CDM

ORIGINAL

Solid Waste Authority of Palm Beach County
North County Resource Recovery Facility Site

Unique & Innovative Facilities

- Use landfill gas to recycle wastewater and lime sludges for beneficial use as fertilizer and quicklime
- Concurrently eliminates sludge disposal to fragile environment

Lime Recalcination and Biosolids Pelletization Facilities

Request for an Amendment Leading to a Modification of Power Plant Site Certification PA84-20

Second Revision to Include Project Updates and Information Requested in FDEP Letter Dated April 8, 2003

October 2003

Volume III: Application Text for Modification of PSD Air Permit No. PSD-FL-108

2678-39378-064

Siting File

SOLID WASTE AUTHORITY OF PALM BEACH COUNTY
NORTH COUNTY RESOURCE RECOVERY FACILITY SITE

REQUEST FOR AN AMENDMENT LEADING TO A MODIFICATION OF POWER PLANT SITE CERTIFICATION PA84-20

Second Revision to Include Project Updates and Information Requested in FDEP Letter Dated April 8, 2003

LIME RECALCINATION AND BIOSOLIDS PELLETIZATION FACILITIES

Volume III of III

Submitted to:
FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
SITING COORDINATION OFFICE
TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301

Prepared for:
Solid Waste Authority of Palm Beach County
7501 North Jog Road
West Palm Beach, Florida 33412

RECEIVED
OCT 22 2003
BUREAU OF AIR REGULATION

Prepared by:
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West Palm Beach, Florida 33406

October 2003

10/14/03
Alex H. Makled, P.E., DEE
Florida Registered Engineer
Engineer Number 45935

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2.0 Air Quality Regulations

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Section 1
Project Overview and Summary of Air Quality Impacts

