Brevard Energy, LLC
29261 Wall Street, MI 48393

March 18, 2008

A.A. Linero, Program Administrator
Bureau of Air Regulation, South Permitting Section
Department of Environmental Protection
STATE OF FLORIDA
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Subject: Brevard Energy, LLC
DEP File No. 0090069-006-AC (PSD-FL-378A)
Response to request for additional information

Dear Mr. Linero,

Brevard Energy, LLC (Brevard Energy) is submitting the enclosed documents prepared by Derenzo and Associates to the Florida Department of Environmental Protection, Bureau of Air Regulation (Florida DEP-BAR) in response to a request for information dated December 19, 2007 related to an air construction permit application for the modification of the Brevard Energy permit.

The enclosed information and "Appendix G – Air Quality Modeling Protocol and Ambient Air Impact Results for Brevard Energy, LLC" is being submitted to provide additional information as requested by the Florida DEP and the comments by the US Environmental Protection Agency sent to the Florida DEP by electronic mail on February 6, 2008.

Brevard Energy, LLC appreciates the Florida DEP-BAR consideration of the information presented.

Please contact us at (248) 380-3920 or our authorized agent Derenzo and Associates, Inc. at (517) 324-1880 if you have any questions or require additional information.

Sincerely,

BREVARD ENERGY, LLC

Scott Salisbury
Managing Member

attachment

Phone: (248) 380-3920 Fax: (248) 380-2038

Derenzo and Associates, Inc.
Environmental Consultants

March 18, 2008

Mr. Scott Salisbury
Brevard Energy, LLC
29261 Wall Street
Wixom, MI 48393

Subject: Brevard Energy, LLC
DEP File No. 0090069-006-AC (PSD-FL-378A)
Response to request for additional information

Dear Mr. Salisbury,

Derenzo and Associates, Inc. (Derenzo and Associates) has prepared this document to provide Brevard Energy, LLC (Brevard Energy) with information in response to the Florida Department of Environmental Protection (Florida DEP) additional information request dated December 19, 2007 related to an air construction permit application for the modification of the Brevard Energy construction permit (0090069-006-AC, PSD-FL-378A).

Brevard Energy has requested that conditions of Permit PSD-FL-378 be modified to increase the SO_2 emission factor and emission rate that is allowed for the permitted facility. The magnitude of the SO_2 emission factor and rate increase that was proposed for the permitted facility exceeds the Prevention of Significant Deterioration (PSD) significant SO_2 emission rate threshold of 40 tons per year (TpY) as defined by Florida Administrative Code (F.A.C.) Chapter 62-212 *Stationary Sources-Preconstruction Review.*

Modeling Protocol Revisions

An air quality modeling protocol was submitted with the construction permit modification application dated November 2, 2007. The enclosure provides a revised version of the "Appendix G – Air Quality Modeling Protocol and Ambient Air Impact Results for Brevard Energy, LLC". The modeling protocol has been revised to provide additional information as requested by the Florida DEP and the comments by the US Environmental Protection Agency (USEPA) sent to the Florida DEP by electronic mail on February 6, 2008.

The following sections of Appendix G have been amended and/or supplemented with information to respond to requests made by the Florida DEP and the USEPA:

- Information was added to the Site Characteristics and Facility Information section (Section 2.0) regarding the relationship between Brevard Energy and the Brevard County (owner of the Central Disposal Facility).

- The Local Development section (Section 2.3) was added to analyze the growth in the area that has occurred since August 7, 1977.

- A discussion on the landfill and influencing structures was added to the section on GEP Stack Height Analysis and Influencing Structures (Section 2.5).

- The section that presents Criteria Pollutant Emission Rates (Section 3.2) now includes a discussion for $PM_{2.5}$ emissions.

- Information was added to the Model Selection section (Section 3.3.1) addressing the use of the unmodified regulatory version of AERMOD.

- The section on Meteorological Data (Section 3.3.3) includes information about the applicability of the meteorological data that was used in the Significant Impact Analysis.

- Justification for using Orange County for local air pollutant monitoring data is provided in the section on Background Air Quality (Section 4.2).

- The requirement for Preconstruction Monitoring is addressed in Section 4.5.

- Section 5.0 was added to analyze the air impacts and visibility impacts the source could have on Class I areas.

Expanded BACT Analysis

The Florida DEP requested that the best available control technology (BACT) analysis for SO_2 be expanded to include the:

1. Mini-CAT™ sulfur removal technology.

2. Guidance provided in the Control Cost Manual of the Office of Air Quality Planning and Standards (OAQPS).

Mini-CAT™ System

Gas Technology Products (a division of Merichem Chemicals & Refinery Services LLC) distributes the LO-CAT® and Sulfur-Rite® hydrogen sulfide removal systems. The Sulfur-Rite® product is a non-regenerative process typically used to treat gas containing low sulfur content and requires a dry out period prior to disposal. Budgetary costs were provided by Gas Technology Products for its Sulfur-Rite® process; however, capital and operating costs exceed those for the LO-CAT® systems; therefore, it was not recommended for the Brevard Energy project.

Based on the LFG flowrate and sulfur content specifications required for the Brevard Energy LFG fueled electricity generation facility, Gas Technology Products recommended the LO-

CAT® II hydrogen sulfide removal system. The Mini-CAT™ system referenced by the Florida DEP is a subset of the LO-CAT® family of products. It is listed as a design of the LO-CAT® system on the manufacturer's website (http://www.gtp-merichem.com/products/lo-cat/process.php). The Mini-CAT™ and LO-CAT® II systems use the same redox chemistry technology for the conversion of H_2S to elemental sulfur and regeneration of the catalyst. A representative for Gas Technology Products indicated that the Mini-CAT™ is a different packaged configuration for the LO-CAT® technology (vertically-installed vessels) that is used in certain design situations and that the budgetary estimate provided for the LO-CAT® II process is the same as that for the Mini-CAT™ process (January 15, 2008 telephone conversation with Mr. John Watson, Business Development Manager for Gas Technology Products).

OAQPS Control Cost Guidance

BACT control cost analyses were provided in the application documents for three (3) hydrogen sulfide removal systems:

- SulfaTreat®, a non-regenerative sulfur scavenging process that uses vessels packed with an inert granular substrate coated with iron oxide. The system proposed by SulfaTreat® consists of multiple sets of twin adsorption vessels that allow for on-line media replacement.

- LO-CAT® II, a regenerating liquid redox system in which adsorber vessels containing a liquid catalyst adsorbs H_2S and convert it to elemental sulfur. The catalyst is regenerated on-line in a separate oxidation vessel allowing for continuous operation of the gas treatment system.

- H2SPLUS, a non-regenerative chemobiofilter that uses vessels packed with an organic media impregnated with iron oxide. The system proposed by Mtarri/Varani, LLC requires operation of a recirculating water loop (to maintain the moisture of the organic media) and a shutdown period to dry and replace the media.

A copy of the EPA OAQPS Air Pollution Control Cost Manual (Manual), Sixth Edition, January 2002, was obtained from the EPA Clean Air Technology Center website. Section 5 of the Manual, *SO_2 and Acid Gas Controls*, contains two subsections for Pre-Combustion Controls (Section 5.1) and Post-Combustion Controls (Section 5.2). Section 5.1 has not been developed and contains no information for pre-combustion controls. Section 5.2 has two subsections for wet scrubbers for acid gas and wet/dry scrubbers for SO_2. Neither of these sections is directly applicable to the adsorption and control of hydrogen sulfide from a fuel gas stream.

There are some similarities between the evaluated adsorption systems and the acid gas wet scrubber information presented in Section 5.2, Chapter 1 of the Manual. Therefore, the economic analysis was repeated using the capital cost factors and annual cost factors for gas adsorber systems presented in Tables 1.3 and 1.4 of the Manual (Section 5.2). Purchased

equipment costs were provided by the individual vendors and used for the PEC factor in the tables.
Attachment A presents cost and design information provided by MI SWACO (an authorized SulfaTreat® distributor), a control cost calculation based on the guidance provided in the OAQPS Manual, and the control cost calculations submitted with the construction permit modification application (labeled as Appendix I-1).

Total annual costs calculated based on the OAQPS Manual guidance equal $869,003 per year. The estimate submitted with the construction permit application was $539,000 per year. As presented in Section 6.3.1 of the November 2, 2007 application document:

> *Results of analyses performed for the installation and operation of the SulfaTreat® system indicate that operating and capital recovery costs (based on a 15-year equipment service life) exceed $539,000 per year, or $8,191 per ton of* SO_2 *reduced.*

Attachment B presents cost and design information provided by Gas Technology Products for the LO-CAT® II process, a control cost calculation based on the guidance provided in the OAQPS Manual, and the control cost calculations submitted with the construction permit modification application (labeled as Appendix I-2).

Total annual costs calculated based on the OAQPS Manual guidance equal $333,187 per year. The estimate submitted with the construction permit application was $292,000 per year. As presented in Section 6.3.2 of the November 2, 2007 application document:

> *Results of analyses performed for the installation and operation of the LO-CAT® II system indicate that operating and capital recovery costs (based on a 15 year equipment service life) exceed $292,000 per year, or $4,451 per ton of* SO_2 *reduced.*

In both cases, the original estimates provided in the construction permit application, which were based on a combination of estimated costs and OAQPS guidance, are less than the costs determined by using the calculation factors in the OAQPS Manual.

The third sulfur removal system evaluated, the H2SPLUS system, has lower estimated capital and operating costs as compared to the SulfaTreat® and LO-CAT® II systems. However, this system has not been used for a fuel gas stream as large as the Brevard Energy facility and has some inherent limitations for a revenue-producing LFG to energy facility. As presented in Section 6.4 of the November 2, 2007 application document:

> While the analyses presented in this document indicate that the H2SPLUS system has the most cost effective LFG sulfur removal system, the equipment design is relatively new and the equipment vendor only has details on its successful implementation at a facility that treats a small volumetric flowrate (150 scfm) of LFG (which is significantly less than the maximum 3,486 scfm LFG flowrate specified for Brevard Energy).

The quotations provided by MI SWACO (SulfaTreat®) and Gas Technology Products (LO-CAT® II and Sulfur-Rite®) are for systems designed for continuous operation that have no gas delivery interruptions, which are associated with system regeneration or media change-out activities. The H2SPLUS system proposed by Mtarri/Varani requires that the sulfur removal media (iron sponge) be taken off-line and it be soaked with water for a period of 24 hours prior to replacement. Based on the information provided by Mtarri/Varani, it appears that the company (compared to the other equipment vendors) does not have a lot of experience with large revenue producing LFG to energy projects or sour natural gas sweetening projects. Additional research is required in order to determine whether the H2SPLUS system can be reliably upgraded (scaled up) to meet the design and operating specification of the Brevard Energy LFG fueled IC engines.

Proposed PM_{10} Testing Methods

As part of the construction permit application, Brevard Energy proposed an alternative PM_{10} testing method as opposed to Reference Method 201 specified in the construction permit.

Attachment C provides electronic mail messages from the Florida DEP Emissions Monitoring Section granting approval to use the alternate proposed method.

Please contact us (517) 324-1880 if you have any questions or require additional information.

Sincerely,

DERENZO AND ASSOCIATES, INC.

Robert L. Harvey
Engineering Services Manager

Attachments
Enclosure

ATTACHMENT A

SULFATREAT CONTROL COST ANALYSIS

Rob Harvey

From: Robert Izatt [rizatt@centurytel.net]

Sent: Tuesday, August 28, 2007 8:46 AM

To: rharvey@derenzo.com

Subject: Landfill gas

Mr. Harvey,

Thank you for the opportunity to quote SulfaTreat for your landfill application. Please find the EPS attached below.

The vessel configuration would dictate utilizing twelve vessels total. The size would be 120" ID x 18' seam to seam. The vessels are numerous due to the high flow and low pressure. Approximate new price would be -$300,000 for all twelve vessels. Used may be an option, and I will look for similar type and let you know. Installation costs will very based upon location.

The system is configured with six sets of lead lag vessels, meaning you would change out six lead vessels every 218 days. At this point, the lag vessels would become lead vessels.

The SulfaTreat material cost is $.48 per pound FOB St. Louis, IL. Freight to Florida would be about $.03 per pound additional. The cost for change out labor and disposal of SulfaTreat would be approximately $2600 per vessel. With all costs included you would see a total cost to change each vessel of approximately $39,320. SulfaTreat is comprised of inert iron compounds and can be disposed of in any class 2 without problems.

Please let me know if you have any further questions.

Thank you,

Rob Izatt
Sales Executive
SulfaTreat a business unit of MI-L.L.C.

Phone: 1-231-275-2840
Fax: 1-231-275-2839
Cell: 1-231-357-7819

MI SWACO

SulfaTreat · A Business Unit of M-I L.L.C. · 17998 Chesterfield Airport Road · Suite 215 · Chesterfield · Missouri · 63005 · USA
Tel : 636.532.2189 · Toll Free: 800.726.7687 · Fax:636.532.2764 · info@sulfatreat.com

DATE : August 28, 2007

SULFATREAT®
ESTIMATED PERFORMANCE SHEET ("EPS")

CUSTOMER INFORMATION:

Company:	DERENZO & ASSOCIATES		
Lease Name:	LANDFILL		
Contact:	Rob Harvey	Lease City:	
Phone:	517-324-1880	Lease State:	FL
Fax:	517-324-5409	Lease Country:	USA

OPERATING CONDITIONS

Gas Flow Rate (MMscf/d):	4.800	Gas Pressure (psig):	2.0
Inlet H2S (ppmv):	500	Gas Temperature (°F):	90
Max. Outlet H2S (ppmv):	25.0	Water Saturated:	Yes
CO2 (Mole %):	20.0	O2 (Mole %):	0.50

REACTOR DIMENSTIONS AND SET UP

Total Number Of Vessels:	12	Inside Diameter(inches):	120.0
System Design*:	Lead/Lag	Bed Height (feet):	14.8
*Vessels are in trains of two		Min. S/S Height (feet):	18.80
		Vessel Loading (lbs/vessel):	72,000

PREDICTED RESULTS

Days to Max. Outlet H2S:	218 **	Product Selection:	ST-410HP
H_2Sulfur Removed (lbs):	45,831	Product Price (USD/lb):	$0.48
H_2Sulfur Removed (lbs/day):	210.2	Product Cost/Vessel (USD)	$34,560
Gas Volume Produced (MMscf):	1,048.241	Cost/MCF (USD)	$0.1978
Gas Velocity (ft/min):	6.59	Cost/lb Sulfur Removed (USD):	$4.52
Total Pressure Drop (psi):	1.96	**All prices are FOB St. Louis**	

NOTES & SPECIAL CONDITIONS:

Contact Email: rharvey@derenzo.com
** Change one of the two vessels and reverse vessel sequence

ASK ABOUT OUR NO FAULT PRODUCT WARRANTY

Any Questions? Call Rob Izatt at 231-275-2840, MI

1.00.77 RMI goalseek

OAQPS CONTROL COST WORKSHEET
SULFATREAT SYSTEM
Capital Cost Factors for Gas Absorbers

Direct Costs		
Purchased equipment		
Adsorber vessels (estimate provided by SulfaTreat)	$300,000	
Material for 12 vessels (quoted by SulfaTreat)	$414,720	
	$714,720	(A)
Instrumentation (0.10 A)	$71,472	
Sales Tax (0.03 A)	$21,442	
Freight (0.05 A)	$35,736	
Purchased equipment cost, PEC	$843,370	(B)
Direct installation costs		
Foundations & supports (0.12 B)	$101,204	
Handling & erection (0.40 B)	$337,348	
Electrical (0.01 B)	$8,434	
Piping (0.30 B)	$253,011	
Insulation (omit for Florida climate)	$0	
Painting (0.01 B)	$8,434	
Direct installation costs	$708,430	
Site preparation (estimated)	$5,000	(SP)
Buildings (none required)	$0	(BLD)
Total Direct Costs, DC (1.85B + SP + BLD)	**$1,556,800**	**(DC)**
Indirect costs (installation)		
Engineering (0.10 B)	$84,337	
Construction and field expenses (0.10 B)	$84,337	
Contractor fees (0.10 B)	$84,337	
Start-up (0.01 B)	$8,434	
Performance test (0.01 B)	$8,434	
Contingencies (0.03 B)	$25,301	
Total Indirect Costs, IC	**$295,179**	**(IC)**
Total Capital Investment = DC + IC	**$1,851,979**	**(TCI)**

OAQPS CONTROL COST WORKSHEET
SULFATREAT SYSTEM
Annual Cost Factors for Gas Absorbers

