and techniques (including fuel cleaning or treatment or innovative fuel combustion techniques) for control of each such pollutant.*
>
> *If the Department determines that technological or economic limitations on the application of measurement methodology to a particular part of an emissions unit or facility would make the imposition of an emission standard infeasible, a design, equipment, work practice, operational standard or combination thereof, may be prescribed instead to satisfy the requirement for the application of BACT. Such standard shall, to the degree possible, set forth the emissions reductions achievable by implementation of such design, equipment, work practice or operation.*
>
> *Each BACT determination shall include applicable test methods or shall provide for determining compliance with the standard(s) by means which achieve equivalent results.*
>
> *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 standard under 40 CFR Parts 60, 61, and 63.*

In addition, applicants must provide an Air Quality Analysis that evaluates the predicted air quality impacts

resulting from the project for each PSD pollutant.

PSD Applicability for the Project

The project is located in Miami-Dade County, which is in an area that is currently in attainment with the state and federal AAQS or otherwise designated as unclassifiable. According to Table 3-3 of the application, the applicant provides the following PSD applicability analysis summarizing the proposed project emissions.

Table A. Applicant's Annual Emission Summary and PSD Applicability Analysis

Pollutant	Baseline Actual Emissions (TPY)	Projected Actual Emissions (TPY)	Increased from Project (TPY)	Significant Emissions Rate (TPY)	Subject to PSD?
CO	164.3	619.4	455	100	Yes
NO_X	32.6	110.6	78	40	Yes
PM/PM_{10}	8.51	39.5	31	25/15/10	Yes
SO_2	225.9	264.9	39	40	No
VOC	7.21	44.3	37	40	No

Notes:

a. "TPY" means tons per year.

b. Baseline actual emissions were calculated based on the highest consecutive 2-year average reported in the air operating report for each pollutant during the years 2000 to 2009. Projected actual emissions are based on worst-case engine/flare combination. The increase from the project is the difference between the projected and baseline actual emissions.

c. With regard to particulate matter with a mean particle diameter of 2.5 microns or less ($PM_{2.5}$), the Department adopted by reference the federal ambient air quality standard for $PM_{2.5}$, but has not yet promulgated the implementing regulations for PSD preconstruction review (e.g., define $PM_{2.5}$ as a PSD pollutant with a significant emission rate for PSD applicability). We are in the process of completing a rulemaking action to implement this remaining piece of the $PM_{2.5}$ program.

As shown in the table, the project is subject to PSD preconstruction review for CO, NO_X and PM/PM_{10} in accordance with the provisions of Rule 62-212.400, F.A.C. Therefore, BACT determinations are required for CO, NO_X and PM/PM_{10} emissions. An air quality modeling analysis is required for CO, nitrogen dioxide (NO_2) and PM_{10} emissions.

3. PROJECT DETAILS

Landfill Gas Availability

The Medley Landfill currently generates approximately 4,000 scfm of landfill gas (LFG), which is being controlled by two existing flares: a 6,000 scfm enclosed flare and a 3,000 scfm open flare. Each engine can fire approximately 588 scfm of landfill gas per engine for a total of 3,528 scfm total for six engines. This is approximately 5.08 million standard cubic feet per day (MMscf per day). The current landfill gas generating capacity is adequate to fuel and power all six engines. According to the landfill gas projection recovery model (gas curves), the future estimated landfill production rate is estimated to be 7,317 scfm by the year 2025.

Treatment of Landfill Gas

The equipment and processes used to treat (dewater, filter and compress) the collected landfill gas prior to its combustion as fuel in the proposed engines will consist of the following.

- Landfill gas will pass through the suction separator, which is used for moisture knockout and mechanically filters the gas in the initial portion of the treatment system.

- Landfill gas enters the blowers, which supply the compressor. The heat of compression increases the temperature of the gas.
- Landfill gas in excess of the engines design capacity bypasses the treatment system prior to being routed to the flares for destruction.
- Landfill gas is dewatered by cooling the gas in the after-cooler to condense remaining water vapor in the landfill gas to condensate.
- Landfill gas passes through a coalescing filter to remove particles down to 1 micron. The cooled and filtered gas is then reheated in the re-heater/economizer to vaporize any remaining moisture before being fired in the engines.

Attachment 1: Process Flow Diagram – LFG Treatment System for Medley Landfill

CAT G3520C Engines/Generator Specifications (EU 006 – EU 011)

Each of the six identical CAT Model G3520C engines/generators sets will have the following specifications:

- Each engine is designed to fire low-pressure, lean fuel mixtures (lean-burn) and produce low combustion by-product emissions. Each engine is equipped with an air-to-fuel ratio controller to monitor engine performance parameters and automatically adjust the air-to-fuel ratio and ignition timing to maintain efficient fuel combustion, which also minimizes air pollutant emissions.
- Each engine will be fired exclusively with landfill gas generated by and received from the Medley Landfill.
- Each engine will fire a maximum of approximately 588 scfm of landfill gas.
- Each engine will have power generation rating of 2,233 brake horsepower (bhp).
- Each engine will be connected to an electrical generator rated at 1.6 MW, nominal.

- The maximum fuel consumption rate of each engine is 588 scf per minute or 35,280 scf per hour.
- Based on a landfill gas heating value of 500 Btu per scf, the maximum heat input rating for each engine is 17.64 million Btu (MMBtu) per hour.

With all six engines operating, the proposed landfill gas project will have a total electrical generating capacity of 9.6 MW, nominal. Emissions produced by the combustion of landfill gas in the six gas engines will be exhausted to ambient air through individual stacks connected to the engine exhaust manifolds. Five of the six engines will be housed in an enclosed building and the sixth engine will be located outside the building. Each engine exhaust stack is 33-feet tall and equipped with a silencer.

New Source Performance Standards (NSPS) Provisions

The landfill gas engines and generator sets are subject to applicable NSPS provisions in 40 Code of Federal Regulations (CFR) 60 for Subpart A (General Provisions) and Subpart JJJJ (Standards of Performance for Stationary Spark Ignition Internal Combustion Engines). These regulations establish operating limitations and emissions standards for CO, NO_X and VOC. The vendor, Caterpillar, will not certify the CAT G3520C engines when burning landfill gas as fuel. Therefore, the engines must meet the following emission standards required by 40 CFR 60.4233(e), as defined by Table B of this subpart.

Table B: CAT G3520C Emission Limits

Pollutant	NSPS Subpart JJJJ Emission Standards	Proposed Limits	Regulation
CO	5.0 g/bhp-hr	3.5 g/bhp-hr	Rule 62-212.400(BACT), F.A.C.
NO_X	3.0 g/bhp-hr	0.6 g/bhp-hr	Rule 62-212.400(BACT), F.A.C.
VOC	1.0 g/bhp-hr	0.163 g/bhp-hr (0.8 lb/hour)	Rule 62-212.400(12), F.A.C., Avoids PSD Review

The engines must be tested to demonstrate compliance with these emissions standards. The draft permit will identify NSPS Subpart A and JJJJ in the Appendices.

In addition, the existing landfill gas collection and control system must meet the applicable requirements of the following NSPS provisions: Subpart A (General Provisions) and Subpart WWW (Standards of Performance for Municipal Solid Waste Landfills) in 40 CFR 60. When operating, the CAT G3520C engines will serve as the control device to meet the applicable NSPS Subpart WWW requirements.

National Emission Standards for Hazardous Air Pollutants (NESHAP) Provisions

The landfill gas engines are subject to applicable NESHAP provisions in 40 CFR 63 for Subpart A (General Provisions) and Subpart ZZZZ (Reciprocating Internal Combustion Engines). Pursuant to 40 CFR 63.6590, these units comply with NESHAP Subpart ZZZZ by complying with NSPS Subpart JJJJ. The draft permit will identify NESHAP Subpart A and ZZZZ in the Appendices.

Emission Standards

Based on Waste Management's experience operating similar equipment at various other facilities and the Best Available Control Technology (BACT) analysis, the applicant proposes the following maximum emission rates for the CAT G3520C engines:

- NO_X: 0.60 grams per brake-horsepower hour (g/bhp-hour)
  3.0 lb/hour and 12.9 TPY per engine
  77.4 TPY for all six engines
- CO: 3.5 g/bhp-hour
  17.2 lb/hour and 75.5 TPY per engine
  453.0 TPY for all six engines

- VOC/NMOC: 0.163 g/bhp-hour
  0.80 lb/hour and 3.5 TPY per engine
  21.0 TPY for all six engines
- $PM/PM_{10}/PM_{2.5}$: 0.24 g/bhp-hour
  1.2 lb/hour and 5.2 TPY per engine
  31.2 TPY for all six engines
- SO_2: 830 ppmv of H_2S and 588 scfm
  4.9 lb/hour and 21.3 TPY per engine
  127.8 TPY for all six engines

Potential CO, NO_X and $PM/PM_{10}/PM_{2.5}$ emissions were based on the results of BACT analyses. These emissions were estimated using emission factors developed by Waste Management based on operating similar units at other Waste Management sites. VOC emissions were estimated based on the assumption that 100 % of the non-methane organic compounds (NMOC) emissions are VOCs. The calculation of the potential NMOC emissions were based on compliance with the emission limit specified in New Source Performance Standards (NSPS) Subpart WWW. Based on these requirements, the NMOC mass emissions were calculated using the NMOC concentration of 20 parts per million by volume dry (ppmvd) as hexane at 3% oxygen (O_2) in the exhaust gases.