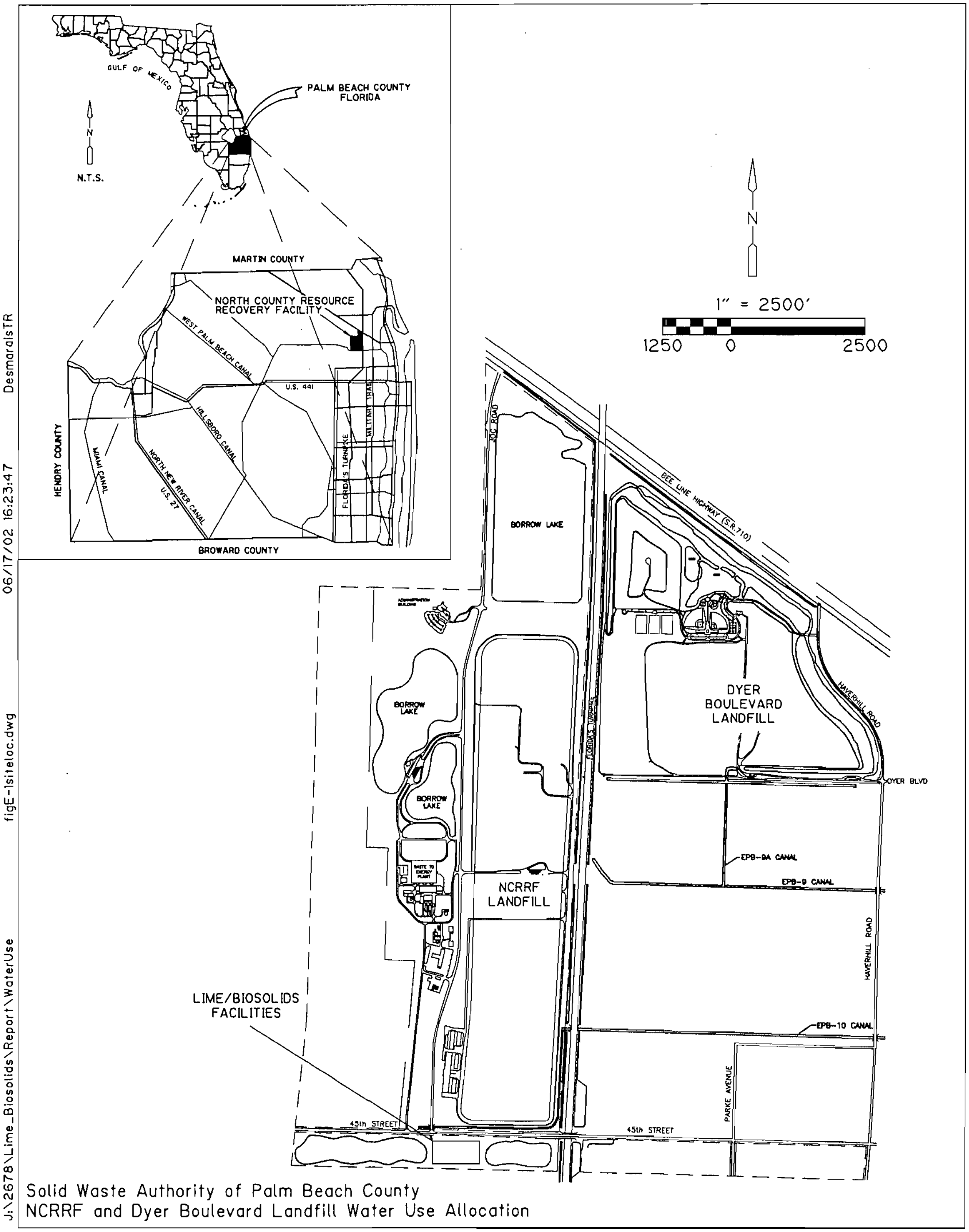
1.1 Introduction and Site Location

The Solid Waste Authority of Palm Beach County (SWA) is responsible for processing and disposing of the municipal solid waste collected in all thirty-seven Palm Beach County municipalities and the unincorporated area of Palm Beach County.

SWA currently operates a 2,000 ton per day Waste-to-Energy (WTE) plant, at the North County Resource Recovery Facility (NCRRF) at 7501 North Jog Road in West Palm Beach. The area location of the NCRRF is shown in **Figures 1-1 and 1-2**.