Direct Annual Costs, DC

Operating Labor	
Operator (1/2 hr per shift, at $20/hr)[1]	$2,600
Supervisor (15% of operator)	$390
Operating materials	
Solvent	$0
Chemicals (SulfaTreat replacement)[2]	$353,880
Wastewater disposal[3]	
Maintenance	
Labor (1/2 hr per shift, at $20/hr)[1]	$2,600
Material (100% of maintenance)	$2,600
Electricity	
Fan (additional 20 kW)[4]	$12,264
Pump	$0

Indirect Annual Costs, IC

Overhead (60% of total labor and materials)	$217,242
Administrative charges (2% of TCI)	$37,040
Property tax (1% of TCI)	$18,520
Insurance (1% of TCI)	$18,520
Capital recovery (0.1098 x TCI)	$203,347
Total Annual Cost = DC + IC	**$869,003**

1. One shift per day, 5 days per week, 40 wks per year at $20 per hour.
2. SulfaTreat changeout and disposal. Based on a vessel life of 240 days, an average of 9 vessels would be changed out per year. SulfaTreat estimated the changeout costs (material and labor) at $39,320 per vessel (see August 28, 2007 electronic mail message).
3. Spent SulfaTreat disposal is included in changeout costs.
4. Estimated 20 kW additional load on LFG compressor to overcome system pressure drop, calculated at $0.07 per kWh

GAS TREATMENT / SULFUR DIOXIDE ABATEMENT COSTS
SULFATREAT® SYSTEM

Design and Emissions Data

LFG flowrate	5.02	MMcf/day
	3,486	scfm
Sulfur content (as H_2S)	455	ppmv
Sulfur removed per day (elemental sulfur) at 95% efficiency	180.3	lb/day
Sulfur dioxide emissions abated	360.7	lb/day
	65.8	ton/yr
SulfaTreat media per vessel	72,000	lb.
H_2S removal per vessel (1 lb. per 10 lb. media)	7,200	lb.
Vessel lifetime (days to saturation, 6 vessels on-line)	240	days
SulfaTreat replacements per year	1.5	

Initial Capital Costs		Cost/Unit	Units	Total Cost
SulfaTreat Vessels	120-in ID x 18 ft. length	$25,000	12	$300,000
Freight	Estimated			$10,000
Subtotal Purchased equipment costs (PEC)				***$310,000***
Media cost per vessel	72,000 lb per vessel @ $0.48/lb	$34,560	12	$414,720
Piping / foundation	15% of PEC			$46,500
Direct installation costs (DIC)[1]	50% of PEC			$155,000
Indirect installation costs (IIC)[2]	20% of PEC			$62,000
Subtotal Media and Installation Costs				***$678,220***
Total capital investment (TCI)				***$988,220***
Annual interest rate (fraction)	0.07			
Control system lifetime (years)	15			
Captial recovery factor (per year)[3]	0.1098			
Annual Capital Recovery (TCI * Recovery factor)				***$108,501***

GAS TREATMENT / SULFUR DIOXIDE ABATEMENT COSTS
SULFA TREAT SYSTEM (continued)

Annual Operating Costs	Basis	Unit/yr	Cost/Unit	Total Cost
SulfaTreat media replacement	6 vessels, 1.5 changes/year	9.0	$34,560	$311,040
SulfaTreat media freight	$0.03 per pound media	9.0	$2,160	$19,440
Changeout labor & disposal	$2600 per vessel	9.0	$2,600	$23,400
Electricity (kWh)	20 kW added compressor	175,200	$0.07	$12,264
Natural Gas	None required	0	$0	$0
Taxes, insurance, admin.[4]	4% of TCI	1	$39,529	$39,529
Operating labor[5]	Avg. $20 per work day	260	$20	$5,200
Maintenance (labor and materials)[5]	Avg. $40 per work day	260	$40	$10,400
Overhead (supervision and labor)[6]	60% of O&M costs			$9,360
Total Operating Costs (per year)				***$430,633***

Summary of Emission Reduction Costs

Capital Costs (Annual Cost Recovery)	$108,501
Operating Costs	$430,633
Total Annual Costs	***$539,134***
Landfill Gas Treated per year (MMscf)	1,832
Annual Sulfur Control Costs ($/MMscf)	***$294.27***
Sulfur Dioxide Reduced per year (tons at 95% removal)	65.8
SO_2 Reduction Cost ($/ton, annual basis)	***$8,191***

GAS TREATMENT / SULFUR DIOXIDE ABATEMENT COSTS
SULFA TREAT SYSTEM (continued)

References from EPA AIR POLLUTION CONTROL COST MANUAL, Sixth Edition, January 2002, Section 5.2 for Gas-Adsorbers.

1. Section 5.2, Table 1.3 indicates that Direct Installation Costs (DIC) including piping are equivalent of up to 85% of the Purchased Equipment Cost.
2. Section 5.2, Table 1.3 indicates that Indirect Installation Costs (IIC) are equivalent of up to 35% of the Purchased Equipment Cost.
3. Capital Recovery Factor presented in Section 5.2, Table 1.4.
4. Section 5.2, Table 1.4 indicates that Administrative charges, Property tax and Insurance are equivalent to 4% of the Total Capital Investment.
5. Estimated based on information presented in Section 5.2, Table 1.4.
6. Section 5.2, Table 1.4 indicates that Overhead is equivalent to 60% of Labor and Materials.

ATTACHMENT B

LO-CAT II CONTROL COST ANALYSIS

----- Original Message -----
From: John Watson
To: Rebecca Frear
Sent: Wednesday, August 22, 2007 3:56 PM
Subject: RE: H2S removal estimate follow up (GTP 829-07)

Rebecca,

I was waiting on additional information, but I have a partial answer for you and I hope this will be helpful while I wait on the missing info.

For the revised feed definition, you will need to decide between LO-CAT and Sulfur-Rite technologies. LO-CAT is the regenerable system that I proposed for the erroneous operating case that we previously evaluated. It produces elemental sulfur using a regenerable catalyst system and has low operating costs relative to scavenger systems like our Sulfur-Rite process. However, the CAPEX associated with LO-CAT for this smaller size range is generally higher than the CAPEX associated with Sulfur-Rite. So the choice usually comes down to the relative weighting given to CAPEX vs. OPEX.

I have estimated costs for LO-CAT for your latest feed definition. I will provide the Sulfur-Rite estimates later when they become available.

Based on the process conditions you provided:
gas fow rate: 3486 scfm
temp: 90 °F
outlet pressure: 2 psig
H2S in raw gas: 500
required H2S limit in outlet: 50 ppm
use of treated gas: fuel

Sulfur Recovered
212 pounds per day as elemental sulfur in a 65 wt% cake

CAPEX (+/- 50%)

LO-CAT Equipment Package		1,090,000
Installation Costs		380,000
Total Installed Cost	US	$1,470,000

OPEX
Chemical cost: $170 per ton of sulfur removed ($5,900 per year at design rates)
Electrical requirement: 17 kW ($10,200 per year @ $0.07/kWh)
Total Operating Cost: $16,100 per year @ design rates

I assumed you would need this gas at 2 psig but we really didn't discuss that when you provided me the revised basis. If this gas is at very low pressure, you will also need to provide the gas at sufficient pressure to overcome system pressure drop and deliver the gas to the engines at 2 psig. For the 50 ppm outlet spec, the required LO-CAT inlet pressure will be ~ 4 psig. If your system cannot deliver this type of pressure, we can provide a blower to boost the pressure. Let me know if you would like further information about blowers at this time, or if we need to consider a higher pressure let me know that.

As I said, I will provide and estimate for Sulfur-Rite as soon as it becomes available.

Regards,

John F. Watson
Business Development Manager
Gas Technology Products
a division of Merichem Chemicals & Refinery Services LLC
846 East Algonquin Road, Suite A100
Schaumburg, Illinois 60173
847-285-3858
cell: 224-848-2579
fax: 847-285-3888
jwatson@merichem.com
www.merichem.com

OAQPS CONTROL COST WORKSHEET
LO-CAT® II SYSTEM
Capital Cost Factors for Gas Absorbers

<u>Direct Costs</u>		
Purchased equipment		
LO-CAT package (from Gas Technology Products)	$1,090,000	(A)
Instrumentation (0.10 A)	**	
Sales Tax (0.03 A)	$32,700	
Freight (0.05 A)	**	
Purchased equipment cost, PEC	$1,122,700	(B)
Direct installation costs		
Foundations & supports (0.12 B)	**	
Handling & erection (0.40 B)	**	
Electrical (0.01 B)	**	
Piping (0.30 B)	**	
Insulation (omit for Florida climate)	**	
Painting (0.01 B)	**	
Direct installation costs	$380,000	
Site preparation (estimated)	$5,000	(SP)
Buildings (none required)	$0	(BLD)
Total Direct Costs, DC (1.85B + SP + BLD)	**$1,507,700**	**(DC)**
<u>Indirect costs (installation)</u>		
Engineering (0.10 B)	$112,270	
Construction and field expenses (0.10 B)	$112,270	
Contractor fees (0.10 B)	$112,270	
Start-up (0.01 B)	$11,227	
Performance test (0.01 B)	$11,227	
Contingencies (0.03 B)	$33,681	
Total Indirect Costs, IC	**$392,945**	**(IC)**
Total Capital Investment = DC + IC	**$1,900,645**	**(TCI)**

** Gas Technology Products provided an installation estimate of $380,000 that presumably included these items.

OAQPS CONTROL COST WORKSHEET
LO-CAT® II SYSTEM
Annual Cost Factors for Gas Absorbers

Direct Annual Costs, DC

Operating Labor	
Operator (1/2 hr per shift, at $20/hr)[1]	$2,600
Supervisor (15% of operator)	$390
Operating materials	
Solvent	$0
Chemicals[2]	$5,900
Wastewater disposal[3]	$2,024
Maintenance	
Labor (1/2 hr per shift, at $20/hr)[1]	$2,600
Material (100% of maintenance)	$2,600
Electricity	
Fan (additional 20 kW)[4]	$12,264
Pump (17 kW for LO-CAT system)[5]	$10,424

Indirect Annual Costs, IC

Overhead (60% of total labor and materials)	$9,668
Administrative charges (2% of TCI)	$38,013
Property tax (1% of TCI)	$19,006
Insurance (1% of TCI)	$19,006
Capital recovery (0.1098 x TCI)	$208,691
Total Annual Cost = DC + IC	**$333,187**

1. One shift per day, 5 days per week, 40 wks per year at $20 per hour.
2. Chemicals are estimated to cost $170 per ton of sulfur removed or $5,900 per year (see August 22, 2007 electronic mail message).
3. Operation of the LO-CAT system is expected to generate 50.6 tons of filter cake per year. Disposal costs are estimated at $40 per ton.
4. Estimated 20 kW additional load on LFG compressor to overcome system pressure drop, calculated at $0.07 per kWh
5. Specified by Gas Technology Products (see August 22, 2007 electronic mail message).

GAS TREATMENT / SULFUR DIOXIDE ABATEMENT COSTS
LO-CAT® II DESULFURIZATION PROCESS

Design and Emissions Data

LFG flowrate	5.02 MMcf/day
	3,486 scfm
Sulfur content (as H_2S)	455 ppmv
Sulfur removed per day (elemental sulfur) at 95% efficiency	180.3 lb/day
	32.9 ton/yr
Sulfur dioxide emissions abated	360.7 lb/day
	65.8 ton/yr

Initial Capital Costs		Cost/Unit	Units	Total Cost
Lo-CAT equipment package	Cost provided by vendor			$1,090,000
Initial chemical charge (included)				$0
Subtotal Purchased equipment costs (PEC)				***$1,090,000***
Site prep / foundation	10% of PEC			$109,000
Installation Cost	Estimate provided by vendor			$380,000
Subtotal Installation Costs				***$489,000***
Total capital investment (TCI)				***$1,579,000***
Annual interest rate (fraction)		0.07		
Control system lifetime (years)		15		
Captial recovery factor (per year)[1]		0.1098		
Annual Capital Recovery (TCI * Recovery factor)				***$173,366***

GAS TREATMENT / SULFUR DIOXIDE ABATEMENT COSTS
LO CAT SULFUR SYSTEM (continued)

Annual Operating Costs	Basis	Unit/yr	Cost/Unit	Total Cost
Chemical Costs (per ton of sulfur)	$170 / ton sulfur removed	32.9	$170	$5,595
Chemical Freight Costs	Estimated	4	$300	$1,200
Spent Media Disposal (tons)[2]	Sulfur in 65% wt cake	50.6	$40	$2,025
Electricity (kWh)	17 kW for LO-CAT	148,920	$0.07	$10,424
Electricity (kWh)	20 kW for added blower	175,200	$0.07	$12,264
Natural Gas	None required	0	$0	$0
Taxes, insurance, admin.[3]	Estimated at 4% of TCI	1	$63,160	$63,160
Operating labor [4]	$20 per work day	260	$20	$5,200
Maintenance (labor and materials)[4]	$40 per work day	260	$40	$10,400
Overhead (supervision and labor)[5]	60% of O&M costs			$9,360
Total Operating Costs (per year)				***$119,629***

Summary of Emission Reduction Costs

Capital Costs (Annual Cost Recovery)	$173,366
Operating Costs	$119,629
Total Annual Costs	***$292,994***
Landfill Gas Treated per year (MMscf)	1,832
Annual Sulfur Control Costs ($/MMscf)	***$159.92***
Sulfur Dioxide Reduced per year (tons at 95% removal)	65.8
SO_2 Reduction Cost ($/ton, annual basis)	***$4,451***

GAS TREATMENT / SULFUR DIOXIDE ABATEMENT COSTS
LO CAT SULFUR SYSTEM (continued)

References from EPA AIR POLLUTION CONTROL COST MANUAL, Sixth Edition, January 2002, Section 5.2 for Gas Adsorbers.

1. Capital Recovery Factor presented in Section 5.2, Table 1.4.
2. Disposal costs estimated at $40 per ton.
3. Section 5.2, Table 1.4 indicates that Administrative charges, Property tax and Insurance are equivalent to 4% of the Total Capital Investment.
4. Estimated based on information presented in Section 5.2, Table 1.4.
5. Section 5.2, Table 1.4 indicates that Overhead is equivalent to 60% of Labor and Materials.

ATTACHMENT C

ALTERNATE TEST METHOD APPROVAL

Robert Harvey

From: Pacione, Michael [Michael.Pacione@dep.state.fl.us]
Sent: Monday, February 04, 2008 12:01 PM
To: rharvey@derenzo.com
Subject: RE: Alternate PM-10 test method request for LFG engines

Mr. Harvey
Just to let you know the alternate sampling procedure you requested will be approved. I understand you have sent a permit revision application to DEP. I spoke with the permit engineer and have sent a request to incorporate this into the new permit. If for some reason this doesn't work out, DEP will send out an Order authorizing the combined EPA method 5/202 sampling procedure in lieu of method 201. Please contact me if you have any questions. Thanks

Michael P. Pacione
Environmental Specialist II
FDEP-Emissions Monitoring
Phone 850-921-9511
Fax 850-922-6979

-----Original Message-----
From: Pichard, Errin
Sent: Thursday, January 24, 2008 9:36 AM
To: 'rharvey@derenzo.com'
Cc: Pacione, Michael
Subject: RE: Alternate PM-10 test method request for LFG engines

Yes, that should be fine.
We will contact you if we need additional information.
Thanks,
Errin

-----Original Message-----
From: Robert Harvey [mailto:rharvey@derenzo.com]
Sent: Thursday, January 24, 2008 9:32 AM
To: Pichard, Errin
Subject: RE: Alternate PM-10 test method request for LFG engines

Mr. Pichard,

This request is actually part of a permit application currently on file with Florida DEP. The application documents (which included the PM-10 alternate method request) were certified by the Brevard Energy responsible official, Mr. Scott Salisbury.

The permitting section asked that we contact you directly with this request (please see paragraph 3 of the attached letter).

Please let me know if this is sufficient authorization.

Robert Harvey
Engineering Services Manager
Derenzo and Associates, Inc.
rharvey@derenzo.com
Ph: (517) 324-1880

-----Original Message-----
From: Pichard, Errin [mailto:Errin.Pichard@dep.state.fl.us]
Sent: Thursday, January 24, 2008 9:15 AM
To: rharvey@derenzo.com
Cc: Mike Brack
Subject: RE: Alternate PM-10 test method request for LFG engines

Mr. Harvey -

Before we can review your request, we will need a letter from your client authorizing you to make this request on their behalf. You can e-mail a scanned version.

If you have any questions, please call me.