Sulfur dioxide (SO_2) emissions can be produced during the combustion of landfill gas since it contains sulfur-bearing compounds (such as hydrogen sulfide (H_2S)) that are oxidized at normal engine operating temperatures. Site-specific sulfur content analyses have not been performed on the landfill gas generated by the landfill. Potential SO_2 emissions were estimated based on a maximum H_2S content of the landfill gas of 830 ppmv to avoid PSD review. It is assumed that all the H_2S is converted to SO_2 during combustion of the landfill gas.

Hazardous Air Pollutants

Hazardous Air Pollutants (HAP) as specified in Rule 62-210.200(155), F.A.C are produced during the combustion of landfill gas to be used as fuel by the internal combustion engines since:

1. HAP compounds are present in the gas generated by Medley Landfill and the fuel combustion process is not 100% complete (ie. a small portion of the HAPs pass through the fuel combustion system).
2. When combusted, chlorinated compounds present in landfill gas can form hydrogen chloride (HCl), which is a regulated HAP.

Site-specific HAP content analyses have not been performed on the landfill gas generated by Medley Landfill. Therefore, data developed by EPA in AP-42, Section 2.4 (Table 2.4-1) were used to estimate the total potential HAP content of the landfill gas to be used as fuel. Based on the maximum operating scenarios, the applicant estimates total annual HAP emissions (engines plus flares) to be 1.1 tons per year (TPY).

Flares (EU-001 and EU-002)

Two existing flares will be retained, but will be relocated adjacent to the landfill gas-to-energy plant. The two existing flares consist of:

- *Open Flare (EU 001)*: The 3,000 scfm candle type open flare was installed in 1990, which is used primarily as a backup flare. The open flare stack is 2 feet in diameter with a height of 58 feet above ground. The flare is subject to a minimum exit velocity requirement of 18.3 meters per second. The flare is designed for an overall 98% destruction efficiency of total hydrocarbons at a design flow with a landfill gas methane content of 40% to 60%.
- *Enclosed Flare (EU 005)*: The 6,000 scfm enclosed flare was installed in 2003, which is used as the primary flare. The enclosed flare stack is 12.5 feet in diameter with a height of 55 feet above ground. The flare is subject to a minimum temperature requirement of 1,400° F. The flare is designed for an overall 99% destruction efficiency for total hydrocarbons and 98% destruction efficiency for NMOC.

The flares will operate under the following scenarios: when the engines are not available because of downtime or maintenance; or when landfill gas is generated in excess of the design fuel requirements of the proposed engines. The landfill gas will not be treated when combusted in the flares.

NSPS Provisions

The existing Medley Landfill is subject to the following applicable provisions: NSPS Subparts A (General Provisions) and WWW (Standards of Performance for Municipal Solid Waste Landfills) in 40 CFR 60. The existing flares have met the applicable requirements of these subparts. The draft permit will authorize the relocation of these flares, but will not change any currently applicable requirements with regard to these regulations.

NESHAP Provisions

The existing Medley Landfill is subject to the following applicable NESHAP provisions: Subpart M (Standards for Asbestos) in 40 CFR 61; and Subparts A (General Provisions) and AAAA (National Emission Standards for Hazardous Air Pollutants for Municipal Solid Waste Landfills) in 40 CFR 63. The existing flares have met the applicable requirements of these subparts. The draft permit will authorize the relocation of these flares, but will not change any currently applicable requirements with regard to these regulations.

4. BEST AVAILABLE CONTROL TECHNOLOGY (BACT) DETERMINATION

The project to install six landfill gas engines is a physical modification of the facility. As previously described, the project is subject to PSD preconstruction review for CO, NO_X and $PM/PM_{10}/PM_{2.5}$ emissions from the landfill gas engines (EU-006 – EU-011).

General Discussion of Emissions

The CAT G3520C engines are the primary source of CO, NO_X and PM_{10} emissions from this project. Table C summarizes the potential annual emissions produced from the engines and the flares.

Table C: Potential Annual Emissions

Pollutant	Tons/Year	
	CAT G3520C Engines	Open/Enclosed Flares
CO	452.8	166.6
NO_X	77.4	33.0
PM_{10}	31.0	8.5

The applicant reviewed data in EPA's RACT/BACT/LAER Clearinghouse (RBLC) to identify control technology determinations for the operation of reciprocating internal combustion engines firing landfill gas. The following table summarizes this information.

Table D: CO, NO_X and PM BACT Determination for landfill gas fired internal combustion engines.

Facility	Engine Type and Size	Date	Control Method CO/NO_X	Type	g/bhp-hour		
					CO	NO_X	PM_{10}
Sampson County Disposal, LLC (NC)	CAT 3520 2233 HP	09/09/2009	GCP	BACT	2.75	0.5	0.15
Pine Tree Landfill (ME)	LFG-ICE 1359 HP	10/15/2007	---	BACT	2.75	0.65	---
University of New Hampshire (NH)	LFG-ICE 2233 HP	07/25/2007	Combustion Controls	BACT/LAER	2.75	0.5	0.10
Waste Management Midpenn (VA)	CAT 3516 1148 HP	05/29/2007	GCP	BACT	2.7[a]	1.45[a]	1.52[b]

Facility	Engine Type and Size	Date	Control Method CO/NO_X	Type	g/bhp-hour		
					CO	NO_X	PM_{10}
Brevard Energy, LLC (FL)	CAT 3520 2233 HP	03/06/2007	GCP	BACT	2.75	0.6	0.27
Seminole Energy, LLC (FL)	CAT 3520 2146 HP	01/17/2007	GC	BACT	2.75	0.6	0.24
Monmouth County Reclamation Center (NJ)	LFG-ICE 1468 HP	12/12/2006	---	CBC/LAER	2.53	0.53	0.12
Manchester Renewable Power Corp. (NJ)	CAT 2233 HP	10/06/2006	A/F Controller	BACT/LAER	2.75	0.5	0.20[b]
Burlington County Resource Recovery (NJ)	Jenbacher 2012 HP	08/03/2006	GCP	CBC/LAER	2.5	0.6	0.16
Trail Ridge Energy, LLC (FL)	CAT 3520 2233 HP	02/24/2006	GC	BACT	2.75	0.6	0.24
Ridgewood Rhode Island Generation (RI)	CAT 3520 2229 HP	01/05/2005	A/F Controller	BACT/LAER	2.75	0.5	0.10
Bio Energy Texas, LLC (TX)	CAT 3520 2172 HP	07/23/2004	Lean Burn Design	BACT	2.8	0.6	0.15
Carlton Farms Landfill (MI)	LFG-ICE 1095 HP	12/23/2003	GCP				
Northwest Regional Landfill (AZ)	LFG-ICE 1410 HP	10/27/2003	Proper Operation & Maintenance	BACT	2.5	0.6	---
Carbon Limestone LFG (OH)	LFG-ICE 1877 HP	04/10/2003	Lean Burn Design	BACT	2.27	1.2	0.097
Chino Basin Desalter Authority (CA)	LFG/DG-ICE 1408 HP	06/18/2002	A/F Controller	BACT	2.5	0.6	0.049
MM San Bernardino Energy (CA)	LFG-ICE 1850 HP	05/16/2002	A/F Controller	BACT	2.5	0.6	---
Reliant Security LFGTE (TX)	Jenbacher 2231 HP	01/31/2002	GCP	BACT	3.0	0.6	0.039
Reliant Energy Galveston Plant (TX)	Jenbacher 2343 HP	01/24/2002	---	CBC	3.0	0.6	0.095

Abbreviations: Horsepower (HP); Landfill Gas (LFG); Internal Combustion Engines (ICE); Case-By-Case (CBC); Good Combustion Practices (GCP); Good Combustion (GC); and Air/Fuel Controller (A/F Controller)

a. Project shows BACT limit for CO as 239 tons/year and NO_X as 128.30 tons/year, conversion done for 8 engines operating 8,760 hours/year.

b. BACT limit for $PM_{2.5}$ also.