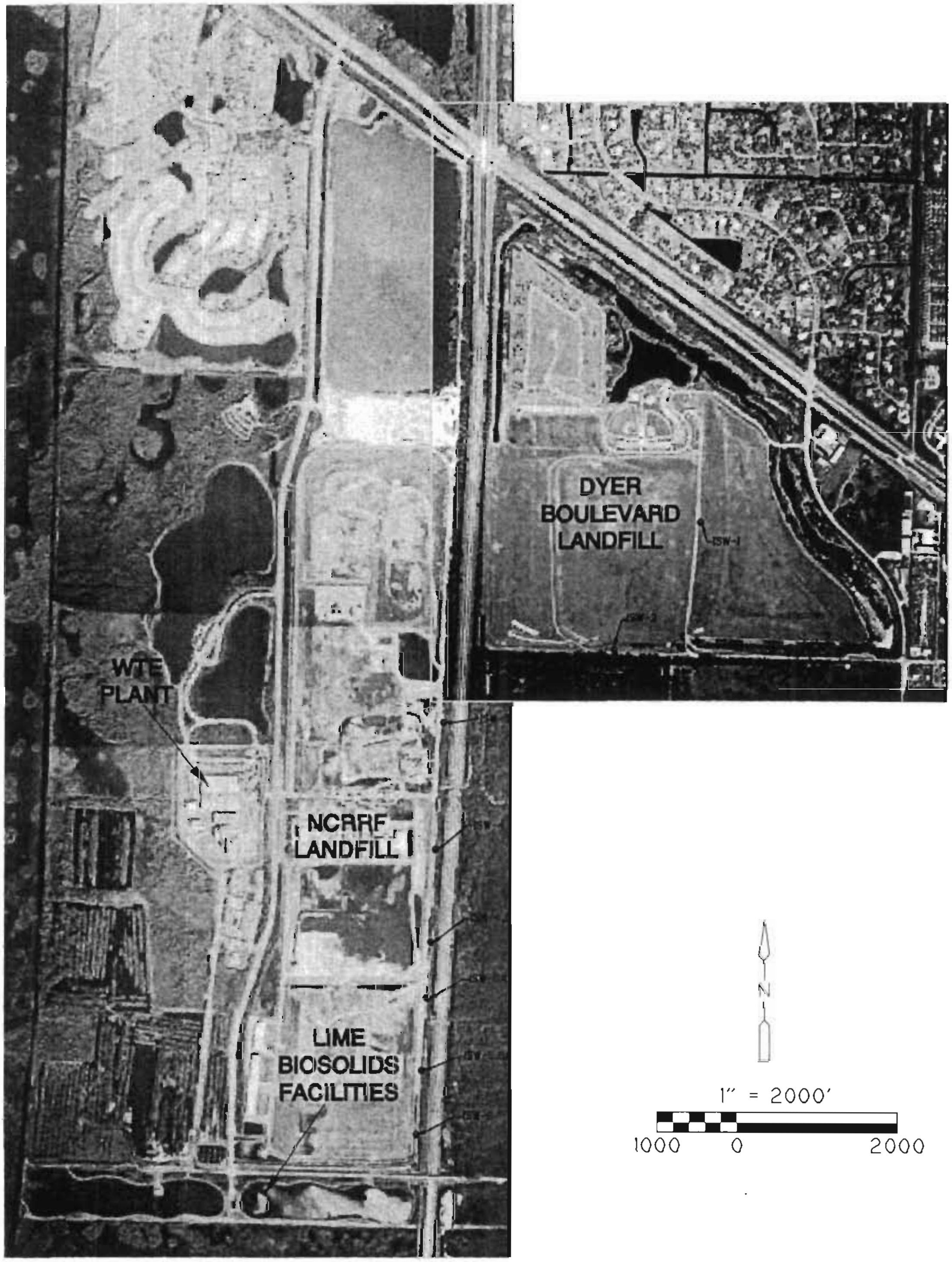
In addition to the WTE, the NCRRF contains other air emissions sources: the Class I and III Landfills, ash handling facilities, lime and chemical storage silos, Materials Recycling Facility, auto spray booth, and Composting Facility. These are primarily insignificant or unregulated air emissions sources themselves. However, because they are on the same site as the NCRRF, all of the emissions units at the NCRRF are together regulated as a "major" source of air pollutants under Chapters 62-212.400, Florida Administrative Code (FAC) (Prevention of Significant Deterioration (PSD), and 62-213, FAC (Operating Permits). The NCRRF has PSD Permit No. PSD-FL-108, A, B, C and D; and Title V Air Operating Permit No. 0990234-003-AV. This volume presents the text of the application for the PSD Permit modification for the addition of two new facilities at the NCRRF. Volume II contains the consolidated application forms for both the PSD Permit and Title V Permit modifications for the two new facilities.

The Lime Recalcination Facility (LRF) and Biosolids Pelletization Facility (BPF) are proposed to be located on SWA's 15-acre parcel immediately across 45th Street (to the south) from the rest of the NCRRF. Although this parcel is across a publicly owned right-of-way from the rest of SWA's property, it was included as part of the NCRRF in the initial Power Plant Site Certification (PPSA No. PA84-20). The LRF will combust landfill gas (with natural gas as a back-up fuel) in a high-temperature rotary kiln to convert lime sludge, a waste product from water treatment plants, to quicklime, which has market value. The LRF will be designed to produce up to 100 dry tons per day (dtpd) of finished quicklime. The landfill gas will come from SWA's Class I Landfill on the NCRRF across 45th Street. The BPF will also combust landfill gas (with natural gas as a back-up fuel) in two 200 wet tons per day (wtpd) rotary dryers (400 wtpd total) to dry sewage sludge, and then screen the dried sludge into marketable fertilizer pellets. The preliminary site plan for both facilities is shown in **Figure 1-3**. Both of these projects have environmental benefits because:



Solid Waste Authority of Palm Beach County
NCRRF and Dyer Boulevard Landfill Water Use Allocation