Errin Pichard, Administrator
Emissions Monitoring Section
Florida Department of Environmental Protection 850-921-9580

The Department of Environmental

Protection values your feedback as a customer. DEP Secretary Michael W. Sole is committed to continuously assessing and

improving the level and quality of services provided to you. Please take a few minutes to comment on the quality of

service you received. Copy the url below to a web browser to complete the DEP

survey:
http://survey.dep.state.fl.us/?refemail=Errin.Pichard@dep.state.fl.us Thank you in advance for completing the survey.

From: Robert Harvey [mailto:rharvey@derenzo.com]
Sent: Thursday, January 17, 2008 2:53 PM
To: Pichard, Errin
Cc: rharvey@derenzo.com; 'Mike Brack'
Subject: Alternate PM-10 test method request for LFG engines

Mr. Pichard,

Our client, Brevard Energy LLC, has been issued Air Construction Permit 0090069-004-AC, PSD-FL-378 for the construction and operation landfill gas-fueled internal combustion engine generator sets.

Conditions of Permit PSD-FL-378 require that PM-10 emission measurements for the engine generator exhaust be performed in accordance with USEPA Reference Method 201 (Section III, Condition C.2.f). The size of the Method 201 cyclone sampling apparatus relative to the engine generator exhaust stack diameter (maximum 18 inches), elevated exhaust gas temperatures (in excess of 900°F) and high exhaust gas moisture content (approximately 13%) may make the application of Method 201 undesirable for these landfill gas-fueled engines.

We are requesting approval to modify the requirement to allow the use of USEPA Reference Method 5 [Determination of Particulate Matter Emissions from Stationary Sources] and Method 202 [Determination of Condensable Particulate Matter Emissions from Stationary Sources] as an alternative to USEPA Method 201. All of the particulate matter, filterable and condensable, measured using the combined Method 5/202 sample train will conservatively be reported as PM-10.

Brevard Energy has an Air Construction Permit application on file with the Florida DEP that requests this modification in its permit (the application is identified as PSD-FL-378A).

Thank you for your consideration of our request. Please contact us at (517) 324-1880 or rharvey@derenzo.com if you have any questions or require additional information.

Robert Harvey
Engineering Services Manager
Derenzo and Associates, Inc.
rharvey@derenzo.com

Derenzo and Associates, Inc.
Environmental Consultants

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APPENDIX G

AIR QUALITY MODELING PROTOCOL
AND
AMBIENT AIR IMPACT RESULTS
FOR
BREVARD ENERGY, L.L.C.

March 18, 2008

39395 Schoolcraft • Livonia, MI 48150 • (734) 464-3880 • FAX (734) 464-4368
4970 Northwind, Suite 213 • East Lansing, MI 48823 • (517) 324-1880 • FAX (517) 324-5409

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APPENDICES

AIR QUALITY MODELING PROTOCOL
AND
AMBIENT AIR IMPACT RESULTS
FOR
BREVARD ENERGY, L.L.C.
PERMIT NO. PSD-FL-378

1.0 INTRODUCTION TO AIR QUALITY IMPACT ANALYSES

Brevard Energy, LLC (Brevard Energy) has been issued Air Construction Permit 0090069-004-AC, PSD-FL-378 (Permit PSD-FL-378) for the construction and operation of an electricity generation facility, which will result in the beneficial use of landfill gas (LFG) that is generated by the Brevard County Solid Waste Management Central Disposal Facility (Central Disposal Facility).

Brevard Energy is requesting that conditions of Permit PSD-FL-378 be modified to increase the SO_2 emission factor and rate that is allowed for the permitted facility. The magnitude of the SO_2 emission factor and rate increase that is proposed for the permitted facility exceeds the Prevention of Significant Deterioration (PSD) significant SO_2 emission rate threshold of 40 tons per year (TpY) as defined by Florida Administrative Code (F.A.C.) Chapter 62-212 *Stationary Sources-Preconstruction Review* (i.e., the proposed 75.65 lb/MMscf emission factor results in a potential annual SO_2 emission rate of 93.8 TpY; and the permitted facility is a major PSD source for carbon monoxide).

1.1 Class II Area Impacts

The Brevard Energy LFG-fueled electricity generation facility is a permitted major source of CO emissions relative to federal Prevention of Significant Deterioration (PSD) regulations. Therefore, air quality impact analyses are required for all regulated criteria pollutants (CO, NO_X, SO_2, PM_{10}, except ozone) that have the potential to be emitted by the facility in order to demonstrate that these emissions will not cause or significantly contribute to a violation of National Ambient Air Quality Standards (NAAQS).

The calculated ambient air impact results are compared to Class II Area PSD increment concentrations to demonstrate that the proposed project emissions are acceptable relative to federal PSD program requirements.

This protocol presents technical information and procedures that were used for performing air pollutant dispersion modeling analyses to predict maximum ambient air impacts that are produced by the electricity generation facility, existing flare emissions and appropriate background sources.

Section 3.0 of this protocol presents technical information and procedures that were used to perform the Class II Area impact analyses.

1.2 Class I Areas

The Brevard Landfill in Cocoa, Florida is located 175 kilometers from the nearest national wilderness areas. Based on the minimum distance to a Class I designated areas (175 km) and the requirement for analysis of Class I Areas within 300 km of the source, Brevard Energy is providing results of Class I Area impacts and visibility analyses.

Section 5.0 of this protocol presents technical information, procedures and results for the Class I Area impacts and visibility analyses.

Table G-1.1 presents the distances from the Brevard Energy facility to the closest three (3) Class I Areas.

Table G-1.1 National Wilderness Areas and their approximate distances from the Brevard Energy Facility

State	Wilderness Area	Representative UTM coordinates (km) East	North	Distance (km)
FL	Brevard Energy Facility	3,140	517	-
FL	Chassahowitzka Wilderness Area	3,174	344	175
GA	Okefenokee National Wilderness Area	3,385	383	278
FL	Everglades National Park	2,860	551	282

2.0 SITE CHARACTERISTICS AND FACILITY INFORMATION

Brevard Landfill owns approximately 4.40 square kilometers (km^2) of land to the west of US Highway 95, on the western edge of Cocoa about 5 miles from the east coast. The property owned by Brevard County has dimensions of 8,809 feet running north/south and 5,380 feet running east/west. The Central Disposal Facility (portion of the property currently used for waste disposal) occupies an estimated one-fourth of the Brevard County property. The Central Disposal Facility is located in the center of the north half of the property. The electricity generation facility will be located south of the landfill; approximately in the center of the county owned property.

The LFG fueled internal combustion (IC) engines will be housed in a single building (with dimensions of 62.7 feet by 108.7 feet) constructed in a leased area (within the landfill property) near the existing LFG collection system header. A gas transmission line (fuel supply pipe) will be connected to the header of the existing LFG collection system and a dedicated gas blower/compressor will be used to draw methane-rich gas (fuel) from the existing LFG collection system to the gas treatment system and electricity generation facility.

A single meter (flow totalizer) will be installed and operated at the Brevard Energy electricity generation facility to measure the total amount of LFG fuel that is supplied to power the six (6) IC engines (i.e., individual engine fuel use meters will not be installed).

The Brevard Energy electricity generation facility will be located on leased land within the Brevard County property. The electricity generation equipment and process will be owned and operated by Brevard Energy, which has no ownership connection to Brevard County whom owns and operates the Central Disposal Facility (landfill).

However, Brevard Energy will be fueled exclusively with methane-rich gas generated by the Central Disposal Facility (i.e., the facility will not have the ability to fire natural gas). Since all of the fuel utilized by Brevard Energy will be supplied by the Central Disposal Facility, the landfill has an implied control over the electricity generation operations of the proposed facility (i.e., Brevard Energy would not have the capability to generate electricity without the existence of the landfill.) Based on guidance provided by the Florida DEP, Brevard Energy is part of the Central Disposal Facility stationary source and its approved Air Construction Permit is required to be incorporated into the landfill Title V Operating Permit. Because of this relationship between Brevard Energy and Brevard County (Central Disposal Facility), the definition of ambient air is considered to be beyond the public-excluding property barrier (fenceline), which completely encompasses the landfill property owned by Brevard County.

Brevard Landfill owns and operates three (3) utility flares to control landfill gas emissions. Predicted LFG flowrates for the utility flares are presented in Section 2.4.2 of this protocol.

2.1 Land Use

The population density of the area within a radius of 1 km from the source was determined using a county population density map from the 2000 U.S. Census Bureau. The density map indicates that the area surrounding the facility has a population density between 0 and 296 persons per square mile. Because the area surrounding the Brevard Energy facility has a population density significantly less than 1000 persons per square mile (and no significant or unusual development has occurred since the 2000 census), the general classification of the land use can be considered rural. The Census Bureau lists urban areas as having at least 1000 persons per square mile. The facility location is not in an industrial area that would significantly impact the population density analysis (in heavy industrial areas the non-resident population may be much larger than those indicated by standard population density plots).

2.2 Topography

The topography of the land that surrounds the Brevard Landfill is relatively flat. The base elevation of the electricity generation facility is approximately 6.4 meters (21 ft.) above sea level and the minimum release heights for the IC engine exhaust stacks is 20 feet (as measured from local grade), which results in an exhaust stack release elevation of 41 feet above sea level. Based on a review of topography plots of the surrounding area there is no terrain within 3 km that has elevations greater than 41 feet above sea level.

Appendix G-1 provides a site plan of the electricity generation facility and surrounding topography.

2.3 Local Development

In accordance with Florida DEP guidance and rule FAC 62-212.400(3)(h)(5), an air permit application must include analysis of growth in the area since August 7, 1977 in terms of general, commercial, residential and industrial. The growth statistics from the U.S. Census Bureau, USA Counties database were analyzed for Brevard County.

2.3.1 Residential Growth

Brevard County has increased in population from an estimated 241,450 in 1977 to an estimated 518,134 in 2004; an increase of 214%. Another sign of residential growth is occupied housing units in the county; which rose from 101,783 in 1980 to 198,195 in 2000.

2.3.2 Commercial Growth

An indicator of increase in commercial growth is the total number of retail establishments that have increased from 2,214 in 1977 to 4,472 in 1992. On a larger scale than retail establishments, total private nonfarm establishments has increased from 5,173 in 1980 to 12,938 in 2004; an overall increase of 250%.

2.3.3 Industrial Growth

The total labor force has increased from 125,056 people in 1980 to 220,413 people in 2000. The dollar amount earned for all industries went up from $1,262,987 in 1977 to $8,471,410 in 2000. The dollar amount for total county earnings for manufacturing jobs has gone up from $241,644 in 1977 to $1,570,207 in 2000.

Due to the minimal amount of employees that will be required to operate the Brevard Energy facility, (two to three full-time employees) and the limited resources required to fuel and maintain the facility (compared to other large electricity generation facilities), Brevard Energy does not expect that there will be additional growth (population or otherwise) occurring in the area as a direct result of the new facility.

The growth statistics for Brevard County since the 1977 baseline aren't unusual from other areas of Florida and the proposed facility will not result in an increase in the local population. Therefore, the Brevard Energy facility is not expected to cause a significant impact on the surrounding area.

2.4 Exhaust Stack Parameters

2.4.1 IC Engines

The Brevard Energy electricity generation facility will use IC engines that are fueled with treated LFG and designed to operate at base load (100% capacity) conditions. Each of the IC engines is expected to exhaust effluent gas at a rate of 12,050 actual cubic feet per minute (acfm) at 900°F through an 18-inch diameter stack. These engines will operate continuously with the exception of planned maintenance shutdowns or automatic engine shutdowns (instantaneous, automatic engine shutdowns if monitored operating parameters are outside of preset ranges). The amount of time required for an engine start-up is minimal. Since the engines are operated at base load conditions and the durations of engine shutdown and startup times are minimal, no air quality impact concentrations analyses were performed for these specific events (i.e., the engines will not be operated for any appreciable amount of time at loads other than 100%).

Each of the six IC engine exhaust stacks were entered into the computer dispersion model as individual point sources.

2.4.2 *Open Utility Flares*

The Central Disposal Facility LFG control system consists of two flares that have a combined total control capacity of 4,720 scfm. This control capacity has been determined (by the Central Disposal Facility) to be adequate for the life of the landfill based on its permitted design capacity (i.e., the Central Disposal Facility permitted capacity is not expected to generate more than 4,720 scfm of collectable LFG).

The FDEP-DARM issued the Central Disposal Facility a revision to its Title V Operating Permit in 2004 that allowed for the installation and operation of a third LFG flare, which was installed to provide redundancy for the existing LFG control systems. While the third flare provides additional LFG control, the potential LFG control requirement for the landfill remains at 4,720 scfm of collectable LFG. The electricity generation facility has the capacity to receive 3,486 scfm. At the minimum landfill gas generation rate (4,770 scfm) 1,234 scfm is required to be controlled in Flares 1 and 2.

Flares 1 and 2 have actual release heights of 8.53 m; an equivalent release height and diameter were calculated for the flares based on the actual release height and design heat release using the following equations from the TSCREEN users manual:

$H_{equiv} = H_{actual} + 0.00128(Q_c^{0.478})$; and
$D_{equiv} = 1.754*10^{-4} * \text{sqrt}(Q_c)$

Where: H_{equiv} = Equivalent stack height
H_{actual} = Actual stack height (8.53 m for Flares 1 & 2)
D_{equiv} = Equivalent stack diameter (m); and
Q_c = Flared gas heat release ($44.424*10^6$ Btu/hr for Flares 1 & 2)

The equations above account for the flared gas plume rise based on an effective buoyancy flux parameter. Using a gas heat release rate equivalent to the combustion of 1,234 scfm of gas for Flares 1 and 2 at 550 Btu/scf results in an equivalent flare height of 14.32 m and an equivalent diameter of 1.169 m.

The flares were entered into the computer dispersion model as one point source (Flares 1 and 2 have identical release parameters and emissions) using the calculated equivalent height, diameter and default value for temperature (1000 degrees Celsius) and velocity (20 meters per second).

Table G-2.1 presents exhaust stack parameters for the six (6) identical IC engines (BICE 01 through 06) and the utility flare that were used in the air quality impact analyses.

Appendix G-2 provides a plot plan of the electricity generation facility building, IC engine exhaust stacks and flare on a UTM coordinate system.

2.5 GEP Stack Height Analysis and Influencing Structures

The IC engines will be installed within a 62.7 ft. (width) by 108.7 ft. (length) building that has a roof height of 15 ft. The individual exhaust stacks will be located on the roof of the building. The stacks will extend above the roof at least 5 feet (i.e., overall engine exhaust release height of 20 ft. as measured from grade of the land that surrounds the building) and exhaust vertically. The electricity generation facility has a maximum projected crosswind width of 125.5 feet (i.e., the diagonal of the rectangular building).

In general, air pollutant dispersion models consider the influence of building structures on exhaust stack plumes (i.e., downwash conditions) when the exhaust stack has a height that is less than its Good Engineering Practice (GEP) stack height. The GEP stack height for the engine exhaust stacks is 37.5 ft. (11.43 meters) determined with the following equation:

$$H_{GEP} = H_b + 1.5L$$

where: H_{GEP} = formula GEP stack height (ft.)
H_b = height of adjacent building (15 ft.)
L = lesser of height or maximum projected width of adjacent building (15 ft)

Other nearby structures have the potential to influence the plume rise of the engine exhaust stacks if the distance between the stacks and the nearby structure is less than five times the L dimension (lesser of the building height or maximum projected width) of the structure. There are no other nearby structures located within the 5L radius.

The landfill terrain was evaluated as a potential influencing structure and is not considered an influencing structure to the Brevard Energy source because the distance between the landfill and the source exceeds five times the L dimension (lesser of the building height or width). The height of the landfill, which at its maximum is 117 ft., would be considered the L dimension (5 x 117 = 585). The distance between Brevard Energy and the nearest edge of the landfill is approximately 700 ft.

There are no other structures located near the electricity generation facility that have the potential to increase the calculated GEP stack height (i.e., the dimensions of the facility control the GEP stack height determination). The release height of the identical engine exhaust stacks is less than the GEP stack height (based on the dimensions of the structure in which the engines will be installed); therefore, emissions from the electricity generation facility exhaust stacks have the potential to be influenced by aerodynamic downwash created by the building that houses the equipment. The influence of stack downwash on emission impacts was included in the dispersion modeling analyses.

The UTM coordinate locations and heights of the influencing structure (i.e., the building that houses the engines) and engine exhaust stacks were input to the USEPA Building Profile Input Program, Plume Rise Enhancement version (BPIP-PRIME). This computer program calculates projected building widths and heights for the influencing structure as a function of wind direction for use in the building downwash algorithms of the dispersion model that is used for the significant impact analysis (which is described in the following section of this document).

Appendix G-3 provides a compact disc that contains the BPIP input files (.PIP and .GPW files) and output building parameter files (.TAB, .SUM and .SO files) that were used in the modeling analysis.