The specified CO and NO_X BACT/LAER determinations are applicable to the operation of lean-burn engines with air-to-fuel ratio control. The proposed CAT G3520C engines have a power rating of 2,233 bhp. As shown in the table, for landfill gas engines rated greater than 1,100 bhp and less than 2,400 bhp, the CO BACT ranges from 2.27 to 3.0 g/bhp-hour. The corresponding NO_X BACT/LAER range from approximately 0.5 to 0.6 g/bhp-hour. It is important to note that the low CO BACT determination of 2.27 g/bhp-hour corresponds to a NO_X BACT standard of 1.2 g/bhp-hour.

BACT Emission Limits Proposed by Applicant (per Engine)

Pollutant	Emission Limit	Control Technology
CO	3.5 g/bhp-hr and 17.23 lb/hour	Lean-burn engine with air-to-fuel controller
NO_X	0.6 g/bhp-hr and 2.95 lb/hour	Lean-burn engine with air-to-fuel controller
PM_{10}	0.24 g/bhp-hr and 1.18 lb/hour	Pretreatment of landfill gas and good combustion practices

BACT for CO and NOx

Combustion byproducts are generally controlled by an efficient combustion design, but catalytic technologies are available for reducing these emissions. Since CO and NO_X emissions are related combustion byproducts, these pollutants will be grouped together for convenience of review.

Identification of Control Technologies

The applicant provided the following control technologies:

- *Combustion Design and Air-Fuel Controllers:* The design and operation of the combustion chamber is the primary mechanism in controlling CO emissions. The CAT G3520C engines are designed for high-combustion efficiency to extract the most useful energy from the landfill gas possible, which will minimize CO emissions. Combustion controls include technologies designed to limit the formation of CO and NO_X by controlling the combustion temperature and the mixing of air and fuel in the combustion zone. Combustion controls for NO_X include injection timing retard, pre-ignition chamber combustion, controlling air-to-fuel ratio, or de-rating of the engine. The primary NO_X control is a lean-burn combustion design, which uses approximately 75% more air than needed for complete combustion into the combustion chambers. The weak air-fuel mixture leads to lower combustion temperatures and therefore reduces thermal NO_X formation. The proposed CAT G3520C engines are lean-burn engines equipped with an electronic air-fuel ratio controller that will minimize incomplete combustion and maintain a proper balance between CO and NO_X emissions.
- *Oxidation Catalyst:* In the presence of an oxidation catalyst at a given temperature, excess oxygen in the exhaust reacts with CO to form CO_2. This option includes non-selective catalytic reduction (NSCR). The primary design is a flow through exhaust device that contains a honeycomb structure covered with a layer of chemical catalyst that operates at high temperatures. This layer contains small amounts of precious metal that promote the complete oxidation of pollutants in the exhaust stream. This control device will reduce CO emissions as well as VOC emissions, depending on the type and concentration. Destruction efficiencies for CO and VOC emissions can be greater than 90%.
- *Selective Catalytic Reduction (SCR):* The basic principle of SCR is the injection of ammonia (NH_3) into the exhaust stream prior to a catalyst. In the presence of a catalyst, ammonia and NO_X will be reduced to nitrogen (N_2) and water vapor (H_2O). Several different catalysts are available for use at different exhaust gas temperatures. Such systems can also include an oxidation catalyst for CO reduction. Removal efficiencies may be greater than 90%.
- *Regenerative Selective Catalytic Reduction (RSCR):* Regenerative selective catalytic reduction is a new technology targeted for tail-end applications. RSCR utilizes beds of ceramic media to retain the temperature of the flue gas in the optimum range for the catalytic reaction (approximately 300º F to 400º F), which is a key operating parameter for effective NO_X removal. Such systems are capable of 95% heat recovery, which minimizes operating costs while reducing NOx emissions by 80% to 90% or more. Such systems can also include an oxidation catalyst for CO reduction.
- *Selective Non-Catalytic Reduction (SNCR)*: Selective non-catalytic reduction uses ammonia injection into the high temperature combustion zone or flue gas. This is a post-combustion control technology that reduces NO_X to nitrogen and water vapor. The chemical reaction for this technology is driven by high temperatures (1600ºF to 2100ºF) normally found in combustion sources. Removal efficiencies may be greater than 50% depending on the application.

Discussion of Technically Infeasible Control Options and Ranking of Remaining Options

Landfill gas contains siloxanes, which are a class of compounds that exist in the form of R_2SiO, where R is a hydrogen atom or a hydrocarbon and Si is silicon. Siloxanes are present in certain landfill waste streams such as toiletries, cosmetics and other personal grooming items. When combusted, such compounds produce silica (SiO_2), which can quickly poison a catalyst rendering it ineffective. A separate treatment system to remove SiO_2

would be necessary to avoid the adverse effects of deposits and the rapid decrease in reactivity of the catalyst.

The California Air Resource Board (CARB) has developed and published *Guidance for the Permitting of Electrical Generation Technologies* in July 2002, to assist companies and organizations in the permitting of electrical generating equipment. In this guidance document, CARB:

- Recognizes the benefits of generating electricity from waste gases (landfill and digester gas) and the recovery of useful energy.
- Indicates that waste gases "… contain impurities that, if combusted will likely poison catalyst-based post combustion control systems."
- Determines that additional fuel treatment and post combustion controls have limited success and/or have not been proven to be cost effective in reducing air pollutant emissions from waste combustion applications.

Other state regulatory agencies (e.g., Texas, Rhode Island and New Jersey) have made similar determinations and issued permits that specify BACT for LFG-fueled engines that do not include the use of add-on emission controls because of catalyst poisoning by siloxanes. Such poisoning leads to poor reduction efficiencies and eventually destruction and early replacement of the catalyst. In the preamble to the NSPS for Stationary Spark Ignition Internal Combustion engines and the NESHAP for Reciprocating Internal Combustion Engines, EPA agrees siloxanes will poison the catalyst in add-on control technologies such as SCR, NSCR and oxidation catalysts, which makes the equipment ineffective in a very short period of time.

To employ a catalytic technology would require a siloxane removal system. For a previous project the Department contacted Applied Filter Technology (AFT), which has been active in the biogas-to-energy business since 1996 and has 167 biogas-to-energy systems in operation around the world. For ten years, the AFT siloxane removal systems have primarily been used in conjunction with combustion turbines to achieve guaranteed LFG specifications that are intended to protect the combustion turbines, which operate within close mechanical tolerances. The percentage of siloxane removal required for protecting a combustion turbine is much less than the siloxane removal efficiency required for protecting a catalyst. In addition, AFT does not have any experience in using the siloxane removal system for engines and the protection of the catalyst used in add-on control. It appears that a siloxane removal system that can protect the landfill gas engines as well as the control catalyst is still on the horizon.

In September of 2010, the Medley Landfill reported a siloxane level of 21 ppm (1.6 micrograms (ug)/Btu), which is higher than the level recommended by the engine manufacturer, Caterpillar (0.60 ug/Btu). This will mean more frequent preventative maintenance as well as major maintenance overhauls. Therefore, add-on control technologies using a catalyst are considered technically infeasible for this project due to premature deactivation by siloxanes. Also, SNCR is not feasible for the landfill gas engines because there is no high-temperature window that will forward this chemical reaction. The remaining control option is combustion design and controls. As previously shown by the applicant, data in the RBLC database (2002 – 2009) supports the lean-burn combustion design, air-fuel controller and good combustion practices as BACT for landfill gas engines.

<u>Selection of BACT and Rationale</u>

The applicant proposes to use efficient combustion design and air-fuel controllers to establish BACT for CO as 3.5 g/bhp-hour and for NOx as 0.6 g/bhp-hour. As shown in previous Table D summarizing BACT standards posted in the RBLC database, the range of previous CO BACT standards is 2.27 to 3.0 g/bhp-hour and NOx BACT standards is 0.5 to 1.45 g/bhp-hour. The applicant's proposed limits are based on Waste Management's experience with operating similar landfill gas-fired engines and the ambient temperatures in south Florida. Caterpillar LLC states that a nominal CO emission rate from the CAT G3520C engines is 2.5 g/bhp-hour; however, this is only representative of the first 100 hours of operation. Caterpillar LLC also specifies a "not to exceed" limit of 4.13 g CO/bhp-hour at 100% load. The proposed limits are lower than NSPS Subpart JJJJ emissions standards of 5.0 g CO/bhp-hour and 3.0 g NOx/bhp-hour.

For several previous projects using the CAT G3520C engines firing landfill gas, the Department established CO BACT as 2.75 g/bhp-hour and NOx BACT as 0.6 g/bhp-hour, which were based on the applicant's proposals as well as the efficient combustion design and air-fuel controllers. The engines have been installed and are in operation. Two of these applicants have pending projects to increase the CO emissions standards stating that the gradual degradation of the engines will cause higher CO emissions. The Department is currently reconsidering these previous determinations because of the inverse relationship between CO and NOx emissions. In other words, an engine can be tuned to achieve low NOx emissions at the price of higher CO emissions or vice versa.