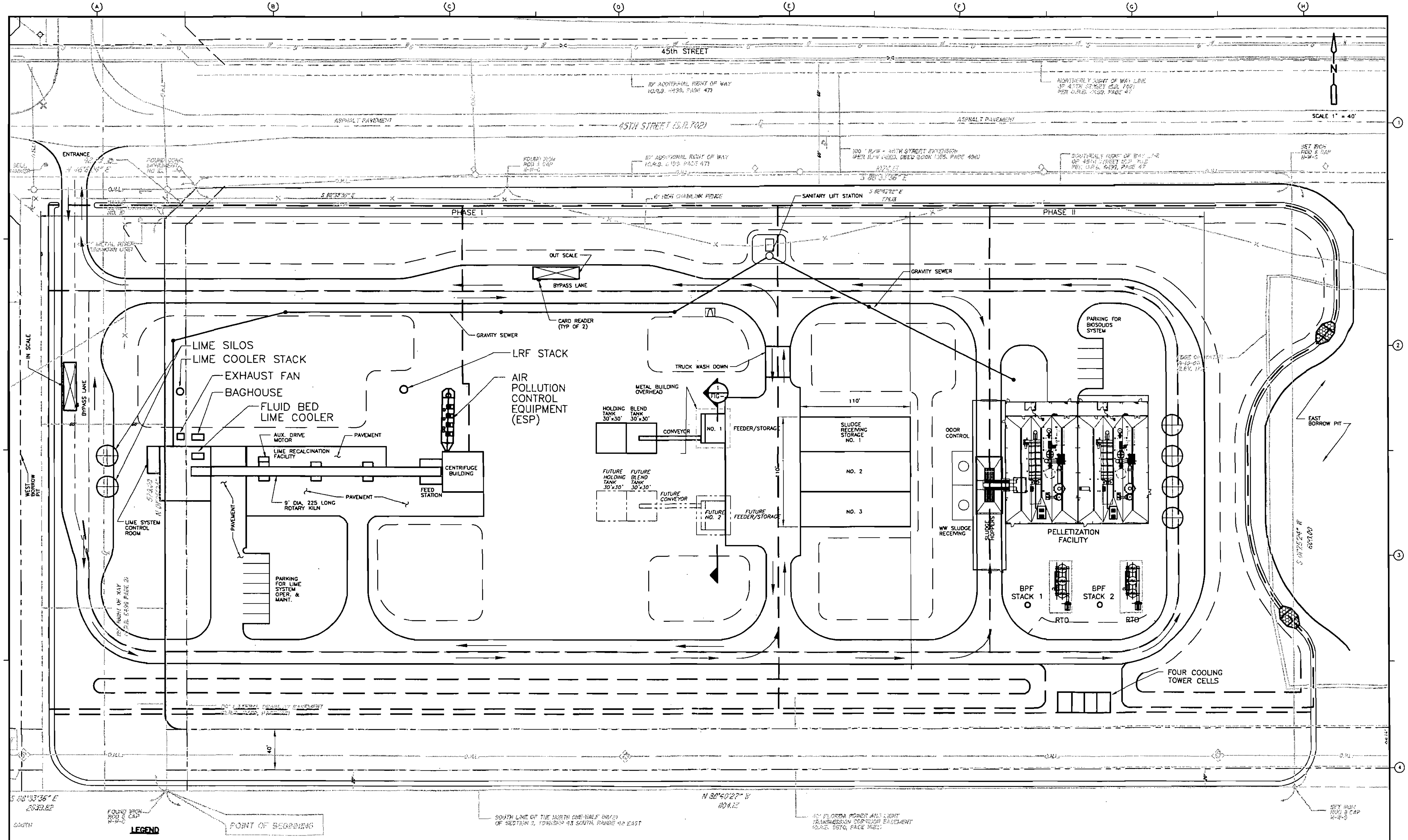
Figure 1-1
Site Location Map



Flight date: 4/15/98

J:\2678\Lime_Biosolids\Report\WaterUse\ fig1-2aerial.dwg 05/16/02 DesmaraisTR

Figure No. 1-2
Aerial Photograph



LEGEND

⬮1 PROPOSED SOIL BORING LOCATIONS

* 20' DRAINAGE EASEMENT TO BE ABANDONED AS PART OF RIGHT OF WAY RELOCATION AGREEMENT

L:\2678\39373\FIGURES\ FIGURE1-3 07/31/03 16:48:11 0:37:31 gerhj

NOT TO BE USED
FOR CONSTRUCTION

DAVID PRAH, P.E.
NO. 43393

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: J. HILL
DRAWN BY: D. AUST
SHEET CHK'D BY: D. PRAH
CROSS CHK'D BY: M. LEWIS
APPROVED BY: D. PRAH
DATE: JULY 2003

CDM Camp Dresser & McKee Inc.
2310 Maitland Center Parkway, Suite 300
Maitland, Florida 32751
Tel: 407-660-2552
Cert. of Authorization No. 20

SOLID WASTE AUTHORITY OF PALM BEACH COUNTY
7501 NORTH JOG ROAD

LIME RECALCINATION AND
BIOSOLIDS PELLETIZATION FACILITY

PRELIMINARY SITE PLAN

PROJECT NO. 2678-39373
FILE NAME: FIGURE1-3.DWG

SHEET NO.
FIGURE 1-3

- They provide for re-use and recycling of materials that are currently disposed of as waste, thereby preserving resources and extending the life of existing waste disposal space; and

- They reclaim and use the energy in collected landfill gas, which is currently being burned off in a flare.

1.2 Description of Proposed New Facilities

1.2.1 Lime Recalcination Facility

The LRF will combust 33 million British Thermal Units per hour (MMBtu/hr) of landfill gas (and natural gas) in a high-temperature rotary kiln to convert lime sludge, a waste product from water treatment plants, to quicklime, which can be sold, or re-used at water treatment plants. This process, called recalcination, will convert the lime sludge, made up primarily of calcium carbonate ($CaCO_3$), into quicklime (CaO), by driving off carbon dioxide (CO_2) in the kiln at a temperature of approximately 1,250° C. The LRF will be designed to accept up to 172 dtpd of water treatment plant lime sludge (at an average of 65 percent solids) and produce up to 100 dtpd of finished quicklime. The hot combustion gases will flow up, countercurrent to the downward flowing lime, through the slightly inclined rotary kiln. The air emissions points will be the feed end of the kiln (which is also the kiln exhaust), the cross-bar lime cooler, and the dry finished lime storage silo. Because lime sludge will be delivered to the facility wet, there will be no air emissions from the sludge handling. **Figure 1-4** illustrates the process flow.