Table G-2.1 Exhaust stack parameters for the LFG combustion devices; open utility flares and Brevard Energy facility

Source ID	Location (UTM) East (m)	North (m)	Base Elev. (m)	Stack Height (m)	(ft)	Stack Diameter (m)	(ft)	Temp. (K)	Exit Velocity (m/s)
BICE01	516,755	3,140,579	6.40	6.09	20.0	0.457	1.5	755	34.64
BICE02	516,760	3,140,579	6.40	6.09	20.0	0.457	1.5	755	34.64
BICE03	516,765	3,140,579	6.40	6.09	20.0	0.457	1.5	755	34.64
BICE04	516,770	3,140,579	6.40	6.09	20.0	0.457	1.5	755	34.64
BICE05	516,775	3,140,579	6.40	6.09	20.0	0.457	1.5	755	34.64
BICE06	516,780	3,140,579	6.40	6.09	20.0	0.457	1.5	755	34.64
FLARE1/2†	516,760	3,140,709	6.40	14.09	46.21	1.120	3.67	1273	20.00

† Data presented for height and diameter are equivalent values calculated for open flares, using equations from the TSCREEN users manual. Exit temperature and velocity are default values for open flares.

3.0 CLASS II AREA SIGNIFICANT IMPACT ANALYSIS

3.1 Purpose

A new source that has potential criteria air pollutant emissions in excess of PSD major source thresholds is required to perform analyses to determine whether its regulated air pollutant emissions will significantly impact the ambient air in designated Class II areas. In NAAQS attainment areas, a demonstration that indicates the maximum predicted ambient air pollutant impacts (concentrations) caused by the emissions of a proposed source are less than the applicable PSD significant impact levels is equivalent to a demonstration of compliance with Federal and State ambient air standards.

Table G-3.1 presents PSD significant impact levels established for Class II areas.

Air pollutant emissions from major sources that result in predicted ambient air impacts that exceed the significant impact levels are required to perform additional modeling to consider the cumulative impact caused by background emission sources and regional air pollutant background concentrations to demonstrate compliance with PSD increment consumption requirements and applicable federal ambient air quality standards (NAAQS).

For the purposes of the Class II modeling demonstration the criteria pollutant emissions from the operation of the IC engines at 100% capacity, and the utility flares operating at a capacity of 1,234 scfm were considered in order to provide the most conservative (i.e., maximum) estimate of ambient air impacts.

3.2 Criteria Pollutant Emission Rates

Table G-3.2 presents criteria pollutant emission rates for the electricity generation facility that were used in the modeling analysis. The maximum SO_2 and NO_2 impacts produced by the electricity generation facility were based on the total conversion of SO_X compounds to SO_2, and 75% conversion of NO_X compounds to NO_2.

Due to the current lack of guidance for modeling $PM_{2.5}$, potential emissions for PM_{10} are being considered a surrogate for $PM_{2.5}$ emissions.

Table G-3.3 presents criteria pollutant emission rates for the flare that were used in the modeling analysis. The emission rates are based on the LFG throughput specified in the previous section and pollutant emission factors provided by Brevard Landfill representatives.

3.3 Refined Modeling

Screening modeling is often performed for an initial determination of maximum impacts and the radius of significant impact. However, the screening model (e.g., SCREEN3) only calculates impacts associated with a single representative emission source. Due to the differences between the IC engine and flare exhaust parameters, no screening modeling was performed for this project (the analysis was performed using a refined model).

3.3.1 <u>*Model Selection*</u>

The AERMOD (American Meteorological Society/Environmental Protection Agency Regulatory Model) air pollutant dispersion model (version No. 04300) was used to calculate ground-level pollutant concentrations resulting from the electricity generation facility and flare air pollutant emission rates and exhaust configuration. AERMOD is the most recent Gaussian steady-state plume dispersion model released by USEPA for use in assessing ambient air impacts associated with air pollutant releases and was adopted by the USEPA as the preferred general purpose dispersion model (Federal Register Notice November 9, 2005). The USEPA *Guideline on Air Quality Models* (40 CFR Part 51, Appendix W) specifies that impacts calculated with most steady-state Gaussian plume models are applicable at distances up to 50 km from the origin of the emission source.

The use of the AERMOD model was determined appropriate because it:

- Can be used to model combined impact concentrations for multiple emission sources.

- Uses the plume rise enhancement (PRIME) building downwash algorithm, which has been shown to be superior to the downwash algorithm in previously released Gaussian steady-state plume dispersion models.

The following sections present input data and processing options that were used for the AERMOD air pollutant dispersion modeling. The AERMOD input files were prepared by entering appropriate data (applicable to the specific emission process) and model operating parameters into a Windows-based graphical user interface (GUI) developed by BEE-Line Software (BEEST for Windows, current version 9.72). BEEST for Windows uses the unmodified regulatory AERMOD program. BEE-Line software has documented test cases from utilizing the EPA AERMOD modeling program compared to utilizing AERMOD executed through BEEST for Windows.

3.3.2 <u>*Model Options*</u>

The AERMOD dispersion model was executed with regulatory default options, which include the use of stack-tip downwash and incorporate the effects of elevated terrain (if applicable). In regulatory default mode, no calculations are performed for deposition or plume depletion.

Based on information presented in Section 2.1 of this protocol, the land use for the area surrounding the electricity generation facility is predominantly classified as rural (as opposed to urban). Therefore, no options for urban dispersion were used to calculate air quality impact concentrations produced by the modeled emission sources.

3.3.3 Meteorological Data

Meteorological data (hourly surface measurements and upper-air soundings) for the five-year period 1999 through 2003 were provided by the Florida DEP for this project. The station numbers identified on the meteorological data files indicate that the surface and upper air input data were acquired from the Orlando and Tampa Bay areas. The data were preprocessed by the Florida DEP using the AERMET meteorological preprocessor program to produce two types of data files for each meteorological year that are used by AERMOD; surface scalar parameters (*filename*.sss) and vertical profiles (*filename*.pfc). A profile base elevation of 28.7 meters (94.2 feet) was used with the meteorological data for the execution of AERMOD.

The meteorological data set was determined to be the most representative of met conditions at the application site (Central Disposal Facility) due to its proximity and surrounding area and was recommended by the Florida DEP.

The surface data used in the meteorological data file were obtained from measurements at the Weather Observation Station at the Orlando International Airport (Orlando site WBAN: 12815). The surface data collected at this station is not only the location that is closest to Brevard Energy, but from research performed by Derenzo and Associates, it is the only location with complete surface data in the region that can be combined with the Tampa Bay upper air data to form a usable data file.

The Orlando International Airport is located in the southeast section of Orlando. The city has a large urban area with a very high population density. Although the Airport is located in the city, the land to the east of the airport is mostly rural and includes lakes to the southeast. The area around the Brevard Energy facility does not have the same urban qualities that are found in Orlando; however the land west of the facility is similar to the area east of the airport (rural characteristics). Most of the land surrounding the Central Disposal Facility is rural and includes a few bodies of water.

The AERMET data files used for this project are provided on the compact disc in Appendix G-3.

3.3.4 Receptor Network

Ground-level pollutant impact concentrations are required to be calculated for all nearby areas that are considered to be ambient air (i.e., areas in which public access is not precluded or restricted by the stationary source). Preliminary modeling results (using AERMOD) indicate that ambient air impacts for the criteria pollutants exceed PSD Class II significance levels exterior to the Brevard Landfill facility property fenceline. Based on modeling performed for similar sources, the receptor network (locations at which air pollutant impact concentrations are calculated) used in the AERMOD modeling analyses was developed by creating a grid of receptors on a Cartesian coordinate system having a spacing of 100 meters to determine off-site impacts up to 2.1 km from the Brevard Energy facility to ensure that all maximum impacts were within the boundary of the receptor grid. Receptors were placed at the Brevard Landfill facility boundary (fenceline) and extended 2.1 km in all directions from the facility.

No flagpole receptors were identified in the area surrounding the facility location.

Figure G-3.1 presents a depiction of the receptor network that was used to perform the refined modeling analysis.

3.3.5 *Terrain Data*

As presented in Section 2.2 of this protocol and the site plan in Appendix G-1, there is no off-site complex terrain in the area, as there are no offsite receptors at elevations that exceed the stack height. The terrain in the region surrounding the Brevard Landfill property is at elevations lower than the stack release elevation for the IC engines and flare; therefore, the terrain was classified as simple.

USGS 30-meter (7.5 minute) ASCII Digital Elevation Models (DEM) files were obtained for the geographical area surrounding the facility. The DEM data were based on the North American Datum of 1927 (NAD27). USEPA's AERMAP computer program was used to extract data from the DEM files and calculate source base elevations and receptor elevations using the default algorithm (inverse distance squared of the nearest four terrain nodes).

The DEM data files and AERMAP output files that were used in the model are provided on the compact disc in Appendix G-3.

3.3.6 *Pollutant Impact Averaging Times*

Maximum ambient air pollutant impact concentrations produced by the emission sources were determined for the specified five-year meteorological period. These results were compared to the PSD significant impact levels, and if applicable, to establish the radius of significant impact (i.e., the geographic areas that surround the emission facility that are determined to have maximum impacts that are greater than the significance values). The highest calculated impact for each pollutant and averaging period for the five-year meteorological data set was used for the significant impact area (SIA) determination.

The impact concentration(s) calculated for:

- SO_2 were based on maximum 3-hr, 24-hr annual average impacts.
- PM_{10} and $PM_{2.5}$ were based on maximum 24-hr and annual impacts.
- CO were based on the maximum 1-hr and 8-hr average impacts.
- NO_2 was based on the maximum annual average impact.

Highest 2nd high impacts for short-term pollutant averaging periods that are used for PSD and NAAQS demonstrations were not considered for the SIA determinations.

3.4 Refined Modeling SIA Results

Appendix G-4 provides AERMOD output summary files.

Results from the SIA modeling analysis indicate that emissions from the combined operation of the utility flare and electricity generation facility result in maximum impact concentrations that exceed the Class II significant impact levels for SO_2 24-hr and 3-hr time periods. The maximum impacts do not exceed the significant impact level for SO_2 annual, CO, NO_X and PM_{10}.

Because PM_{10} is being considered as a surrogate for $PM_{2.5}$, emissions for $PM_{2.5}$ are also considered to be under the significant impact level.

Table G-3.4 presents the Brevard Energy facility and utility flare emission rates used in the modeling demonstration, the predicted individual impacts from the flares and electricity generation facility and combined impacts for all on-site LFG combustion sources.

The maximum radius of impact for SO_2 is 1.8 km. Therefore, the receptor grid (which considers receptors out to a distance of 2.1 km from the facility) adequately encompasses the significant impact area. The calculated significant impact area is used to determine the number of sources that need to be included in the multisource modeling analysis (described in Section 4.0 of this protocol).

Table G-3.1 Significant Impact Levels for Class II Areas (μg/m³)

Pollutant	Annual	24-Hr	8-Hr	3-Hr	1-Hr
Nitrogen Dioxide (NO_2)	1.0	--	--	--	--
Carbon Monoxide (CO)	--	--	500	--	2000
Sulfur Dioxide (SO_2)	1.0	5.0	--	25.0	--
Particulates (PM_{10}/TSP)	1.0	5.0	--	--	--

Table G-3.2 Criteria pollutant emission rates for the Brevard Energy facility used in the air quality analysis

Pollutant	LFG-Fired ICE Emission Factors		Single ICE[5] Emissions (lb/hr)	Facility Emission Rate for Six (6) ICE (lb/hr)	Facility Emission Rate for Six (6) ICE (TpY)	Facility Emission Rate for Six (6) ICE (g/s)
Nitrogen Dioxide (NO_x)[1]	0.60	g/bhp-hr	2.95	17.72	77.6	1.67
Carbon Monoxide (CO)	2.75	g/bhp-hr	13.54	81.23	355.8	10.24
Sulfur Dioxide (SO_2)[2]	75.7	lb/MMcf	2.64	15.82	69.30	1.99
Sulfur Dioxide (SO_2)[3]	91.4	lb/MMcf	3.19	19.12	-	2.41
Particulates[4]	0.24	g/bhp-hr	1.18	7.09	31.05	0.89

1. Emission factor of 0.60 g/bhp-hr is for total oxides of nitrogen (NO_x), USEPA guidance specifies that 75% of NO_x can be considered NO_2, which is reflected only in the (g/s) emission rate.
2. Sulfur Dioxide annual emission rates based on LFG sulfur content of 455 ppmv as H_2S.
3. Maximum short-term (3-hr and 24-hr) SO_2 emission rate based on a LFG content of 550 ppmv as H_2S.
4. Particulate emission rate for TSP, PM_{10} and $PM_{2.5}$.
5. Based on operation of a single engine at base load (100% capacity) conditions; engine output of 2,233 hp and maximum theoretical fuel consumption of 34,860 scfh LFG.

Table G-3.3 Criteria pollutant emission rates for the Brevard Landfill utility flare used in the air quality analysis

Pollutant	LFG Utility Flare Emission Factors		Flare 1/2 Emission Rate[2] (lb/hr)	(g/s)
Nitrogen Dioxide (NO_x) [1,3]	0.06	lb/MMBtu	2.45	0.231
Carbon Monoxide (CO) [3]	0.20	lb/MMBtu	8.15	1.03
Sulfur Dioxide (SO_2) [4]	75.7	lb/MMscf LFG	5.60	0.706
Sulfur Dioxide (SO_2) [5]	91.4	lb/MMscf LFG	6.77	0.853
Particulates [6]	17.0	lb/MMdscf CH_4	1.26	0.159

1. USEPA guidance specifies that 75% of NO_x can be considered NO_2, which is reflected in the (g/s) emission rate.
2. Based on continuous operation at 1,234 scfm LFG and heat value of 550 Btu/scfm (44.424 MMBtu/hr).
3. Manufacturer guaranteed emission rate.
4. Sulfur Dioxide annual emission rates based on LFG sulfur content of 455 ppmv as H_2S.
5. Maximum short-term (3-hr and 24-hr) SO_2 emission rate based on a LFG content of 550 ppmv as H_2S.
6. Default PM emission rate AP-42 section 2.4-5.