In 2009, the Bay Air Quality Management District issued a white paper[1] discussing this very issue. Based on actual test data (62 individual tests) for firing landfill gas in three types of spark-ignited reciprocating internal combustion engines (15 total engines), the report indicates the following:

- The engines were annually demonstrating compliance with the CO and NOx standards; however, this appeared to be more of a function of careful preparation of the engine for the annual test rather than the design of the engine.
- The same engine type could be "biased for low NOx emissions" (0.5 g NOx/bhp-hour or less with greater than 2.1 g CO/bhp-hour) or "biased for low CO emissions" (2.1 g CO/bhp-hour or less with greater than 0.5 g NOx/bhp-hour) depending on the air-fuel controller.
- The exhaust from some of the tested engines was periodically monitored throughout the year by hand-held portable probes. This data showed degradation with regard to CO emissions such that many engines were frequently in excess of the CO standard. The report indicates a gradual CO increase of up to 1.5 g/bhp-hour over a year of operation.

The conclusion of the report is that CO and NOx emissions standards should be paired when relying on combustion design and control. As shown below, the Bay Air Quality Management District chose to establish standards based on a low NOx bias or a low CO bias and then allow the CO standard to increase approximately 1.5 g/bhp-hour over a year of operation calling the upper CO standard a "not to exceed (NTE)" limit:

Low NOx Bias:	NOx:	0.5 g/bhp-hour
	CO:	2.5 g/bhp-hour (and NTE 3.9 g/bhp-hour)
Low CO Bias:	NOx:	0.6 g/bhp-hour
	CO:	2.1 g/bhp-hour (and NTE 3.6 g/bhp-hour)

The applicant's proposed BACT limits of 3.5 g CO/bhp-hour and 0.6 g NOx/bhp-hour appear to be in line with this concept and is based on actual performance of these engines at Waste Management's other facilities. Therefore, considering all available information, the Department establishes the following preliminary paired BACT standards for the proposed engines:

CO:	3.5 g/bhp-hour and 17.2 lb/hour (initial and annual EPA Method 10 stack test)
NOx:	0.6 g/bhp-hour and 3.0 lb/hour (initial and annual EPA Method 7E stack test)

This will allow the engines to be tuned for NOx emissions while providing adequate room for reasonable CO emission levels.

BACT for Particulate Matter

Identification of Available Control Technologies

"Smoke" is defined as the collection of airborne solid and liquid particulates and gases emitted as products of incomplete combustion. In AP-42 Section 3.3, EPA identifies two types of smoke that may be emitted from internal combustion engines during stable operations: blue smoke and black smoke, both which indicate problems with the engine operation. Blue smoke is emitted when lubricating oil leaks (result from normal wear

[1] "Revisiting BACT for Lean Burn Landfill Gas Fired Internal Combustion Engines"; Toxics Section, Engineering Division, Bay Air Quality Management District; February 26, 2009.

on piston rings and seals) into the combustion chamber of the engine and is partially burned. Black smoke is agglomerated carbon particles (soot) formed in regions of the combustion mixtures that are oxygen deficient. Black smoke reflects inefficient combustion. Proper maintenance is the most effective method of preventing blue smoke emissions from all types of internal combustion engines, while proper design minimizes black smoke. The applicant identified the following control techniques for reducing and minimizing particulate matter emissions from the engines.

- *Fuel Pre-Treatment (Filtration):* The landfill gas will be pre-treated to remove moisture and condensable impurities as well as filtered to remove particulate matter before combustion.
- *Good Combustion Practices:* The primary options for reducing and minimizing particulate matter emissions from the engines typically include optimizing the design of the combustion chamber, implementing practices that improve the oxidation process to minimize incomplete combustion and proactive maintenance, which are collectively referred to as good combustion practices.
- *Add-On Controls (Filtration):* Wet or dry filtration equipment could be added to capture and filter the exhaust gas to remove particulates.

Identification of Technically Feasible Control Alternatives and Ranking

According to Section 2.4 in AP-42 (Municipal Solid Waste Landfills), data posted in the RBLC database, and other recent permits and permit applications, no add-on controls have been required for reducing particulate matter from engines firing landfill gas. Landfill gas contains siloxanes, which are oxidized to silicon dioxide during combustion. This abrasive substance is also very sticky and can clog add-on controls such as fabric filters making them inoperable in a short period of time. As previously discussed, the technology to remove siloxane from landfill gas for engines is just emerging. In addition, satisfactory pretreatment of the landfill gas makes it cost prohibitive to install add-on particulate controls and/or a siloxane removal system. Therefore, post-combustion add-on control technologies are not considered appropriate for internal combustion engines. Therefore, the combination of fuel pre-treatment combined with good combustion practices is selected as the top control option.

Selection of BACT and Rationale

As shown in previous Table D summarizing BACT standards posted in the RBLC database, the range of previous BACT for particulate matter ranges from 0.039 to 1.52 g/bhp-hour. Florida's most recent BACT determination for a similar landfill gas engine was 0.24 g/bhp-hour based on fuel pretreatment and good combustion practices. Although initial stack tests for particulate matter emissions from new landfill gas engines have been very low (< 0.1 g/bhp-hour), subsequent tests on the same equipment tend to show higher emission levels with increased engine operating hours. Based on operating experience, Caterpillar, Inc. confirms an increase in particulate matter resulting from normal wear and tear on piston rings and seals. Therefore, the Department establishes the following work practice standards as the preliminary BACT determination for particulate matter from the engines:

- The permittee shall install, operate and maintain a landfill gas pretreatment system to dewater, compress and filter (down to 1 micron) the landfill gas prior to combustion in the engines.
- The permittee shall implement the following good combustion practices to minimize particulate matter emissions: lean-burn combustion design, efficient combustion through the air-fuel controller and preventive and periodic maintenance in accordance with the requirements of NSPS Subpart JJJJ.
- As determined by EPA Method 9, visible emissions from the landfill gas engines shall not exceed 10% opacity.

The above work practice standards should achieve a particulate matter (PM/PM_{10}) emission rate of less than 0.24 g/bhp-hour.

Discussion of $PM_{2.5}$ Emissions

The Department adopted by reference the federal ambient air quality standard for $PM_{2.5}$, but has not yet promulgated the implementing regulations for PSD preconstruction review (e.g., define $PM_{2.5}$ as a PSD pollutant with a significant emission rate for PSD applicability). We are in the process of completing a rulemaking action to implement this remaining piece of the $PM_{2.5}$ program. The draft permit includes the following requirements, which address $PM_{2.5}$ emissions:

- Use of landfill gas as the only fuel;
- Requirement to pre-treat the LFG with filtration down to 1 micron prior to combustion;
- Sampling, analysis and reporting requirements to ensure that the project remains minor with respect to SO_2 emissions, which is a precursor of $PM_{2.5}$ emissions; and
- Establishing a NOx standard of 0.6 g/bhp-hour (another precursor of $PM_{2.5}$ emissions), which is 80% below the applicable 2008 NSPS Subpart JJJJ limitation of 3.0 g/bhp-hour.

Also, regional SO_2 and NOx emissions (precursors of $PM_{2.5}$ emissions) have dramatically decreased in recent years due to regulatory programs such as the Clean Air Interstate Rule (CAIR). For additional details, see the discussion under the "Additional Impacts Analysis" (page 23) in the Air Quality Analysis in Section 6 of this Technical Evaluation and Preliminary Determination. The Department believes that these techniques and limitations effectively minimize $PM_{2.5}$ emissions.

5. OTHER REQUIREMENTS

Based on the PSD applicability analysis, emissions of SO_2 (39 tons/year) and VOC (37 tons/year) are just below the PSD significant emission rates. Emissions of SO_2 may vary greatly depending on the wastes being land filled. Therefore, the draft permit requires semiannual sampling, analysis and reporting to ensure the SO_2 emissions remain minor with respect to this project. The VOC emissions will be a function of the combustion controls and compliance with the CO BACT standard will ensure low VOC emissions. The draft permit specifies the NSPS Subpart JJJJ limit of 1.0 g VOC/bhp-hour as well as a limit of 0.8 lb VOC/hour to avoid PSD preconstruction review.

6. AIR QUALITY ANALYSIS

This section provides a general overview of the modeling analyses required for PSD preconstruction review followed by the specific analyses required for this project.

Overview of the Required Modeling Analyses

Pursuant to Rule 62-212.400, F.A.C., the applicant is required to conduct the following analyses for each PSD significant pollutant:

- A preconstruction ambient air quality analysis,
- A source impact analysis based on EPA-approved models, and
- An additional impact analysis.