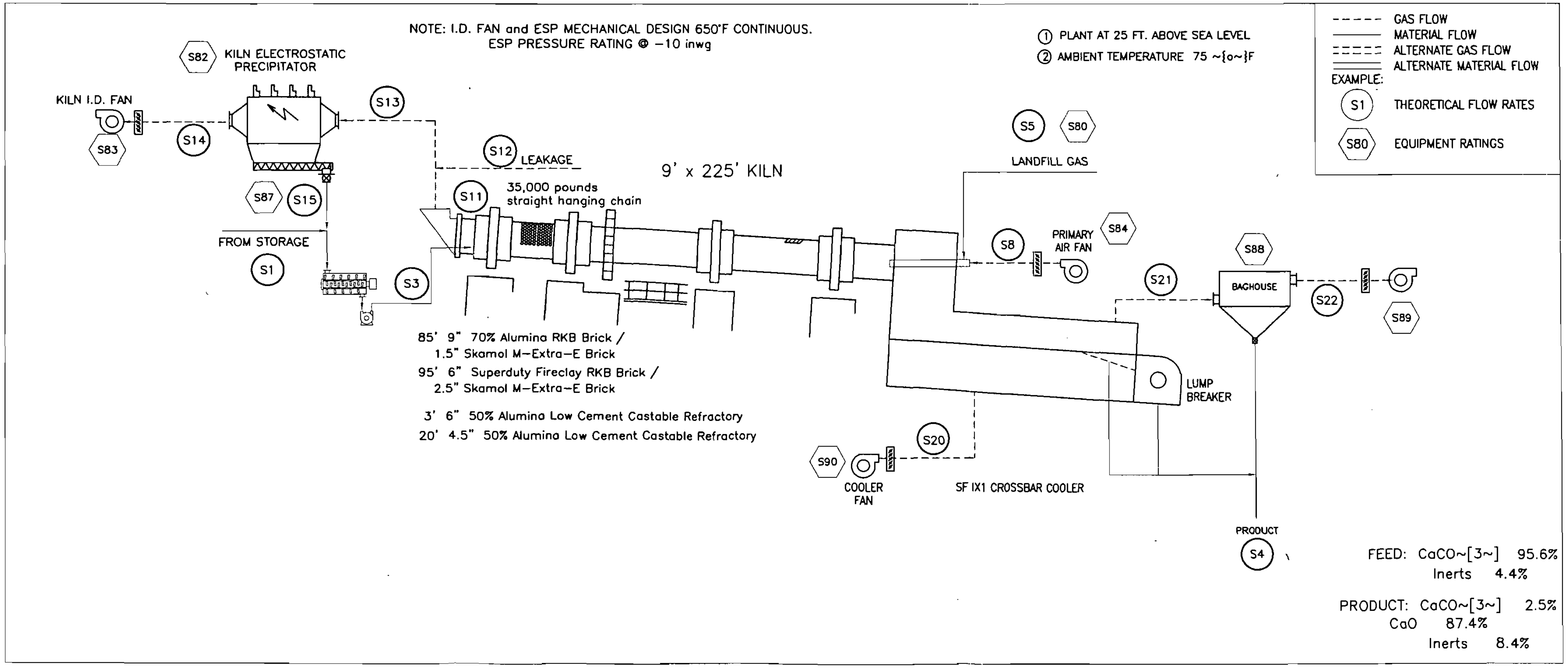
The rotary lime kiln will include a low-NO_X burner for control of nitrogen oxide (NO_X) emissions from the flame, and an electrostatic precipitator (ESP) on the kiln exhaust, for the control of particulate matter (PM) emissions. The LRF will also have a bag house for control of PM emissions from the cross-bar lime cooler, and fabric filters for control of PM emissions from the lime product storage silos. The locations of these sources are shown on Figure 1-3.

1.2.2 Biosolids Pelletization Facility

The BPF will combust 48 MMBtu/hr of landfill gas (and natural gas) in two 200-wtpd rotary dryers (24 MMBtu/hr each) to dry sewage sludge, and then screen the dried sludge into marketable fertilizer pellets. Hot combustion gases (about 850° F at the dryer inlet) will flow through a rotating drum with the biosolids, driving off water and volatile organic compounds (VOCs). At the dryer exhaust end, a preseparator and polycyclone will remove the pellets and heavier dust particles from the gas stream and send these to screens for size sorting. The exhaust gases, containing products of combustion (NO_X, carbon monoxide (CO), and sulfur dioxide (SO_2)), PM, and VOCs, will then go through a tray condenser and venturi scrubber. These devices will remove PM, and some SO_2. The gases will then go through a regenerative thermal oxidizer (RTO) to combust the VOCs before exiting the exhaust stack. **Figure 1-5** illustrates the process flow.