Table G-3.4 Ambient air impact results compared to PSD Class II Significant Impact Levels

Pollutant	Averaging Time	Flare Emission Rate (g/s)	Energy Facility Emission Rate (g/s)	Maximum Predicted Flare Impact (μg/m³)	Maximum Predicted Energy Facility Impact (μg/m³)	Combined Energy and Flare Impact (μg/m³)	Class II Significant Impact Levels (μg/m³)
NO_2	Annual	0.231	1.67	0.03	0.57	0.62	1.0
CO	8-hr	1.027	10.24	5.07	82.5	84.0	500
	1-hr	1.027	10.24	8.02	143	143	2000
SO_2	Annual	0.706	1.993	-	0.79	0.80	1.0
	24-hr	0.853	2.410	-	10.1	10.1	5.0
	3-hr	0.853	2.410	-	25.2	25.2	25.0
PM_{10}	Annual	0.159	0.892	0.23	0.30	0.34	1.0
	24-hr	0.159	0.892	0.43	4.12	4.61	5.0

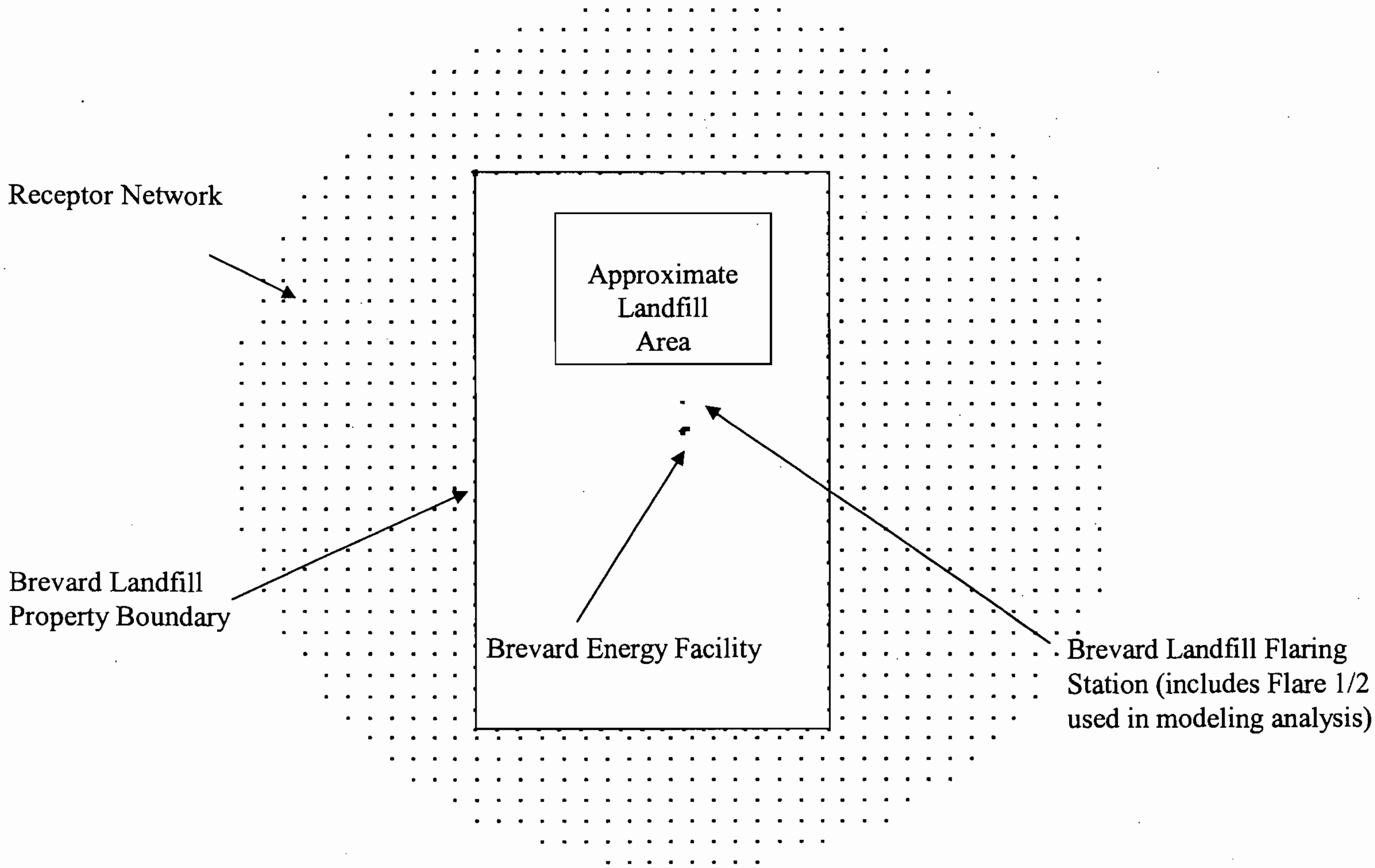


Figure G-3.1 Receptor network used in refined modeling analysis

4.0 BACKGROUND DATA AND MULTISOURCE MODELING

Air quality impact analyses were performed for the increase in allowed SO_2 emissions proposed for the LFG fueled IC engine - generator sets and all pollutants at rates currently permitted for the facility. These analyses indicate that off-site ambient air SO_2 impacts exceed significance levels when the Brevard Landfill combustion sources are fueled with LFG that contains greater than approximately 400 ppmv H_2S. Therefore, multi-source ambient air SO_2 impact analyses were performed to evaluate the cumulative impacts produced by background sources (major sources located within 75 km of the SO_2 significant impact area) and the Central Disposal Facility equipment and processes based on the combustion of LFG that contains up to:

1. 550 ppm H_2S (91.44 lb SO_2/MMscf) on a short-term basis that was used to demonstrate compliance with 3-hr and 24-hr SO_2 ambient air standards; and assemble

2. 455 ppm H_2S (75.65 lb SO_2/MMscf) on an annual average that was used to demonstrate compliance with the annual SO_2 ambient air standard.

The predicted annual ambient air impact for the Brevard Landfill combustion sources does not exceed the PSD significant concentration. However, since the proposed annual SO_2 emission rate exceeds the PSD significant emission increase threshold (40 tons per year), annual average SO_2 impacts were included in the PSD and NAAQS modeling demonstration.

4.1 Background Sources

Major PSD sources with air pollutant emissions that produce ambient air quality impact concentrations that exceed the Class II significant concentrations are required to perform a multi-source air quality impact modeling demonstration (i.e., PSD increment consumption analysis and NAAQS compliance demonstration). A multisource modeling demonstration is required for all pollutants with a maximum impact that exceeds the PSD significant impact concentration and must consider all major sources that:

1. Are located within the significant impact area (sources located at a distance from the facility that is less than the radius of significant impact); and

2. Have the potential to significantly impact the SIA of the facility (generally considers major sources within 50 to 75 km from the SIA).

An inventory of background emission sources required to be considered in the multisource PSD increment and NAAQS modeling analysis (major sources located within 75 km of the significant impact area) was provided by the Florida DEP. The inventory provided by the department specified the emission units that consume PSD increment (those emission units that were installed subsequent to the applicable PSD baseline date).

Based on discussions with the Florida DEP, emission rates for the background sources provided by the regulatory agency are based on potential emission rates. All modeling performed that includes these background sources is based on allowable emissions for each source (i.e., a maximum emissions scenario), rather than actual emissions.

Appendix G-5 provides the inventory of permitted air pollutant emission rates and exhaust stack parameters for the background sources provided by the Florida DEP.

Many of the background sources in the provided inventory were screened out (i.e., excluded from the refined modeling demonstration) using the '20D' criteria. This method, recommended by the Florida DEP, excludes from the modeling analysis any source that has emissions (in TPY) less than 20 times the distance (in km) between the background source and the SIA.

The Florida DEP has indicated that based on their review of the background inventory, none of the sources are considered to be increment expanding sources.

Appendix G-6 provides the inventory of permitted air pollutant emission rates and exhaust stack parameters for the background sources used in the multisource PSD increment and NAAQS modeling analysis (those that were determined to be significant by the 20D evaluation).

4.2 Background Air Quality (Monitoring Data)

For the NAAQS demonstration, representative background pollutant concentrations were added to the predicted air pollutant impacts determined by the multisource modeling analysis. Available air monitoring data were retrieved from the USEPA AIRS website. Monitoring stations located in Brevard County do not provide SO_2 background data. The nearest station with complete SO_2 data is located in Orange County on Morris Boulevard, Winter Park. The distance from Winter Park to the Brevard Energy facility is approximately 50 miles. The three most recent years of complete data from the Orange County station were reviewed (2005-2007) to establish representative background air pollutant concentrations.

Orange County contains more industrial and urban area (e.g. Orlando) than Brevard County. Because Brevard County consists of a larger percentage of rural land than Orange County, it would be expected that the SO_2 background data for Orange County would be higher, or a worst case scenario, compared to Brevard County if the data existed.

Table G-4.1 presents representative maximum background concentrations (maximum year for 2005-2007) for SO_2 that were used in the NAAQS demonstration.

4.3 Criteria Pollutant Emission Rates and Averaging Periods

The predicted emission impact concentrations for the refined multisource air quality analysis were determined using the operating parameters and emission rates for the six individual engine exhaust stacks, the utility flares and appropriate background sources.

The results for the SIA (presented in Section 3.0) are based on the highest calculated impact for each averaging period for any of the five years modeled. For the PSD increment and NAAQS refined modeling analyses, the combined ambient air impact of the facility and appropriate background sources was based on the:

- Highest second-high (i.e., highest of the second highest concentration predicted for any of the five meteorological years used) SO_2 impact for the PSD and NAAQS 3-hr, and 24-hr averaging periods.

- Highest SO_2 impact for the PSD and NAAQS annual averaging period.

4.4 PSD and NAAQS Results

Table G-4.2 presents results of the PSD increment consumption analysis.

Table G-4.3 presents results of the state and federal ambient air quality standards analysis.

The highest SO_2 3-hour ambient air impact produced by the modeled emission sources is 289 $\mu g/m^3$, which is less than the allowable PSD increment of 512 $\mu g/m^3$. This calculated impact results in a cumulative ambient air concentration, including the reported background, of 318 $\mu g/m^3$, which is less than the NAAQS of 1300 $\mu g/m^3$. The highest SO_2 24-hour ambient air impact produced by the modeled emission sources is 78 $\mu g/m^3$, which is less than the allowable PSD increment of 91 $\mu g/m^3$. This calculated impact results in a cumulative ambient air concentration, including the reported background, of 94 $\mu g/m^3$, which is less than the Florida ambient air quality standard of 260 $\mu g/m^3$. The highest SO_2 annual average ambient air impact produced by the modeled emission sources is 11 $\mu g/m^3$, which is less than the allowable PSD increment of 20 $\mu g/m^3$. This calculated impact results in a cumulative ambient air concentration, including reported background, of 14 $\mu g/m^3$, which is less than the Florida ambient air quality standard of 60 $\mu g/m^3$. These calculated impacts result in cumulative ambient air concentrations, including background pollutant measurements that are less than the respective NAAQS and Florida ambient air quality standards (i.e., there are no calculated impacts beyond the Landfill facility property that exceed the standards).

4.5 Preconstruction Monitoring

Based on the results for the SIA and multisource modeling performed for the Brevard Landfill sources (existing flares and electricity generation facility), off-site impacts for:

- NO_2, CO and PM_{10} emissions are less than the significant impact level for all of-site receptors;
- PM_{10} emissions are less than the significant impact level on an annual basis; and
- PM_{10} emissions for 3-hour and 24-hour averaging periods exceed significance but are less than 30% of the Florida or NAAQS.

The monitored background SO_2 concentrations for this region are relatively low and when combined with the multisource modeling results are less than 35% of the Florida or NAAQS. Background concentrations near the landfill would have to be over ten times larger than those recorded in Orange County to risk exceeding the applicable air quality standards. The area around the Brevard County Landfill is relatively rural and is not expected to be significantly impacted by industrial or urban activities. Therefore, Brevard Energy is proposing that the existing air monitoring data be used to satisfy the pre-construction monitoring requirement (i.e., on-site monitoring data are not expected to yield data that indicate significantly greater concentrations than that collected in Orange County).

Table G-4.1 Monitoring data that were used to establish background air quality for the NAAQS demonstration

Pollutant	Averaging Time	Concentration[1,2] (ppm)	($\mu g/m^3$)	Monitoring Site	County[3]	Year(s)
SO_2	3-hour	0.011	29.3	Morris Blvd. Winter Park	Orange	2005
SO_2	24-hour	0.004	10.6	Morris Blvd. Winter Park	Orange	2005
SO_2	Annual	0.001	2.66	Morris Blvd. Winter Park	Orange	2005

1. For SO_2 the monitoring data provided in the USEPA AIRS database are presented in ppm and were converted to $\mu g/m^3$ using an ideal gas relationship (0.02405 m^3/g-mol) and the molecular weight for SO_2 (64).

2. Maximum concentrations reported for the 3 most recent years of data (2005, 2006 and 2007).

3. The Orange County monitoring station is the closest measurement station that records background SO_2 concentrations.

Table G-4.2 Results of PSD increment consumption analysis

Pollutant	Averaging Period	Met. Year	Maximum Impact PSD Increment Consuming Sources[1] (µg/m^3)	Allowable PSD Class II Increment (µg/m^3)
SO_2	3-hr (2nd high)	1999	289	512
SO_2	24-hr (2nd high)	1999	77.7	91
SO_2	Annual	2001	10.9	20

1. Includes the Brevard Energy facility, existing LFG combustion sources at the Brevard County Landfill and appropriate PSD increment-consuming sources identified by the Florida DEP.

Table G-4.3 Results of Florida and Federal ambient air quality standards analysis

Pollutant	Averaging Period	Met. Year	Maximum Multisource Impact[1] (μg/m³)	Representative Background Concentration[2] (μg/m³)	Max Combined Ambient Air Concentration (μg/m³)	Florida Standards[3] (μg/m³)	NAAQS (μg/m³)
SO_2	3-hr (2nd high)	1999	289	29.3	318	1300	1300
SO_2	24-hr (2nd high)	2000	77.7	10.6	88.3	260	365
SO_2	Annual	2001	10.9	2.66	13.6	60	80

1. Includes the Brevard Energy facility, existing LFG combustion sources at the Brevard County Landfill and appropriate PSD increment-consuming sources from Table G-4.2

2. Background monitoring data provided in the USEPA AIRS database and presented in Table I-4.1.

3. Florida Ambient Air Quality Standards provided in Rule 62-204.240(a)(b)(c).

5.0 CLASS I AREA MODELING

Based on guidance from the Federal Land Manager, a Class I area PSD increment and visibility analyses must be performed when a proposed facility is a potential major source that will be located within 300 km of a designated Class I area. The Brevard Energy facility is located approximately 175 km from the nearest boundary of the Chassahowitzka Wilderness Area (Chassahowitzka), 278 km from the Okefenokee National Wilderness Area and 282 km from the Everglades National Park. The Florida DEP recommends that Brevard Energy analyze the potential impact the facility potentially has on the nearest Class I area (Chassahowitzka) as a demonstration for all Class I areas located in excess of this distance..

The Brevard Energy facility is located approximately 175 km from the closest portion of Chassahowitzka and approximately 190 km from the furthest boundary of the protected area. The refuge was established in 1943 and encompasses 31,000 acres on the west coast of Florida that includes marshland, bays, swamps and grasslands. It runs north and south for approximately 12 miles along the Chassahowitzka River.

Table G-5.1 presents the location of the closest three (3) Class I areas relative to the Brevard Energy facility.

5.1 Model Selection

Guidance from the Florida DEP and USEPA indicates analysis of Class I Areas impacts are required using the CALPUFF dispersion model when the area is at a distance over 50 km from the source (Gaussian steady-state plume dispersion models (i.e., AERMOD) are only recommended up to 50 km). CALPUFF is a multi-layer, multi-species non-steady-state puff dispersion model that simulates the effects of time- and space-varying meteorological conditions on air pollution transport, transformation and removal.

Guidance issued by USEPA indicates that the CALPUFF dispersion model can be used to assess haze impairment that may be attributable to the emissions from a single source. Other visibility analysis programs are recommended for sources at a distance of less than100 km (i.e. VISCREEN), but the distance from Brevard Energy to Chassahowitzka (175 km) requires that CALPUFF be used for accurate visibility analysis.

The software suite CalPuff Professional version 8.66, distributed by BEE-Line Software, was utilized to determine potential criteria pollutant impacts and potential visibility degradation in the Chassahowitzka Wilderness Area from the emissions produced by the electricity generation facility. The CALPUFF executable files were acquired from the Atmosphere Studies Group (ASG) at TRC CALPUFF homepage. The CALPUFF EPA approved version of the executable files (i.e. CALPUFF.exe, CALPOST.exe, etc.), along with supporting files, were downloaded from the ASG-TRC website, and executed within the CalPuff Professional software.

5.2 Model Options

CalPuff Professional requires the user to input several parameters that affect the impact analysis at the specified receptor network. The source data (i.e., UTM coordinates and stack parameters) that were used for the Class II area significant impact modeling demonstration (presented in Section 3.0 of this protocol) were entered into the Calpuff Professional interface. Default values of zero meters for the initial sigma y and initial sigma x were used and the momentum flux was set to the default value of 1 meter. The computer model requires the user to enter information relating to the Class I area under consideration. For the visibility screening a maximum relative humidity of 98% and Rayleigh Scattering value of 10.0 were used as recommended in the Interagency Workgroup on Air Quality Modeling (IWAQM) *Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts* (IWAQM Recommendation Document).

5.3 Receptor Network

A network of 113 discrete receptors were input into the modeling interface to evaluate criteria pollutant impacts. The CalPuff Professional software includes a database of receptors for all United States Class I Areas. These receptor locations and specifications (including elevations) were initially acquired by Bee-Line Software from the National Park Service website.

5.4 Meteorological Data

The meteorological data used for the CALPUFF modeling were obtained from the Florida DEP. The meteorological data file was already processed in the CALMET pre-processer program that creates a file ready to be used in the CALPUFF portion of Calpuff Professional. The data files (.dat), along with the associated input files (.inp and .lst), for 2001-2003 had to be transferred from the Florida DEP on an external hard drive due to the considerable size of the files (approximately 90 gigabytes per year).

5.5 Class I Area Significant Impact

For the PSD Class I significant impact analysis, impacts calculated at the specified receptors resulting from significant Brevard Energy facility criteria pollutant emissions were determined for comparison to the significant impact concentrations for PM_{10} (24-hr and annual averaging periods), NO_2 (annual averaging period) and SO_2 (3-hr, 24-hr and annual averaging periods).

Table G-5.2 specifies significant impact levels for Class I areas.

5.6 Visibility

The presence of fine particulate matter (sulfates, nitrates and organic carbons) in the atmosphere has the potential to cause visibility impairment by the scattering or adsorbing of light. USEPA has concluded (*Guideline on Air Quality Models*, 40 CFR Part 51, Appendix W, §7.2.1) that the long-range transport of fine particulate matter can significantly impair visibility in areas that are located hundreds of kilometers from the source of these emissions. Therefore, based on the distance between the proposed electricity generation facility and the nearest Class I area (Chassahowitzka Wilderness Area), the FDEP requires that analyses be performed to evaluate the potential impacts of the emission plume produced by Brevard Energy at the closest Class I area (Chassahowitzka).