For the purposes of any required analysis, NO_X emissions will be modeled as NO_2 and only $PM_{10}/PM_{2.5}$ emissions will be considered when modeling particulate matter.

Preconstruction Ambient Monitoring Analysis

Generally, the first step is to determine whether the Department will require preconstruction ambient air quality monitoring. Using an EPA-approved air quality model, the applicant must determine the predicted maximum ambient concentrations and compare the results with regulatory thresholds for preconstruction ambient monitoring, known as de minimis air quality levels. The regulations establish de minimis air quality levels for

several PSD pollutants as shown in Table E. For ozone, there is no de minimis air quality level because it is not emitted directly. However, since NO_2 and VOC are considered precursors for ozone formation, the applicant may be required to perform an ozone ambient impact analysis (including the gathering of ambient air quality data) for any net increase of 100 tons per year or more of NO_2 or VOC emissions.

If the predicted maximum ambient concentration is less than the corresponding de minimis air quality level, Rule 62-212.400(3)(e), F.A.C. exempts that pollutant from the preconstruction ambient monitoring analysis. If the predicted maximum ambient concentration is more than the corresponding de minimis air quality level (except for non-methane hydrocarbons), the applicant must provide an analysis of representative ambient air concentrations (pre-construction monitoring data) in the area of the project based on continuous air quality monitoring data for each such pollutant with an Ambient Air Quality Standard (AAQS). If no such standard exists, the analysis shall contain such air quality monitoring data as the Department determines is necessary to assess ambient air quality for that pollutant.

Table E. Regulatory Thresholds for Preconstruction Ambient Monitoring

PSD Pollutant	De Minimis Air Quality Levels
Carbon monoxide (CO)	575 μg/m^3, 8-hour average
Nitrogen dioxide (NO_2)	14 μg/m^3, annual average;
Particulate Matter (PM_{10})	10 μg/m^3, 24-hour average
Sulfur dioxide (SO_2)	13 μg/m^3, 24-hour average
Lead (Pb)	0.1 μg/m^3, 3-month average
Fluorides (F)	0.25 μg/m^3, 24-hour average
Total reduced sulfur (TRS)	10 μg/m^3, 1-hour average
Hydrogen sulfide (H_2S)	0.2 μg/m^3, 1-hour average
Reduced sulfur compounds (RSC)	10 μg/m^3, 1-hour average
Mercury (Hg)	0.25 μg/m^3, 24-hour average

If preconstruction monitoring data is necessary, the Department may require the applicant to collect representative ambient monitoring data in specified locations prior to commencing construction on the project. Alternatively, the Department may allow the requirement for preconstruction monitoring data to be satisfied with data collected from the Department's extensive ambient monitoring network. Preconstruction monitoring data must meet the requirements of Appendix B of 40 CFR 58 during the operation of the monitoring stations. The preconstruction monitoring data will be used to determine the appropriate ambient background concentrations to support any required AAQS analysis.

Finally, after completing the project, the Department may require the applicant to conduct post-construction ambient monitoring to evaluate actual impacts from the project on air quality.

Source Impact Analysis

For each PSD-significant pollutant identified above, the applicant is required to conduct a source impact analysis for affected PSD Class I and Class II areas. This analysis is to determine if emissions from this project will significantly impact levels established for Class I and II areas. Class I areas include protected federal parks and national wilderness areas (NWA) that are under the protection of federal land managers. Table F identifies the Class I areas located in Florida or that are within 200 kilometers in nearby states. Class II areas represent all other areas in the vicinity of the facility open to public access that are not Class I areas.

Table F. Class I Areas

Class I Area	State	Federal Land Manger
Bradwell Bay NWA	Florida	U.S. Forest Service
Chassahowitzka NWA	Florida	U.S. Fish and Wildlife Service
Everglades National Park	Florida	National Park Service
Okefenokee NWA	Georgia	U.S. Fish and Wildlife Service
St. Marks NWA	Florida	U.S. Fish and Wildlife Service
Wolf Island NWA	Georgia	U.S. Fish and Wildlife Service

Although the Department has not yet adopted Significant Emission Rates (SER), Significant Impact Levels (SIL) or AAQS for $PM_{2.5}$, the applicant modeled $PM_{2.5}$ with respect to the federal maximum 24-hour and annual impacts as discussed further below. In conducting this analysis, the applicant conservatively assumed that all

PM_{10} is actually $PM_{2.5}$ and scaled the SIL for PM_{10} in proportion to the ratio of the respective national AAQS to develop SIL applicable to $PM_{2.5}$. The rationale for the SIL used for $PM_{2.5}$ is as follows:

- The promulgated annual SIL for PM_{10} is 2% of the corresponding state/national AAQS;
- The project-specific annual SIL for $PM_{2.5}$ is also 2% of the corresponding NAAQS;
- The promulgated 24-hour SIL for PM_{10} is 3.3% of the state/national AAQS; and
- The project-specific SIL for $PM_{2.5}$ is also 3.3% of the NAAQS.

The applicant believes this approach encompasses all meaningful $PM_{2.5}$ sources capable of interacting with the Medley Landfill for the purposes of determining impacts with respect to the 24-hour and annual NAAQS for $PM_{2.5}$.

Although the Department has not yet adopted the new NAAQS NO_2 based on a 1-hour average, the applicant modeled for both the 1-hour and annual levels. To conduct this modeling, the applicant proposed project-specific SIL for the first submittal of the NO_2 modeling equal to 5% of the NAAQS for NO_2. This level was based on the SIL for CO, which is 5% of the corresponding NAAQS and the only other pollutant with a 1-hour average (Rule 62-204.200(29), F.A.C.). The second submittal of NO_2 modeling results used 4% of the NAAQS for NO_2, based on the fact that the 4% SIL is more conservative than the initial 5% SIL.

Based on the initial significant impact analysis, no additional modeling is required for any pollutant with a predicted ambient concentration less than the corresponding significant impact level. However, for any pollutant with a predicted ambient concentration exceeding the corresponding significant impact level, the applicant must conduct a full impact analysis. In addition to evaluating impacts caused by the project, a full impact modeling analysis also includes impacts from other nearby major sources (and any potentially-impacting minor sources within the radius of significant impact) as well to determine compliance with:

- The PSD increments and the federal air quality related values (AQRV) for Class I areas.
- The PSD increments and the AAQS for Class II areas.

As previously mentioned, for any net increase of 100 tons per year or more of VOC or NO_2 subject to PSD, the applicant may be required to perform an ambient impact analysis for ozone including the gathering of ambient ozone data.

PSD Models

<u>PSD Class II Area</u>: The EPA-approved American Meteorological Society and EPA Regulatory Model (AERMOD) dispersion model was used to evaluate short range impacts from the proposed project in the surrounding Class II Area and also in the Everglades National Park (ENP) Class I area. In November of 2005, the EPA promulgated AERMOD as the preferred regulatory model for predicting pollutant concentrations within 50 kilometers of a source. The AERMOD model is a replacement for the Industrial Source Complex Short-Term model (ISCST3). The AERMOD model calculates hourly concentrations based on hourly meteorological data. The model can predict pollutant concentrations for annual, 24-hour, 8-hour, 3-hour and 1-hour averaging periods. In addition to the PSD Class II modeling, it is also used to model the predicted impacts for comparison with the de minimis ambient air quality levels when determining preconstruction monitoring requirements.

For evaluating plume behavior within the building wake of structures, the AERMOD model incorporates the Plume Rise Enhancement (PRIME) downwash algorithm developed by the Electric Power Research Institute (EPRI). A series of specific model features recommended by the EPA are referred to as the regulatory options. The applicant used the EPA-recommended regulatory options in each modeling scenario and building downwash effects were evaluated for stacks below the good engineering practice (GEP) stack heights.

Meteorological data used in the AERMOD model consisted of a concurrent five-year period of hourly surface weather observations from the National Weather Service office located at Miami International Airport and twice-daily upper air soundings from Florida International University (FIU) in Miami. The five-year period of

meteorological data was from 2001 through 2005. This station was selected for use in the evaluation because it is the closest primary weather station to the project area and is most representative of the project site.

PSD Class I Area**:** The California Puff (CALPUFF) dispersion model was used to evaluate the pollutant emissions from the proposed project in the ENP Class I area beyond 50 km from the proposed project. Meteorological MM4 and MM5 data used in this model was from 2001, 2002 and 2003. CALPUFF is a non-steady state, Lagrangian, long-range transport model that incorporates Gaussian puff dispersion algorithms. This model determines ground-level concentrations of inert gases or small particles emitted into the atmosphere by point, line, area, and volume sources. The CALPUFF model has the capability to treat time-varying sources, is suitable for modeling domains from tens of meters to hundreds of kilometers, and has mechanisms to handle rough or complex terrain situations.