Emission rates for PM_{10} and those constituents exhausted by the IC engine operation that have the potential to undergo chemical transformation to form nitrate particulate compounds (NO_X and SO_2) were used in the visibility analyses as input for the CALPUFF calculations. The MESOPUFF II chemistry option was utilized, which uses the chemical species SO_2, SO_4, NO_x, HNO_3, NO_3 and primary particulate (PM) for assessing haze contributions within the Class I area.

The operating parameters of the CALPUFF model were configured to calculate light extinction values at the receptors identified in Section 5.3. All background concentration inputs (Ammonium Sulfate, Ammonium Nitrate, Coarse Particulates, Organic Carbon, Soil, Elemental Carbon) for the CALPUFF visibility demonstration were set to zero to show the maximum possible impacts the source could have on Class I area visibility (i.e., all haze impairment was considered to be caused by Brevard Energy without subtracting default background concentrations). A regional haze visibility degradation of 5% or less was considered acceptable visibility (i.e., visibility degradation calculated with CALPUFF compared to the existing default background visibility impairment (b_{ext}) of 10.0 Mm^{-1}).

5.7 Class I Modeling Results

Appendix G-8 presents results from the Class I modeling analysis using the procedures described in this section.

These results indicate that emissions from the proposed electricity generation facility result in maximum impact concentrations that are below the Class I significant impact level for all pollutants modeled and averaging times. Regional haze visibility impairment is below 5%, and visibility change in deciviews is below the FLAG 2000 Guideline of 1% for all years considered in the CALPUFF Class I modeling demonstration.

Table G-5.3 presents maximum combined Brevard Energy facility impacts in the Class I Area.

Table G-5.4 presents the results of the CALPUFF visibility impairment analysis in the Class I Area.

Table G-5.1 Location of Class I area relative to the Brevard Energy facility

	Brevard Energy Facility	Class I Area Chassahowitzka Wilderness Area (closest point)	Class I Area Chassahowitzka Wilderness Area (furthest point)
County	Brevard	Citrus	Citrus
Municipality	Cocoa	Homosassa	Homosassa
Easting (km)	517	344	371.4
Northing (km)	3,140	3,174	3,439.2
Distance to Proposed Facility (km)	NA	175	190

Table G-5.2 Significant Impact Levels for Class I Areas (μg/m^3)

Pollutant	Annual	24-Hr	3-Hr
Inhalable Particulates (PM_{10})	0.2	0.3	--
Nitrogen Dioxide (NO_2)	0.1	--	--
Sulfur Dioxide (SO_2)	0.1	0.2	1.0

Table G-5.3 Results of Class I area significant impact analysis

Pollutant	Averaging Period	Met. Year	Maximum Landfill Sources Impact ($\mu g/m^3$)	Class I Significant Impact Levels ($\mu g/m^3$)
PM_{10}	24-hr	2001	0.0053	0.3
PM_{10}	Annual	2003	0.0002	0.2
NO_2	Annual	2003	0.0002	0.1
SO_2	3-hr	2003	0.0270	1.0
SO_2	24-hr	2001	0.0110	0.2
SO_2	Annual	2003	0.0005	0.1

Table 5.4 Results of CALPUFF visibility impairment analysis for the Chassahowitzka Wilderness Area Class I area

Met. Year	Background Visibility (Mm^{-1})	Days with > 5% Light Extinction	Greatest Light Extinction Change
2001	10.0	0	1.19%
2002	10.0	0	1.40%
2003	10.0	0	1.19%

6.0 SPECIAL MODELING CONSIDERATIONS

6.1 Class II Area Sensitive Receptors

As presented in Section 4, Class II Area Significant Impact Analysis, emission impacts as a result of particulate matter emissions from Brevard Energy are less than the applicable significant impact concentrations. Because of the minimal risk of visibility degradation, and the absence of any significant Class II sensitive areas near Brevard Energy, a visibility analysis outside of the Chassahowitzka Wilderness Area was not performed.

6.2 Particle Deposition

Based on the design and operation of the IC engines and the treatment (dewatering, compression and filtration) of LFG received from the landfill prior to its use as a fuel and combustion, the amount of particulates emitted from the combustion process are expected to be relatively small. Therefore, compliance with the particulate matter ambient air quality standards can be achieved without considering particle deposition (i.e., the removal of particulates from the exhaust plume over the distance of maximum ground-level impacts due to deposition are expected to be minimal).

6.3 Fugitive Emissions

The Brevard Energy electricity generation facility utilizes LFG that is supplied by the Brevard Landfill gas collection and control system. The Brevard Energy electricity generation facility will not be a source of fugitive emissions.

Fugitive emissions for the landfill are already addressed in the existing Title V permit issued the facility.

6.4 Start-Up / Shutdown / Low Load Scenarios

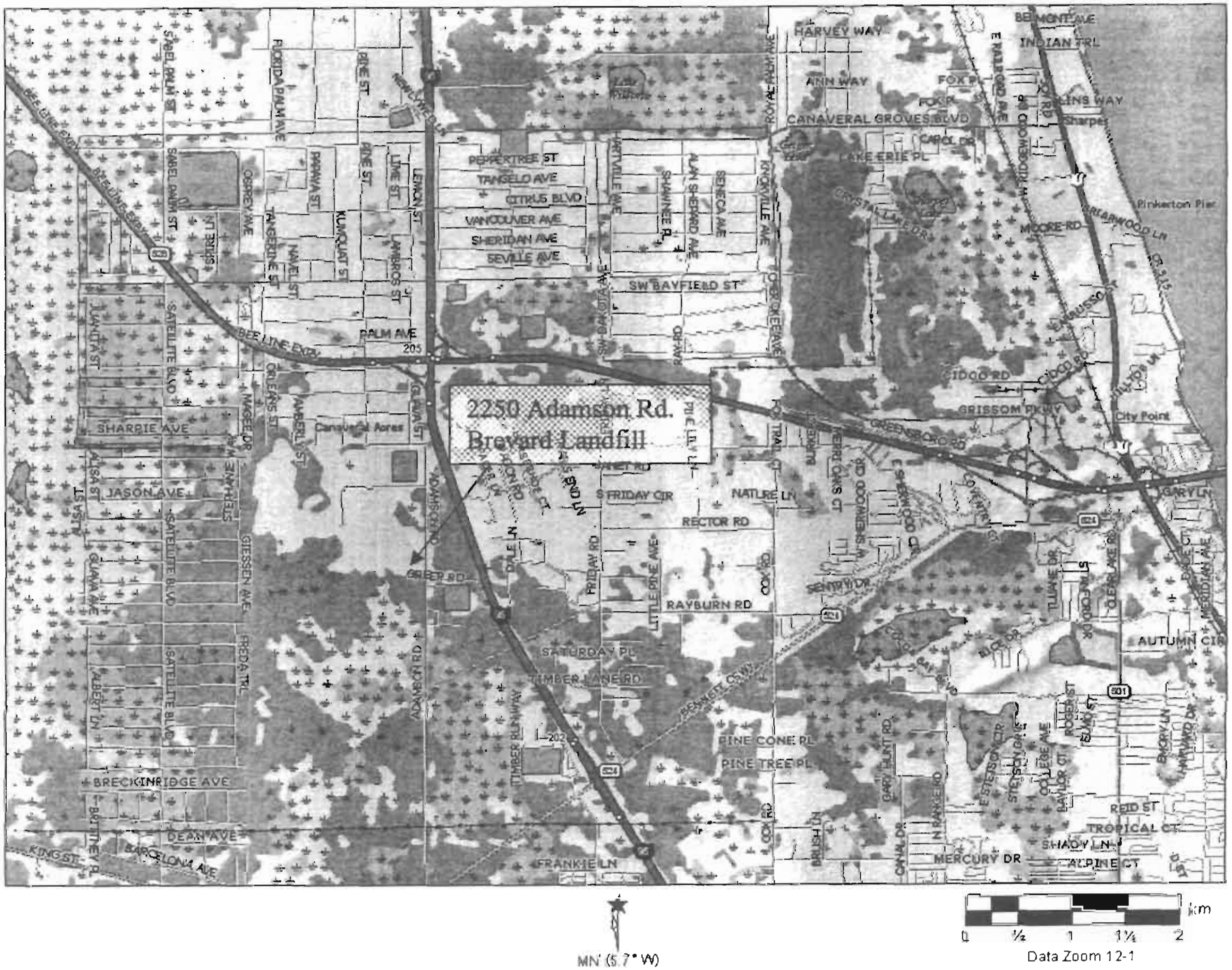
The electricity generation facility will use LFG-fueled IC engines that are designed to operate as base load (100% capacity) conditions. These engines will operate continuously with the exception for planned maintenance shutdowns or automatic engine shutdowns (instantaneous, automatic engine shutdowns if monitored operating parameters are outside of preset ranges). The amount of time required for an engine start-up is minimal. Since the engines are operated at base load conditions and the durations of engine shutdown and startup times are minimal, no air quality impact concentrations analyses will be performed for these specific events.

APPENDIX G-1

LANDFILL AND BREVARD ENERGY SITE PLANS
AND
TOPOGRAPHICAL PLOT

BEST AVAILABLE COPY

Brevard County Property

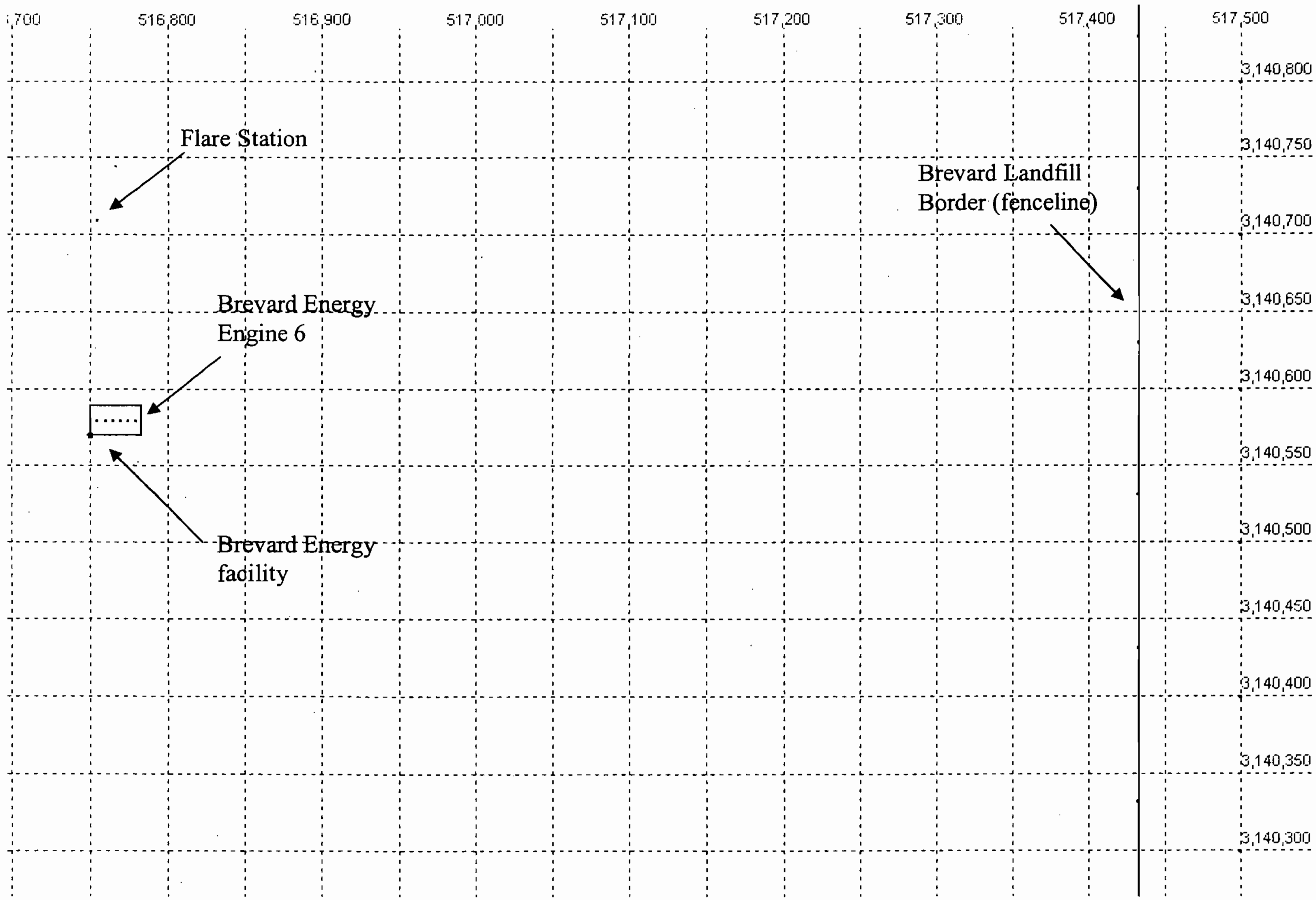


Brevard Landfill location

APPENDIX G-2

COORDINATES FOR FACILITY AND STACKS

Derenzo and Associates, Inc.



Brevard Energy Facility and Stacks

APPENDIX G-3

MODELING INPUT FILES

APPENDIX G-4

RESULTS OF CLASS II SIGNIFICANT IMPACT ANALYSIS

Appendix G-4

AERMOD Modeling Results (SO_2 3-hour 2nd high PSD Increment Consumption Analysis)

Model	File	Pol	Average	Group	Rank	Conc.	East(X)	North(Y)	Elev	Met File
AERMOD	Brevard03 99_SO2short.USF	SO2	3-HR	ALL	2ND	288.7	518700	3139900	7.32	MCOTPA99.SFC
AERMOD	Brevard03 02_SO2short.USF	SO2	3-HR	ALL	2ND	222.4	517400	3138600	6.30	MCOTPA02.SFC
AERMOD	Brevard03 00_SO2short.USF	SO2	3-HR	ALL	2ND	198.9	518700	3139800	7.32	MCOTPA00.SFC
AERMOD	Brevard03 01_SO2short.USF	SO2	3-HR	ALL	2ND	192.1	518700	3139800	7.32	MCOTPA01.SFC
AERMOD	Brevard03 03_SO2short.USF	SO2	3-HR	ALL	2ND	170.7	518600	3141500	7.32	MCOTPA03.SFC
AERMOD	Brevard03 99_SO2short.USF	SO2	3-HR	BNRG	2ND	22.41	517433	3140730	6.71	MCOTPA99.SFC
AERMOD	Brevard03 03_SO2short.USF	SO2	3-HR	BNRG	2ND	20.76	517433	3140432	6.71	MCOTPA03.SFC
AERMOD	Brevard03 00_SO2short.USF	SO2	3-HR	BNRG	2ND	20.69	517433	3140531	6.71	MCOTPA00.SFC
AERMOD	Brevard03 01_SO2short.USF	SO2	3-HR	BNRG	2ND	19.54	517433	3140730	6.71	MCOTPA01.SFC
AERMOD	Brevard03 02_SO2short.USF	SO2	3-HR	BNRG	2ND	17.96	517433	3140531	6.71	MCOTPA02.SFC
AERMOD	Brevard03 99_SO2short.USF	SO2	3-HR	MULTI	2ND	288.7	518700	3139900	7.32	MCOTPA99.SFC
AERMOD	Brevard03 02_SO2short.USF	SO2	3-HR	MULTI	2ND	222.4	517400	3138600	6.30	MCOTPA02.SFC
AERMOD	Brevard03 00_SO2short.USF	SO2	3-HR	MULTI	2ND	198.9	518700	3139800	7.32	MCOTPA00.SFC
AERMOD	Brevard03 01_SO2short.USF	SO2	3-HR	MULTI	2ND	192.1	518700	3139800	7.32	MCOTPA01.SFC
AERMOD	Brevard03 03_SO2short.USF	SO2	3-HR	MULTI	2ND	170.6	518600	3141500	7.32	MCOTPA03.SFC

Appendix G-4

AERMOD Modeling Results (SO_2 24-hour 2nd high PSD Increment Consumption Analysis)