Stack Height Considerations

GEP stack height means the greater of 65 meters (213 feet) or the maximum nearby building height plus 1.5 times the building height or width, whichever is less. Where the affected stacks did not meet the requirements for GEP stack height, building downwash was considered in the modeling analyses. Based on a review of this application, the Department determines that the project complies with the applicable provisions of the stack height regulations as revised by EPA on July 8, 1985 (50 FR 27892). Portions of the regulations have been remanded by a panel of the U.S. Court of Appeals for the D.C. Circuit in NRDC v. Thomas, 838 F. 2d 1224 (D.C. Cir. 1988). Consequently, this permit may be subject to modification if and when EPA revises the regulation in response to the court decision. This may result in revised emission limitations or may affect other actions taken by the source owners or operators.

Additional Impact Analysis

In addition to the above analyses, the applicant must provide an evaluation of impacts to: soils, vegetation, and wildlife; air quality related to general commercial, residential and industrial growth in the area that may result from the project; and regional haze in the affected Class I areas.

PSD Significant Pollutants for the Project

As discussed previously, the proposed project will increase emissions of the following pollutants in excess of the PSD significant emissions rates: CO, NO_X and $PM/PM_{10}/PM_{2.5}$. For the purposes of any required analysis, NO_X emissions will be modeled as NO_2 and only $PM_{10}/PM_{2.5}$ emissions will be considered when modeling particulate matter.

Preconstruction Ambient Monitoring Analysis

Using the AERMOD model, the applicant predicted the following maximum ambient impacts from the project.

Table G. De Minimis Air Quality Levels

Pollutant	Averaging Time	Maximum Predicted Impact (µg/m^3)	De Minimis Concentration (µg/m^3)	Greater than De Minimis?
NO_2	Annual	5	14	No
PM_{10}	24-hr	16	10	Yes
$PM_{2.5}$	24-hr	16	2.3	Yes
CO	8-hr	400	575	No

As shown above, CO and NO_2 are exempt from preconstruction monitoring because the predicted impacts are less than the de minimis levels. $PM_{10}/PM_{2.5}$ are not exempt because their predicted impacts are greater than the de minimis levels. In addition, the project results in PSD net emissions increases of 78 TPY of NO_X and 37 TPY of VOC which is below the threshold of 100 tons/year for each pollutant; therefore no ozone ambient impact analysis is required. The Department maintains an extensive quality-assured ambient monitoring

network throughout the state and data gathered from these monitors can be used to address the $PM_{10}/PM_{2.5}$ impacts. The table below summarizes impacts for all major pollutants in the area. Unless otherwise noted, the table reflects ambient data from 2008-2010 available from existing nearby monitoring locations in Miami-Dade.

Table H. Ambient Air Quality Measurements Near to the Project Site

Pollutant	Location	Averaging Period	Ambient Concentration			
			Compliance Period	Value	Standard	Units
Ozone	Univ. of Miami Rosenstiel	8-hour	2008-10	68[a]	75 [a]	ppb
PM_{10}	Miami Fire Station	24-hour	2008-10	72	150 [b]	$\mu g/m^3$
		Annual	2008-10	26[c]	50 [c]	$\mu g/m^3$
$PM_{2.5}$	Palm Springs Fire Station	24-hour	2007-09	14[d]	35[d]	$\mu g/m^3$
		Annual	2007-09	7[e]	15[e]	$\mu g/m^3$
NO_2	Univ. of Miami Rosenstiel	1-hour	2008-10	73[f]	188[f]	$\mu g/m^3$
		Annual	2008-10	18	100[c]	$\mu g/m^3$
CO	Metro Annex	1-hour	2008-10	3,000	40,000 [g]	$\mu g/m^3$
		8-hour	2008-10	2,300	10,000 [g]	$\mu g/m^3$

a. Represents the 3-year average of the 4th highest daily maximum.
b. Value not to be exceeded on more than an average of one day per year over a 3-year period.
c. Represents the arithmetic mean.
d. Represents the 3-year average of the 98th percentile of 24-hour concentrations.
e. Represents the 3-year average of the weighted annual mean.
f. Represents the 98th percentile of the annual distribution of daily maximum 1-hour concentrations.
g. Value not to be exceeded more than once per year.
h. "ppb" means parts per billion.

The existing monitoring data show no violations of any ambient air quality standards. The Department determines that the data collected from these monitors is representative of the air quality in the vicinity of the project and may be used to satisfy the preconstruction monitoring requirements for $PM_{10}/PM_{2.5}$. As necessary, the above ambient concentrations may be used as the ambient background concentrations for any required AAQS analysis.

Source Impact Analysis for PSD Class I Areas

Affected PSD Class I Areas

For PSD Class I areas within 200 kilometers of the facility, Table I identifies each affected Class I area as well as the distance to the facility and the number of receptors used in the modeling analysis.

Table I. Affected PSD Class I Modeling Identities

PSD Class I Area	Distance	Receptors
Everglades National Park (ENP)	19	265

For the preliminary significant impact analysis, the highest short-term predicted concentrations will be compared to the respective significant impact levels. Since five years of data are available, the highest-second-high (HSH) short-term predicted concentrations will be used for any required AAQS and PSD Class II increment analysis with regard to short-term averages. However, for annual averages, the highest predicted annual average will be compared with the corresponding annual level.

Results of PSD Class I Significant Impact Analysis

Using the CALPUFF model, the applicant predicted the following maximum ambient impacts from the project.

Table J. Significant Impact Analysis for PSD Class I Area

Pollutant	Averaging Time	Max. Predicted Impact (μg/m^3)	Significant Impact Level (μg/m^3)	Significant Impact?	Affected Class I Area
NO_2	Annual	0.02	0.1	No	ENP
PM_{10}	24-hour	0.11	0.30	No	ENP
PM_{10}	Annual	0.01	0.20	No	ENP

As shown, the maximum predicted impacts are less than the corresponding significant impact levels for each pollutant. Therefore, a full impact analysis for the PSD Class I areas is not required.

Source Impact Analysis for PSD Class II Areas

For the preliminary significant impact analysis, the highest short-term predicted concentrations will be compared to the respective significant impact levels. Since five years of data are available, the highest-second-high (HSH) short-term predicted concentrations will be used for any required AAQS and PSD Class II increment analysis with regard to short-term averages. However, for annual averages, the highest predicted annual average will be compared with the corresponding annual level.

Results of the Significant Impact Analysis

Table K shows the results of the preliminary PSD Class II significant impact analysis.

Table K. Significant Impact Analysis for PSD Class II Areas (Vicinity of Facility)

Pollutant	Averaging Time	Maximum Predicted Impact (μg/m^3)	Significant Impact Level (μg/m^3)	Significant Impact?	Radius of Significant Impact (km)
NO_2	1-hour	105	7.5	Yes	8.5
	Annual	4	1	Yes	0.8
PM_{10}	24-hour	16	5	Yes	0.4
	Annual	2	1	Yes	0.7
$PM_{2.5}$	24-hour	16	1.2	Yes	3.7
	Annual	2	0.3	Yes	1.7
CO	1-hour	600	2,000	No	None
	8-hour	400	500	No	

The predicted impacts of NO_2 and PM_{10}/$PM_{2.5}$ are greater than the corresponding PSD Class II significant impact levels; therefore, a full impact analysis for each of these pollutants is required within the applicable significant impact area as defined by the predicted radius of significant impact identified above. For annual average NO_2 and for PM_{10} emissions, a PSD Class II increment analysis and an AAQS analysis was conducted.

Receptor Grids for Performing PSD Increments and AAQS Analyses

For the PSD Class II increment and AAQS analyses, receptor grids are normally based on the size of the significant impact area for each pollutant.

PSD Class II Increment Analysis

The PSD increment represents the amount that new sources in an area may increase ambient ground level concentrations of a pollutant from a regulatory baseline concentration. For PM_{10}, the baseline concentrations

were established in 1977 with a baseline year of 1975 for existing major sources. For NO_2, the baseline concentration was established in 1988 with a baseline year of 1988 for existing major sources. The emission values input into the model for predicting increment consumption are based on the maximum emissions rates from increment-consuming sources at the facility as well as all other increment-consuming sources in the vicinity of the facility. The preliminary analysis indicated NO_2 and PM_{10} to be significant for this project. The following table summarizes the results of the PSD Class II increment analysis.

Table L. PSD Class II Increment Analysis

Pollutant	Averaging Time	Maximum Predicted Impacts (µg/m^3)	Allowable Increment (µg/m^3)	Greater than PSD Class II Allowable Increment?
NO_2	Annual	6	25	No
PM_{10}	24-hour	13	30	No
	Annual	2	17	No

As shown above, the maximum predicted impacts are less than the allowable PSD Class II increments.

AAQS Analysis

For each pollutant subject to an AAQS analysis, the total impact on ambient air quality is obtained by adding an ambient background concentration to the maximum predicted concentration from modeled sources. The ambient background concentration accounts for all sources that are not explicitly modeled. The following table summarizes the results of the AAQS analysis for the affected pollutants.

Table M. AAQS Analysis

Pollutant	Averaging Time	Modeled Sources (µg/m^3)	Ambient Background Concentration (µg/m^3)	Total Impact (µg/m^3)	AAQS (µg/m^3)	Greater than AAQS?
PM_{10}	24-hour	10	72	82	150	No
	Annual	2	27	29	50	No
$PM_{2.5}$	24-hour	20	14	34	35	No
	Annual	3	8	11	15	No
NO_2	1-hour	109	73	182	188	No
	Annual	9	21	30	100	No

As shown in this table, impacts from the proposed project are not expected to cause or significantly contribute to a violation of any AAQS.

For the annual average $PM_{2.5}$ impacts the average of the highest modeled individual year's annual averages paired with the 3-year average of the annual $PM_{2.5}$ concentrations is used to arrive at the total annual impact, and for the 24-hour average $PM_{2.5}$ impacts the average of the first highest modeled annual 24-hour concentrations paired with the 3-year average of 98th percentile 24-hour averages is used to arrive at the total 24-hour average $PM_{2.5}$ impact.

On February 9, 2010, EPA issued a new 1-hour average NAAQS for NO_2. The new NAAQS is 100 ppb based on a 1-hour average (equivalent to 188 ug/m^3) and became effective on April 12, 2010. The procedures for determining modeled impacts for comparison to this standard have been evolving over the last year from very conservative to a more typical analysis that is not overly conservative. There have been three clarification memos issued by the EPA - two in June 2010, and one in March 2011 concerning the implementation of the new standard.

First NOx AAQS Analysis

The applicant submitted two 1-hour NO_2 impact analyses. The first one submitted in August, 2010, was based solely on NO_2 Tier 1 (assumes a 100% conversion of NO_X to NO_2) and Tier 2 (assumes a 75% ambient equilibrium ratio of NO_2 to NO_X or a 75% conversion of NO_x to NO_2) modeling results. The Tier 2 ratio of 75 percent requires justification for short-term use. In accordance with EPA's March 19, 2009, "AERMOD Implementation Guidance", the urban mode was selected and used. The urban mode estimates the effects of urban heat islands. The applicant used a 5 ppb (approximately 10 ug/m^3) significant impact level (SIL) for this submittal, which resulted in a radius of significant impact of 4.5 kilometers. The applicant used a value for the monitored background 1-hour concentration based on the maximum predicted 98th percentile 1-hour NO_2 concentration, instead of the overall highest hourly background NO_2 concentration from a representative monitor. The latter value was based on EPA's recommended very conservative modeling guidance for complying with the new standard that was issued in June 2010. The applicant had already performed the modeling analysis using the former value before EPA issued the June 2010 guidance. The Department sent a request for additional information in September 2010 requesting that the applicant use the EPA recommended background concentration. However, EPA issued further clarification guidance in March 2011, after the second submittal was received, which allows for use of the maximum predicted 98th percentile 1-hour NO_2 concentration background value as a conservative approach, instead. In addition, EPA established the use of an 80% equilibrium ratio of NO_2 to nitrogen oxide (NO) without justification, in lieu of the 75% conversion value used to give Tier 2 modeling results in the first submittal. The Department reanalyzed the first submittal results based on this new information. The results predict NO_2 impacts less than the new standard as shown in the table above.

Subsequent NOx AAQS Analyses

The Department relied on the results from the first submittal, which show compliance with the 1-hour standard. However, the second submittal will be presented for completeness. The applicant's second submittal of modeling results was in January 2011. The urban mode was also used for this submittal. The changes in the modeling inputs included an increase in stack heights of the engines from 10.1 meters (33 feet) to 15.24 meters (50 feet), the use of a 4% SIL and the use of the Tier 3 ozone limiting method (OLM) for determining 1-hour NO_2 impacts. For OLM, an in-stack ratio of 0.1 was used for the large fossil fuel-fired boilers and an in-stack ratio of 0.2 was used for the turbines at the power plant sources included in the cumulative source inventory. In-stack ratios of all other sources, including the project sources were set at 1.0, which means that 100% of NOx emissions from these sources were considered as NO_2 emissions and as a result, impacts from these other sources were actually based on Tier 1 (full conversion) and were not subject to the ozone titration mechanism.

There is enough information in the literature to support the use 0.1 as in-stack ratio for boilers. For example, the MACTEC (Evaluation of Bias in AERMOD-Plume Volume Molar Ratio Method (PVMRM), prepared by MACTEC for Alaska Department of Environmental Conservation, June 2005) study used a representative ratio for boilers of 0.05. Hanrahan used an in-stack ratio of 0.1 for boilers in the initial design of PVMRM. The Air Pollution Control Technology Handbook (By Karl B. Schnelle, Charles Arnold Brown) states that the typical NO_2/NO_X ratio in boiler emissions is equivalent to 0.05 to 0.09. The applicant provided information from combustion turbines at two power plants in Georgia in order to justify the use of 0.2 for turbines. The radius of impact in the second submittal was 8.5 km. There was one distant facility, FPL Fort Lauderdale (28 km away), that had different emission rates in the two submittals. In the first submittal the two banks of 12 gas turbines were modeled at 631 lb/hour per bank (allowable emission rate for one turbine in each bank), and in the second submittal the turbines were modeled at the allowable emission rate for all gas turbines in both banks, which was 15,144 lb/hour. Because of the difference in emission rates, when the applicant remodeled the NO_2 emission impacts were much higher and the use of Tier 3 was implemented. However, the recent actual emissions from these units are much, much lower. Based on discussions with plant personnel and annual operating reports, these units will act in the future more like emergency units than normal backup units. Actual emissions were only 100 TPY in 2009 for Ft. Lauderdale. The units all combined have operated less than 200 hours since 2003. The maximum actual operating hours from these units within the last ten years occurred in 2002 when these

turbines operated an average of 386 hours. These units operate four to six hours on the coldest mornings or on very hot afternoons for six to eight hours. They rarely operate more than two cold or hot days in a row. Based on EPA guidance contained in the March 2011 clarification these units were treated as intermittent sources in the modeling inputs for the first submittal and retained as regular emitting sources in the second submittal. In addition, the time periods that produced the maximum impact from these sources were generally 4 meters/second (m/s) or less. A plume would be transported about 14 km in an hour with this wind speed. With lower wind speeds the plume would be transported even shorter distances. Therefore, given the distance that these units are located from the project, it is highly unlikely that the plumes from these units would be transported to critical areas around the project.

Non-regulatory options like OLM may be used for regulatory purposes according to Appendix W in 40 CFR 60, which contains modeling guidelines and has been adopted in the Florida air rules by reference. An alternative refined model may be used provided:

- The model has received a scientific peer review;
- The model can be demonstrated to be applicable to the problem on a theoretical basis;
- The databases which are necessary to perform the analysis are available and adequate;
- Appropriate performance evaluations of the model have shown that the model is not biased toward underestimates; and
- A protocol on methods and procedures to be followed has been established.

Based on information provided by the San Joaquin Valley Air Pollution Control District, the first four items have already been met. In addition, the OLM method is a Region 10 approved method in the state of Alaska. The applicant did not provide a protocol, but did provide enough information to satisfy the last item.

The applicant submitted a third modeling analysis in May of 2011 which further clarified and confirmed the results in the second submittal. No impact values for comparison to the AAQS were changed.

In summary, the Medley project will use LFG that is currently being flared as fuel to produce usable electrical energy. This project benefits the environment by recovering useful energy in the LFG and generating electricity. The Department encourages renewable energy projects, including waste-to-energy projects.

Additional Impacts Analysis

Current Air Quality Status

Ozone is a key indicator of the overall state of regional air quality. It is not emitted directly from combustion processes. Rather it is formed from VOC and NO_X emitted primarily from regional industrial and transportation sources. VOC is also emitted from fires and vegetation (e.g. isoprene). These two precursors participate in photochemical reactions that occur on an area-wide basis and are highly dependent on meteorological factors.

There are two ozone monitors in Miami-Dade. Ozone limits and measurements are summarized on 3-year blocks, rolled annually. The reported value was calculated by taking the maximum 8-hour readings recorded each day during the three years. The 4th highest of the recorded maxima are identified for each year and then the average of those three values is identified as the compliance value. The average of the annual 4th highest measurements (design value) over the period 2008-2010 at the monitor (designated as University of Miami-Rosenstiel) recording the highest readings in Miami-Dade is 68 parts per billion (ppb).