Model	File	Pol	Average	Group	Rank	Conc.	East(X)	North(Y)	Elev	Met File
AERMOD	Brevard03 99_SO2short.USF	SO2	24-HR	ALL	2ND	77.65	517800	3142300	7.01	MCOTPA99.SFC
AERMOD	Brevard03 03_SO2short.USF	SO2	24-HR	ALL	2ND	71.67	517500	3142500	6.4	MCOTPA03.SFC
AERMOD	Brevard03 01_SO2short.USF	SO2	24-HR	ALL	2ND	71.00	518700	3139800	7.32	MCOTPA01.SFC
AERMOD	Brevard03 00_SO2short.USF	SO2	24-HR	ALL	2ND	65.73	518700	3141200	7.32	MCOTPA00.SFC
AERMOD	Brevard03 02_SO2short.USF	SO2	24-HR	ALL	2ND	53.74	518700	3140500	7.32	MCOTPA02.SFC
AERMOD	Brevard03 03_SO2short.USF	SO2	24-HR	BNRG	2ND	8.78	517433	3140531	6.71	MCOTPA03.SFC
AERMOD	Brevard03 00_SO2short.USF	SO2	24-HR	BNRG	2ND	8.20	517433	3140631	6.71	MCOTPA00.SFC
AERMOD	Brevard03 99_SO2short.USF	SO2	24-HR	BNRG	2ND	7.22	517433	3140730	6.71	MCOTPA99.SFC
AERMOD	Brevard03 01_SO2short.USF	SO2	24-HR	BNRG	2ND	7.20	517433	3140432	6.71	MCOTPA01.SFC
AERMOD	Brevard03 02_SO2short.USF	SO2	24-HR	BNRG	2ND	6.06	517433	3140233	6.71	MCOTPA02.SFC
AERMOD	Brevard03 99_SO2short.USF	SO2	24-HR	MULTI	2ND	77.63	517800	3142300	7.01	MCOTPA99.SFC
AERMOD	Brevard03 03_SO2short.USF	SO2	24-HR	MULTI	2ND	71.65	517500	3142500	6.4	MCOTPA03.SFC
AERMOD	Brevard03 01_SO2short.USF	SO2	24-HR	MULTI	2ND	70.98	518700	3139800	7.32	MCOTPA01.SFC
AERMOD	Brevard03 00_SO2short.USF	SO2	24-HR	MULTI	2ND	65.67	518700	3141200	7.32	MCOTPA00.SFC
AERMOD	Brevard03 02_SO2short.USF	SO2	24-HR	MULTI	2ND	53.48	518600	3140100	7.32	MCOTPA02.SFC

Appendix G-4

AERMOD Modeling Results (SO_2 Annual PSD Increment Consumption Analysis)

Model	File	Pol	Average	Group	Rank	Conc.	East(X)	North(Y)	Elev	Met File
AERMOD	Brevard03 01_SO2annual.USF	SO2	ANNUAL	ALL	1ST	10.93	517200	3142600	6.40	MCOTPA01.SFC
AERMOD	Brevard03 00_SO2annual.USF	SO2	ANNUAL	ALL	1ST	10.64	517900	3142300	7.01	MCOTPA00.SFC
AERMOD	Brevard03 02_SO2annual.USF	SO2	ANNUAL	ALL	1ST	10.17	517100	3142600	6.23	MCOTPA02.SFC
AERMOD	Brevard03 99_SO2annual.USF	SO2	ANNUAL	ALL	1ST	10.07	517500	3142500	6.40	MCOTPA99.SFC
AERMOD	Brevard03 03_SO2annual.USF	SO2	ANNUAL	ALL	1ST	9.58	517900	3142300	7.01	MCOTPA03.SFC
AERMOD	Brevard03 02_SO2annual.USF	SO2	ANNUAL	BNRG	1ST	0.80	515793	3140332	5.79	MCOTPA02.SFC
AERMOD	Brevard03 99_SO2annual.USF	SO2	ANNUAL	BNRG	1ST	0.76	517433	3140531	6.71	MCOTPA99.SFC
AERMOD	Brevard03 00_SO2annual.USF	SO2	ANNUAL	BNRG	1ST	0.75	517433	3140531	6.71	MCOTPA00.SFC
AERMOD	Brevard03 03_SO2annual.USF	SO2	ANNUAL	BNRG	1ST	0.72	515793	3140531	6.10	MCOTPA03.SFC
AERMOD	Brevard03 01_SO2annual.USF	SO2	ANNUAL	BNRG	1ST	0.72	515793	3140332	5.79	MCOTPA01.SFC
AERMOD	Brevard03 01_SO2annual.USF	SO2	ANNUAL	MULTI	1ST	10.73	517200	3142600	6.40	MCOTPA01.SFC
AERMOD	Brevard03 00_SO2annual.USF	SO2	ANNUAL	MULTI	1ST	10.45	517900	3142300	7.01	MCOTPA00.SFC
AERMOD	Brevard03 02_SO2annual.USF	SO2	ANNUAL	MULTI	1ST	9.99	517200	3142600	6.40	MCOTPA02.SFC
AERMOD	Brevard03 99_SO2annual.USF	SO2	ANNUAL	MULTI	1ST	9.89	517500	3142500	6.40	MCOTPA99.SFC
AERMOD	Brevard03 03_SO2annual.USF	SO2	ANNUAL	MULTI	1ST	9.40	517900	3142300	7.01	MCOTPA03.SFC

APPENDIX G-5

DATA FOR BACKGROUND EMISSION SOURCES INCLUDED IN THE MULTISOURCE MODEL

Background Emission Sources Included in the Multisource Model

Facility ID	Facility	Owner/Company Name	East (m)	North (m)	Stack Ht (m)	Exit Temp (K)	Velocity (m/s)	Diam (m)	PM_{10} (g/s)	NO_X (g/s)	SO2 (g/s)	Distance (km)
0970014	FPCD01	Florida Power Corporation	446300	3126000	13.7	677.4	53.3	4.46		373.20	275.40	71.94
0970014	FPCD02	Florida Power Corporation	446302	3126000	15.2	834.7	53.1	4.19	11.20	145.60	113.60	71.94
0970014	FPCD03	Florida Power Corporation	446304	3126000	17.1	806.9	35.8	4.91	3.90	89.10	19.50	71.94
0970014	FPCD04	Florida Power Corporation	446306	3126000	22.9	829.7	42.5	5.79	3.00	60.90	51.80	71.93
0970071	REF01	Reliant Energy Florida, L.L.C.	490430	3111310	22.9	857.4	49.2	5.49	19.80	150.00	39.60	39.36
0970043	KUA02	Kissimmee Utility Authority	449812	3127900	19.8	654.1	29.0	3.05		38.90	6.55	68.13
0950111	WDWC04	Walt Disney World Company	442006	3139000	19.8	413.6	15.8	3.38		58.60	15.10	74.76
0694801	LILP01	Lake Investment, L.P.	434000	3198800	24.4	298.0	0.2	3.05	8.80	111.20	42.20	101.18
0090180	OPP01	Oleander Power Project, LP	520100	3137600	18.3	874.7	34.3	6.71	8.40	204.80	54.80	4.48
0090104	VPI01	VA Paving Inc.	522030	3142280	4.3	449.7	26.5	0.79		0.54	3.02	5.55
0090051	NASA03	NASA	534204	3155000	6.7	810.8	22.0	0.30		110.47		22.65
0090006	FPL01	Florida Power & Light (PCC)	522900	3148900	121.0	414.7	22.4	5.70		456.20	2772.00	10.35
0950184	GOAA01	Greater Orlando Aviation Authority	467300	3145000	4.6	388.6	3.9	0.30		113.02	7.43	49.65
0090196	REF01	Reliant Energy Florida, L.L.C.	521500	3151600	91.4	435.8	26.2	4.27	31.80	168.40	987.10	12.01
0090196	REF02	Reliant Energy Florida, L.L.C.	521502	3151600	91.4	444.1	32.7	4.30	34.09	180.16	1056.39	12.01
0090008	OUC01	Orlando Utilities Commission	521300	3151700	11.0	830.2	33.3	3.77	2.60	48.80	36.00	12.02
0090008	OUC02	Orlando Utilities Commission	521302	3151700	15.5	813.6	26.1	6.74	28.60	92.20	109.80	12.02
0950137	OUC02	Orlando Utilities Commission	483502	3150600	48.8	414.7	22.9	5.79	29.48	100.83	67.41	34.73
0950137	OUC03	Orlando Utilities Commission	483504	3150600	167.6	324.1	23.5	5.79	10.80	739.76	1938.68	34.73
0950014	FBCD01	Florida Power Corp.	475200	3156800	12.5	788.6	41.8	2.50		19.01	31.41	44.61
1270028	FPCO01	Florida Power Corp.	467500	3197200	13.7	838.6	52.9	5.39	23.29	416.55	740.87	75.05
1270028	FPCO02	Florida Power Corp.	467502	3197200	15.2	834.7	53.1	4.19	7.56	147.10	559.43	75.05
1270009	FPL01	Florida Power & Light (PSN)	468300	3190300	38.1	377.4	21.4	5.79	10.08	347.25	53.73	69.43
1270009	FPL02	Florida Power & Light (PSN)	468302	3190300	92.0	421.9	46.7	2.90		92.86	571.72	69.43
1270020	FPCB01	Florida Power Corp.	473400	3193300	12.5	788.6	40.8	3.75	18.25	197.29	156.24	68.26

APPENDIX G-6

DATA FOR BACKGROUND EMISSION SOURCES PROVIDED BY THE FLORIDA DEP

Background Emission Sources Provided by Florida DEP

Facility ID	Facility	Owner/Company Name	East (m)	North (m)	Stack Ht (m)	Exit Temp (K)	Vel (m/s)	Diam (m)	PM_{10} (g/s)	NO_X (g/s)	SO2 (g/s)	Distance (km)
0830070	FGTC01	Florida Gas Transmission Company	418800	3240900	8.5	741.3	44.8	0.40		22.700	0.400	140.22
0830070	FGTC02	Florida Gas Transmission Company	418802	3240900	12.2	641.3	54.9	0.40		1.336	0.277	140.21
0830070	FGTC03	Florida Gas Transmission Company	418804	3240900	18.6	760.8	24.1	2.32	0.491	1.777	0.466	140.21
1050061	HHFP01	Holly Hills Fruit Products	441000	3115400	10.7	505.2	11.3	0.40			2.645	79.82
1050014	SSS01	Standard Sand & Silica Co.	442800	3117300	9.1	350.8	26.5	0.43		0.296		77.52
1050014	SSS02	Standard Sand & Silica Co.	442802	3117300	9.1	380.2	24.1	0.43		0.994	2.769	77.52
1050014	SSS03	Standard Sand & Silica Co.	442804	3117300	25.9	377.4	26.8	0.49		1.964	11.758	77.52
0090112	RACP01	R. A. Connor Paving, Inc.	527770	3110290	8.5	421.9	44.0	0.40		5.796		32.22
0090021	UAFP01	US Air Force/Patrick AFB	538800	3120800	12.2	483.0	25.0	0.82		1.100	3.700	29.62
0090049	APAC01	APAC-Southeast Inc. Central Fl. Division	532600	3120600	12.2	421.9	23.0	1.37	2.463	5.670	4.234	25.50
0970077	FLGC01	Florida Gas Transmission Company	442220	3128490	13.4	723.0	36.5	0.49		1.890	0.265	75.50
0970014	FPCD01	Florida Power Corporation	446300	3126000	13.7	677.4	53.3	4.46		373.200	275.400	71.94
0970014	FPCD02	Florida Power Corporation	446302	3126000	15.2	834.7	53.1	4.19	11.200	145.600	113.600	71.94
0970014	FPCD03	Florida Power Corporation	446304	3126000	17.1	806.9	35.8	4.91	3.900	89.100	19.500	71.94
0970014	FPCD04	Florida Power Corporation	446306	3126000	22.9	829.7	42.5	5.79	3.000	60.900	51.800	71.93
0970071	REF01	Reliant Energy Florida, L.L.C.	490430	3111310	22.9	857.4	49.2	5.49	19.800	150.000	39.600	39.36
0970034	CARG01	Cargill, Inc.	452170	3124790	7.6	477.4	19.2	0.30	1.134	0.428	2.268	66.48
0970007	SVC01	SVC Manufacturing, Inc.	451100	3125800	7.3	513.6	11.3	0.46		0.643	0.644	67.29
0970043	KUA01	Kissimmee Utility Authority	449810	3127900	12.2	654.1	29.0	3.05	5.600	23.100	2.520	68.13
0970043	KUA02	Kissimmee Utility Authority	449812	3127900	19.8	654.1	29.0	3.05		38.900	6.552	68.13
0970043	KUA03	Kissimmee Utility Authority	449814	3127900	39.6	351.3	12.7	5.49		22.300	12.100	68.12
0951219	OPC01	Orlando Paving Company	437870	3139970	12.8	421.9	22.1	1.19	0.976	2.362	1.764	78.88
0090015	GIV01	Good IV - TKLC, INC.	529900	3127300	6.1	388.6	21.3	0.91		0.794	0.003	18.68
0690008	EPWG01	Eagle Picher, Ind. (Wolverince Gasket Div.)	424200	3194100	10.7	807.4	34.3	0.46		0.300		106.92
0970032	STS01	Soil Treatment Services	455500	3127100	11.9	449.7	21.3	0.94		1.265		62.71
0690014	SSC01	Silver Springs Citrus, Inc.	424440	3176540	6.1	449.7	36.0	0.67		1.474	6.249	99.07
0690014	SSC02	Silver Springs Citrus, Inc.	424442	3176540	7.6	491.3	6.1	0.91		0.504		99.07
0690014	SSC03	Silver Springs Citrus, Inc.	424444	3176540	18.3	338.6	13.1	0.85		0.567		99.07
0950111	WDWC01	Walt Disney World Company	442000	3139000	3.7	519.1	8.0	0.52		0.368		74.77
0950111	WDWC02	Walt Disney World Company	442002	3139000	5.2	616.3	44.1	0.55	2.600	31.800	3.600	74.76
0950111	WDWC03	Walt Disney World Company	442004	3139000	9.1	477.4	0.0	0.91	0.067	0.670		74.76
0950111	WDWC04	Walt Disney World Company	442006	3139000	19.8	413.6	15.8	3.38		58.600	15.100	74.76
0090029	COT01	Coastal Terminals, LLC	538900	3141900	4.3	449.7	7.2	0.36		0.232	0.630	22.19
0090029	COT02	Coastal Terminals, LLC	538902	3141900	5.2	449.7	6.8	0.30		0.149	0.454	22.19
0090029	COT03	Coastal Terminals, LLC	538904	3141900	9.1	613.6	9.3	0.76		0.368	1.303	22.19
0970001	KUT01	Kissimmee Utility Authority	460100	3129300	8.5	505.2	2.1	0.91		1.000	3.700	57.76
0970001	KUT02	Kissimmee Utility Authority	460102	3129300	13.4	505.2	1.5	0.79		6.500	7.000	57.76
0970001	KUT03	Kissimmee Utility Authority	460104	3129300	16.2	477.4	2.7	0.85		2.126	2.098	57.76

Background Emission Sources Provided by Florida DEP

Facility ID	Facility	Owner/Company Name	East (m)	North (m)	Stack Ht (m)	Exit Temp (K)	Vel (m/s)	Diam (m)	PM_{10} (g/s)	NO_X (g/s)	SO2 (g/s)	Distance (km)
0970001	KUT04	Kissimmee Utility Authority	460106	3129300	18.3	421.9	19.8	3.66		29.597	32.129	57.75
0690039	CAMP01	C A Meyer Paving & Construction Co.	433600	3158300	7.9	435.8	30.8	0.85	0.491	0.781	3.175	85.02
0690039	CAMP02	C A Meyer Paving & Construction Co.	433602	3158300	21.3	505.2	39.9	0.85		3.528	2.733	85.02
0090012	OUC01	Orlando Utilities Commission	537800	3142200	8.2	433.0	121.3	0.61		0.769	3.969	21.11
0090113	FPL01	Florida Power & Light	537600	3142000	9.8	441.3	0.9	0.61		0.769	4.363	20.90
0970002	SCCP01	St Cloud City Power Plant	471800	3124900	11.6	699.7	18.0	0.52	0.200	16.000	0.400	47.60
0970002	SCCP02	St Cloud City Power Plant	471802	3124900	11.9	727.4	29.3	1.07	2.737	25.326	3.379	47.60
0970002	SCCP03	St Cloud City Power Plant	471804	3124900	10.7	727.4	20.4	1.16			0.539	47.60
0970005	FDOA01	Florida Dept. of Agriculture	459510	3133290	9.1	727.4	5.2	0.55		0.101		57.70
0970030	ASEI01	APAC-Southeast Inc Central Fl. Division	461000	3132700	9.1	435.8	43.1	0.94		3.490	9.576	56.30
0090005	UAFC01	US Air Force/Cape Canaveral AFS	540810	3151870	7.6	449.7	9.4	0.30	0.287	0.152	0.800	26.58
0090005	UAFC02	US Air Force/Cape Canaveral AFS	540812	3151870	3.7	449.7	5.0	0.34			0.400	26.58
0090005	UAFC03	US Air Force/Cape Canaveral AFS	540814	3151870	4.3	449.7	9.4	0.24			0.175	26.59
0090005	UAFC04	US Air Force/Cape Canaveral AFS	540816	3151870	5.2	449.7	7.7	0.30			0.226	26.59
0694801	LILP01	Lake Investment, L.P.	434000	3198800	24.4	298.0	0.2	3.05	8.800	111.200	42.200	101.18
1270031	HPI01	Halifax Paving, Inc.	489240	3242810	5.5	377.4	34.4	0.91		2.495	3.583	105.88
1270031	HPI02	Halifax Paving, Inc.	489242	3242810	8.2	394.1	17.7	1.10		4.549	6.678	105.88
0950213	SWOF01	Sea World of Florida, Inc.	454900	3142500	6.1	455.2	9.2	0.61			0.084	61.88
0090180	OPP01	Oleander Power Project, LP	520100	3137600	18.3	874.7	34.3	6.71	8.400	204.800	54.800	4.48
0950053	LDCI01	Louis Dreyfus Citrus, Inc.	443800	3159500	6.1	338.6	3.0	0.61		0.655	2.835	75.37
0950053	LDCI02	Louis Dreyfus Citrus, Inc.	443802	3159500	9.1	394.1	2.1	0.79		3.400	14.500	75.36
0950053	LDCI03	Louis Dreyfus Citrus, Inc.	443804	3159500	13.7	449.7	17.1	0.79		2.167	12.184	75.36
0950053	LDCI04	Louis Dreyfus Citrus, Inc.	443806	3159500	37.8	349.7	14.9	1.19	1.487	2.331	37.200	75.36
0950046	LHM01	Lockheed Martin Missiles & Fire Control	454500	3146200	10.4	435.8	14.3	0.82		0.161		62.50
0950046	LHM02	Lockheed Martin Missiles & Fire Control	454502	3146200	11.3	484.7	9.2	0.46		0.178		62.50
0090104	VPI01	VA Paving Inc.	522030	3142280	4.3	449.7	26.5	0.79		0.544	3.024	5.55
0090051	NASA01	NASA	534200	3155000	2.4	810.8	0.0	0.30		1.111		22.64
0090051	NASA02	NASA	534202	3155000	4.6	421.9	7.3	0.37		0.396	0.140	22.65
0090051	NASA03	NASA	534204	3155000	6.7	810.8	22.0	0.30		110.472		22.65
0090051	NASA04	NASA	534206	3155000	10.7	531.3	11.9	0.67		1.349	0.479	22.65
0090051	NASA05	NASA	534208	3155000	11.6	505.2	3.3	0.70		0.246	0.087	22.65
0090051	NASA06	NASA	534210	3155000	19.8	505.2	1.5	1.22	0.542	1.530	0.543	22.65
0090051	NASA07	NASA	534212	3155000	20.4	488.6	0.0	0.30		0.113		22.65
0690067	NOPI01	Natural Organic Products International	439150	3184640	18.3	330.2	10.4	1.37		0.265		89.24
0950044	SPC01	Sonoco Products Co.	460700	3142400	19.2	873.0	8.2	1.01		4.222		56.08
0950125	FPS01	FP Spiralkote Inc.	461370	3142050	9.1	477.4	17.1	0.40		0.091		55.40
0950055	ICSF01	ICS-FL, LLC	439800	3178100	7.6	449.7	20.1	0.46		0.141		85.61
1270090	IFI01	Imperial Foam & Insulation MFG. Co.	485000	3235600	6.7	338.6	0.3	0.34		0.088	0.302	100.19

Background Emission Sources Provided by Florida DEP

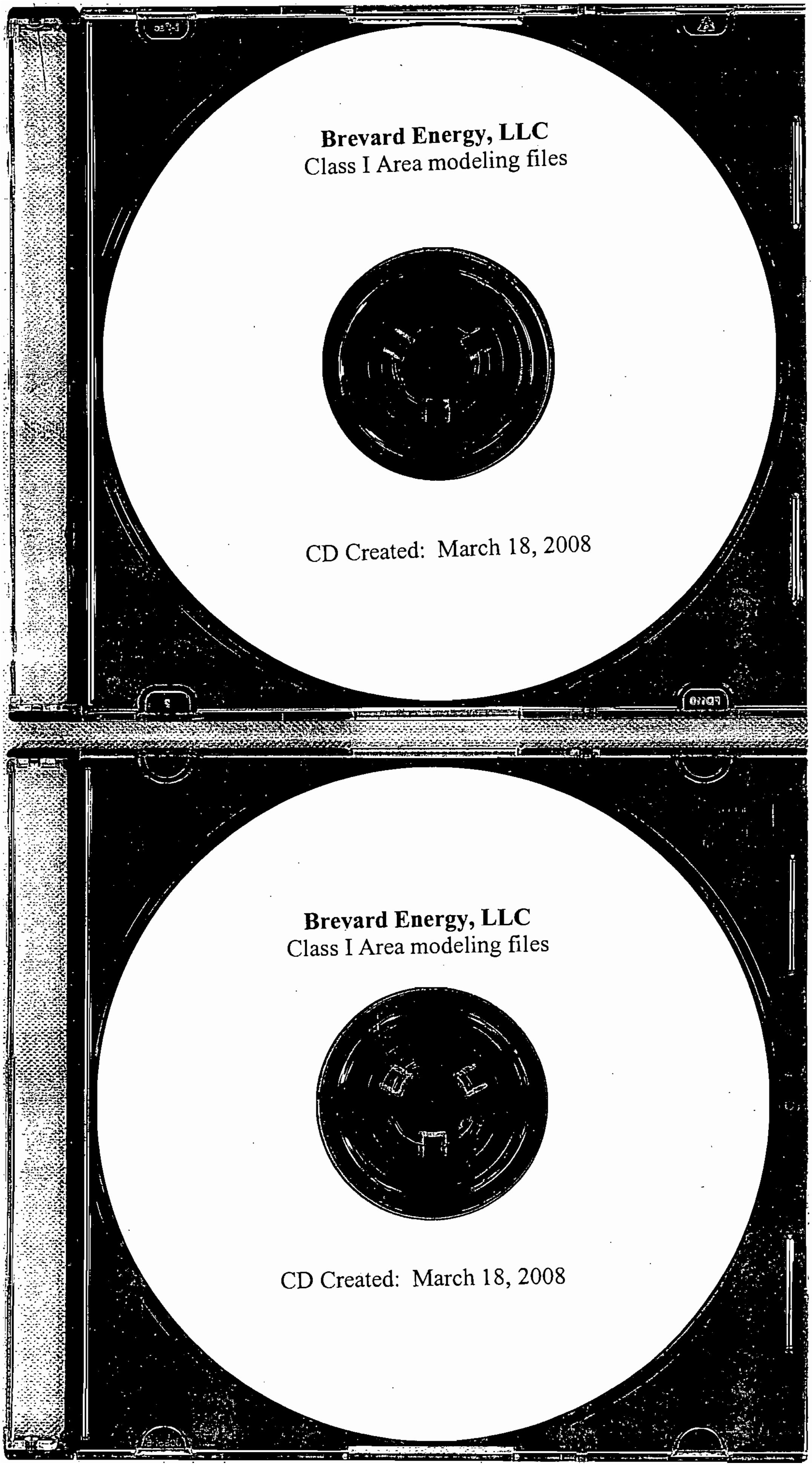
Facility ID	Facility	Owner/Company Name	East (m)	North (m)	Stack Ht (m)	Exit Temp (K)	Vel (m/s)	Diam (m)	PM_{10} (g/s)	NO_X (g/s)	SO2 (g/s)	Distance (km)
0950022	MCI01	Metro Crematory Inc.	446900	3158800	5.5	699.7	10.4	0.49		0.062		72.19
0950182	CFF01	Central Florida Fuels, Inc.	446000	3160600	9.1	519.1	7.6	0.21		0.072	0.076	73.53
0950168	JPBS01	Jancy Pet Burial Service	440300	3181300	4.9	1045.8	10.6	0.38		0.328		86.62
0950230	CRC01	Complete Resources Co.	461710	3143120	4.3	730.2	65.8	0.21		0.100		55.10
0090069	BCBC01	Brevard County Board of Commisioners	516300	3140400	7.0	1033.0	8.3	0.27		0.428		0.48
0950068	MM01	Monterey Mushrooms	441380	3180200	10.7	408.0	23.5	0.40		0.900	0.819	85.15
0950203	OCL01	Orlando Cogen Limited, L.P.	459500	3146100	35.1	388.6	19.8	4.79	1.300	8.700	0.355	57.52
0950190	FGCO01	Florida Gas Transmission Company	451800	3154800	8.5	588.6	29.3	0.49		24.400	0.400	66.49
0950190	FGCO02	Florida Gas Transmission Company	451802	3154800	12.2	560.8	50.3	0.43	0.127	1.336	0.060	66.49
0950190	FGCO03	Florida Gas Transmission Company	451804	3154800	18.6	790.8	17.5	1.83	0.063	0.718	0.239	66.49
0950276	WMP01	Woodlawn Memorial Park and Funeral	450570	3156650	5.5	910.8	4.8	0.52		0.074		68.11
1270006	DWP01	D&W Paving	496400	3233300	6.1	352.4	7.3	0.76		0.151		94.94
1270011	HHS01	Halifax Humane Society	494810	3233160	7.3	1033.0	2.4	0.37		0.126		95.15
7775087	INDE01	Independence Excavatinc, Inc.	463690	3144260	0.0		0.0	0.00	0.509			53.19
0950136	TCI01	Trailer Conditioners, Inc.	464100	3144300	6.0	294.1	0.3	0.91		0.076		52.78
0950136	TCI02	Trailer Conditioners, Inc.	464102	3144300	6.0	294.1	0.3	0.91	0.383			52.78
0090006	FPL01	Florida Power & Light (PCC)	522900	3148900	121.0	414.7	22.4	5.70		456.200	2772.000	10.35
0950031	OPC01	Orlando Paving Company	463270	3146010	8.8	435.8	27.1	0.91		3.137	2.948	53.76
0950149	GMG01	Greenbrier Memorial Gardens	444230	3180710	7.6	1033.0	6.4	0.69		0.290	0.214	82.89
1270074	CCI01	Crane Cams Inc.	491900	3231600	3.0	366.3	0.0	0.30		0.054		94.36
0950251	ACC01	ACCO	445330	3174150	9.1	505.2	3.1	0.40		0.655	0.233	78.92
0950184	GOAA01	Greater Orlando Aviation Authority	467300	3145000	4.6	388.6	3.9	0.30		113.020	7.434	49.65
0950184	GOAA02	Greater Orlando Aviation Authority	467302	3145000	7.6	410.8	6.7	0.46		0.655	1.361	49.65
0950184	GOAA03	Greater Orlando Aviation Authority	467304	3145000	10.7	1144.1	9.8	0.61		0.094	0.079	49.64
1270010	HMC01	Halifax Medical Center	494800	3230100	10.1	441.3	1.8	0.91		0.900		92.18
0950169	STI01	Stericycle Inc.	449500	3168000	13.7	505.2	21.3	0.61	0.168	0.592		72.63
0090196	REF01	Reliant Energy Florida, L.L.C.	521500	3151600	91.4	435.8	26.2	4.27	31.800	168.400	987.100	12.01
0090196	REF02	Reliant Energy Florida, L.L.C.	521502	3151600	91.4	444.1	32.7	4.30	34.093	180.163	1056.391	12.01
0090008	OUC01	Orlando Utilities Commission	521300	3151700	11.0	830.2	33.3	3.77	2.600	48.800	36.000	12.02
0090008	OUC02	Orlando Utilities Commission	521302	3151700	15.5	813.6	26.1	6.74	28.600	92.200	109.800	12.02
0950088	KBN01	Kerry's Bromeliad Nursery FKA Fernlea	451100	3167700	12.2	449.7	9.1	0.76		1.444	8.662	71.03
0950088	KBN02	Kerry's Bromeliad Nursery FKA Fernlea	451102	3167700	4.6	449.7	11.0	0.76			17.400	71.03
0950058	ABC01	A1 Block Corp.	462500	3155000	16.8	299.7	11.0	1.22		0.126		56.14
0950050	HCC01	Hydro Conduit Corp.	454600	3167800	3.4	456.3	293.5	0.03			0.214	67.85
7775075	ARM01	Angelo's Recycled Materials, Inc.	454870	3167860	4.6		0.0	0.21		2.301		67.63
0950156	OPC01	Orlando Paving Co.	455800	3167100	9.4	435.8	31.1	1.04		4.675	5.342	66.47
0950078	FL01	Frito-Lay	459550	3161010	15.2	588.6	3.7	1.07		0.746		60.74
0090043	ASO01	Astrotech Space Operations, Inc.	517400	3155700	2.1	298.0	15.5	0.15		0.057		15.14

Background Emission Sources Provided by Florida DEP

Facility ID	Facility	Owner/Company Name	East (m)	North (m)	Stack Ht (m)	Exit Temp (K)	Vel (m/s)	Diam (m)	PM_{10} (g/s)	NO_X (g/s)	SO2 (g/s)	Distance (km)
1270117	VSWM01	Volusia Solid Waste Management Division	490210	3222890	7.0	688.6	3.1	0.24		1.361	0.832	86.49
1270117	VSWM02	Volusia Solid Waste Management Division	490212	3222890	15.2	1255.2	0.2	3.66		2.538	0.643	86.49
0950063	FH01	Florida Hospital	463800	3160700	11.0	377.4	8.3	0.76		0.454		56.65
0950137	OUC01	Orlando Utilities Commission	483500	3150600	15.2		0.0	1.07		1.673	5.333	34.73
0950137	OUC02	Orlando Utilities Commission	483502	3150600	48.8	414.7	22.9	5.79	29.484	100.830	67.410	34.73
0950137	OUC03	Orlando Utilities Commission	483504	3150600	167.6	324.1	23.5	5.79	10.801	739.762	1938.680	34.73
1270003	NSBU01	New Smyrna Beach Utilities	505760	3214800	8.8		0.0	0.70		5.124		75.04
0950014	FBCD01	Florida Power Corp.	475200	3156800	12.5	788.6	41.8	2.50		19.013	31.411	44.61
1270034	MFC01	Mid Florida Crematory	474500	3211000	4.9	644.1	4.3	0.52		0.053		82.13
1270004	NSBP01	New Smyrna Beach Power Plant	507700	3209800	9.1	533.0	26.5	0.30		4.904	0.252	69.82
1270004	NSBP02	New Smyrna Beach Power Plant	507702	3209800	10.7	699.7	55.2	0.15		31.269	1.621	69.82
1270004	NSBP03	New Smyrna Beach Power Plant	507704	3209800	12.2	644.1	100.6	0.37		18.778	0.971	69.82
1270164	UCNS01	Utilities Commission, City of New Smyrna	506670	3209540	12.8	751.9	20.4	4.11	5.140	27.216	5.192	69.70
1270028	FPCO01	Florida Power Corp.	467500	3197200	13.7	838.6	52.9	5.39	23.286	416.550	740.868	75.05
1270028	FPCO02	Florida Power Corp.	467502	3197200	15.2	834.7	53.1	4.19	7.560	147.096	559.432	75.05
1270009	FPL01	Florida Power & Light (PSN)	468300	3190300	38.1	377.4	21.4	5.79	10.080	347.250	53.728	69.43
1270009	FPL02	Florida Power & Light (PSN)	468302	3190300	92.0	421.9	46.7	2.90		92.860	571.715	69.43
1270085	SIS01	Stationary Incinerator Services	506500	3201800	1.8	299.7	7.0	0.40		2.520	0.063	62.08
1170027	FEI01	Florida Extruders International Inc.	471100	3186300	11.0	1255.2	20.4	0.76		0.635		64.62
1270020	FPCB01	Florida Power Corp.	473400	3193300	12.5	788.6	40.8	3.75	18.246	197.287	156.238	68.26
1170030	OPC01	Orlando Paving Co.	471800	3184700	10.7	394.1	23.1	1.52	0.879	2.772	2.923	62.99
1170018	DC01	Datamax Corp.	474800	3181300	7.6	294.1	8.2	0.85		0.050		58.47

APPENDIX G-7

CLASS I AREA ANALYSIS
INPUT AND OUTPUT FILES


Brevard Energy, LLC
Class I Area modeling files
CD Created: March 18, 2008
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