Emissions of $PM_{2.5}$ (also known as PM_{fine}) are another key indicator of the overall state of regional air quality. Some is directly emitted as a product of combustion from transportation and industrial sources as well as fires. Much of it consists of particulate nitrates and sulfates formed through chemical reactions between gaseous precursors such as SO_2 and NO_X from combustion sources and ammonia (NH_3) naturally present in the air or added by other industrial sources.

There are six $PM_{2.5}$ monitors in Miami-Dade County. $PM_{2.5}$ limits and measurements are summarized on three year blocks, rolled annually. The reported value for $PM_{2.5}$ given in Table H was calculated by taking the average 24-hour readings recorded each day during the three years (2007-2009). The value for each year that exceeds 98% of all daily measurements within that year is identified for each year and then the average of those three numbers is identified as the value compared with the standard. The value calculated in the described manner for $PM_{2.5}$ measured at the Palm Springs Fire Station is given in Table H as 14 micrograms per cubic meter ($\mu g/m^3$) compared with a standard of 35 $\mu g/m^3$. The simple average of all measurements within each three years (2007-2009) was also calculated and then the mean of the three annual averages (7 $\mu g/m^3$) was reported and compared with the standard of 15 $\mu g/m^3$.

The following discussion provides additional information about recent emission trends of SO_2 and NO_X, which are precursors of $PM_{2.5}$ and/or ozone. There is a regional effort underway through the Clean Air Interstate Rule (CAIR) and other regulatory programs to reduce emissions of $PM_{2.5}$ precursors including NO_X and SO_2. Power plant VOC emissions are not as significant as NO_X as a precursor of ozone. Regional SO_2 emission reductions from existing power plants between 2007 and 2009 are listed in Table N. Emissions of SO_2 from power plants in Florida were reduced by nearly 120,000 TPY and regional SO_2 emissions were reduced by over 1.25 million TPY.

Table N. SO_2 Emission Reductions from Power Plants in the Southeast between 2007 and 2009

State	2007 (TPY)	2009 (TPY)	Reduction (TPY)	Reduction (%)
Alabama	447,189	277,971	169,218	38
Florida	317,582	197,682	119,900	38
Georgia	635,484	262,258	373,226	59
Kentucky	379,837	252,001	127,836	34
Mississippi	69,796	40,160	29,636	43
North Carolina	370,826	110,948	259,878	70
South Carolina	172,726	97,940	74,786	43
Tennessee	237,231	108,042	129,189	12
Total	**2,630,671**	**1,347,002**	**1,283,669**	**49**

The state and regional SO_2 reduction trends will continue as coal-fueled power plants continue to install scrubbers to control SO_2 emissions. Regional NO_X emission reductions from existing power plants between 2007 and 2009 are listed in Table O.

Table O. NO_X Emission Reductions from Power Plants in the Southeast between 2007 and 2009

State	2007 (TPY)	2009 (TPY)	Reduction (TPY)	Reduction (%)
Alabama	122,374	49,610	72,764	59
Florida	184,171	84,252	99,919	54
Georgia	107,471	57,566	49,905	46
Kentucky	174,840	78,767	96,073	55
Mississippi	48,546	26,601	21,945	45
North Carolina	59,417	38,782	20,635	35
South Carolina	46,062	21,213	24,849	54

State	2007 (TPY)	2009 (TPY)	Reduction (TPY)	Reduction (%)
Tennessee	102,886	27,911	74,975	73
Total	**845,767**	**384,702**	**461,065**	**55**

In just two years, NO_X emissions from power plants in Florida were reduced by nearly 100,000 TPY and regional NO_X emissions were reduced by over 460,000 TPY. The state and regional NO_X reduction trends will continue as coal-fueled power plant operators throughout the southeastern states continue to install SCR systems to control NO_X.

The figure below shows even more substantial SO_2 and NOx reductions in Florida since 1998. The graph also includes SO_2 and NOx emissions in 2010, which shows the continuing downward trend.

Figure 1. SO_2 and NO_X Reductions from Florida Facilities (1998-2010)

In addition, Florida Power & Light (FPL) facilities are among the largest sources of SO_2 and NO_X nearest to the proposed Medley site. For example, the FPL Ft. Lauderdale and Port Everglades facilities have permitted allowable NOx emissions of over 73,000 and 58,000 TPY, respectively. These sources are 28 and 33 kilometers northeast of Medley facility. However, the actual emissions for these facilities are 3,000 and 2000 TPY, respectively. Both facilities have banks of 12 gas turbines, two for Ft. Lauderdale and one for Port Everglades. These units have "permitted allowable" emissions of 66,028 and 33,057 TPY, respectively. However, the actual emissions from these peak demand units were only 100 TPY for Ft. Lauderdale and 10 TPY for Port Everglades

in 2009. The maximum actual emissions from these units within the last ten years occurred in 2002 when Ft. Lauderdale emitted 947 TPY and Port Everglades emitted 346 TPY. These emissions should continue to fall as the repowered units at the FPL Cape Canaveral, Riviera Beach and West County facilities establish full operation. Projected emissions increases from this project are 39 TPY of SO_2 and 78 TPY of NO_X. To put emissions from the existing FPL facilities and the Medley Landfill project into another perspective, the Department graphed the SO_2 and NO_X emission trends during the period 1998-2009 from FPL fossil-fueled plants located in the Florida peninsula. These trends are shown in the graph below. Most of the plants are in South Florida. The data source for both of these graphs is the EPA Clean Markets Acid Rain database.

Figure 2. SO_2 and NO_X Reductions (Tons/Year) at FPL Peninsular Facilities (1998-2009)

The largest non-FPL NO_X sources in the area based on actual emissions are the Miami-Dade Resource Recovery facility approximately 3 kilometers southwest, TARMAC Pennsuco Cement about 4 kilometers northwest and Miami Cement (CEMEX) about 12 kilometers southwest of the proposed project. In 2009, these facilities had actual annual emissions of 1200, 800 and 800 TPY of NO_X, respectively. These values are significantly less than annual emissions from these sources in 2002, which were 1200, 2500 and 1300 TPY, respectively.

The contribution of 39 TPY of SO_2 and 78 TPY of NO_X from Medley will not affect the general, overwhelming and continuing downward trends in $PM_{2.5}$ and ozone precursors. Similarly, it will not have an appreciable effect on local or regional $PM_{2.5}$ and ozone concentrations.

In addition the overall reduction in $PM_{2.5}$ precursor emissions from stationary sources and the transportation sources (due to use of cleaner fuels) has contributed to the clear decline in ambient $PM_{2.5}$ levels in South Florida during the same period as shown in the next figure.

Figure 3. South Florida Annual Average (µg/m^3) $PM_{2.5}$ Trends in (1999 – 2009)

Basically the pronounced reductions in annual average $PM_{2.5}$ trends in Miami are consistent with the above mentioned reductions in emissions from stationary and transportation sources.

Impacts on Soils, Vegetation and Wildlife

The maximum predicted ground-level concentrations of NO_2, CO and PM_{10} from the proposed project and all other nearby sources are below the corresponding AAQS. The AAQS are designed to protect both the public health and welfare. As such, this project is not expected to have a harmful impact on soils, vegetation or wildlife in the vicinity of the project.

Air Quality Impacts Related to Growth

The proposed modification will not significantly change employment, population, housing, commercial development, or industrial development in the area to the extent that a significant air quality impact will result.

Visibility Analysis

The analysis to determine the potential adverse plume visibility effects in the portions of the Everglades located within 50 kilometers was based on Visual Impact Screening and Analysis (VISCREEN) computer model. A Level 1 analysis was performed. In addition for portions of the ENP greater than 50 km from the project, CALPUFF was used to determine regional haze impacts, and the results were well below the federal land manager's (FLM) screening criteria. The FLM concluded from these analyses that no significant impact on the Class I area was expected.

Nitrogen and Sulfur Deposition

Total nitrogen deposition rates on the PSD Class I area was also predicted using CALPUFF. The maximum predicted nitrogen deposition rates are below the threshold levels recommended by the federal land manager.

7. PRELIMINARY DETERMINATION

The Department makes a preliminary determination that the proposed project will comply with all applicable state and federal air pollution regulations as conditioned by the Draft Permit. This determination is based on a technical review of the complete application, reasonable assurances provided by the applicant, and the conditions specified in the Draft Permit. Tammy McWade and Jeff Koerner are the project engineers responsible for reviewing the application and drafting the permit changes. Cleve Holladay is the meteorologist responsible for reviewing and approving the ambient air quality analyses. Additional details of this analysis may be obtained by contacting the project engineer at the Department's Bureau of Air Regulation at Mail Station #5505, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400.