SOLID/LIQUID/GAS	UNITS	S1	S3	S4	S8	S11	S12	S13	S14	S15	S20	S21	S22	S82	S83	S84	S87	S88	S89
MASS FLOW – SOLID	LB/HR	14354.8	16437.2	8332.7	0.0	2083.2	0.0	2083.2	0.6	2082.5	0.0	0.0	0.0	4243.3	0.6	0.0	4165.1	4553.9	0.9
MASS FLOW –LIQUID	LB/HR	8798.1	8798.0	0.0						0.0							0.0		
MASS FLOW – GAS	LB/HR				4056.5	47741.1	6000.0	53741.1	53741.1		34642.2	10080.0	10080.0	53846.6	55210.7	5254.1		34642.2	34642.2
MASS FLOW – TOTAL	LB/HR	23152.9	25235.3	8332.7	4056.5	49824.3	6000.0	55824.3	53741.8	2082.5	34642.2	10080.0	10080.0	58089.9	55211.4	5254.1	4165.1	39196.1	34643.1
VOLUME	ACFM				853.9	19725.9	1349.7	21355.9	21043.0		7531.0	1763.3	1785.1	24752.6	25379.7	1181.9		13282.4	13282.4
VOLUME	NCFM				837.7	10606.6	1239.0	11850.3	11850.3		7153.7	2081.6	2081.6	11873.6	12174.4	1085.0		7153.7	7153.7
VOLUME	GAL/MIN																		
TEMPERATURE	°F	100.0	110.8	140.0	75.0	450.0	75.0	417.5	402.5	402.5	90.0	125.0	125.0	550.0	550.0	75.0	550.0	425.0	425.0
STATIC PRESSURE	INWG				28.0	−1.5	0.0	−3.5	−4.5		26.0	165.5	158.5	−5.5	−5.5	0.0		−12.0	−12.0
DENSITY	LB/ACF				0.0792	0.0403	0.0741	0.0419	0.0426		0.0767	0.0953	0.0941	0.0363	0.0363	0.0741		0.0435	0.0435
DENSITY	LB/GAL																		
DUST LOAD	GR/ACF				0.00	12.32	0.00	11.38	0.00		0.00	0.00	0.00	20.00	0.00	0.00		40.00	0.01
H_2O DEW POINT	°F				0.00	166.45	0.00	161.52	161.42		0.00	0.00	0.00	161.32	161.32	0.00		0.00	0.00
COMPOSITION H_2O	VOL % H_2O				0.00	37.78	0.00	33.81	33.81		0.00	0.00	0.00	33.81	33.81	0.00		0.00	0.00
COMPOSITION O_2	VOL % O_2				20.88	1.31	20.88	3.37	3.37		20.88	20.88	20.88	3.37	3.37	20.88		20.88	20.88

FUEL STREAMS	UNITS	S5	S80
MASS FLOW	LB/HR	5878.10	7641.52
HEAT RELEASE	MMBTU/HR	30.4638	39.6030
DENSITY LIQUID	LB/GAL		
DENSITY GAS	LB/NCF	0.0707	0.0707
FLOWRATE LIQUID	GAL/MIN		
FLOWRATE GAS	NCFM	1385.69	1801.40
FLOWRATE SOLID	DRY STPH		
	WET STPH		
TEMPERATURE	°F	60.0	60.0
DRY LHV	BTU/LB	5182.6	5182.6
SURFACE MOISTURE	% H_2O	0.00	0.00
ULT ANALYSIS C	%	31.14	31.14
ULT ANALYSIS H	%	6.15	6.15
ULT ANALYSIS O	%	38.32	38.32
ULT ANALYSIS H_2O	%	0.00	0.00
ULT ANALYSIS N	%	24.39	24.39
ULT ANALYSIS S	%	0.00	0.00
ULT ANALYSIS ASH	%	0.00	0.00



NOTE: I.D. FAN and ESP MECHANICAL DESIGN 650°F CONTINUOUS.
ESP PRESSURE RATING @ −10 inwg

① PLANT AT 25 FT. ABOVE SEA LEVEL
② AMBIENT TEMPERATURE 75 ~{o~}F

FEED: CaCO~[3~] 95.6%
Inerts 4.4%

PRODUCT: CaCO~[3~] 2.5%
CaO 87.4%
Inerts 8.4%

SOURCE:
FFE MINERALS USA INC.

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DAVID PRAH, P.E.
NO. 43393

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: J. HILL
DRAWN BY: M. BANDA
SHEET CHK'D BY: D. PRAH
CROSS CHK'D BY: J. HILL
APPROVED BY: D. PRAH
DATE: SEPTEMBER 2002

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SOLID WASTE AUTHORITY
OF PALM BEACH COUNTY
7501 NORTH JOG ROAD

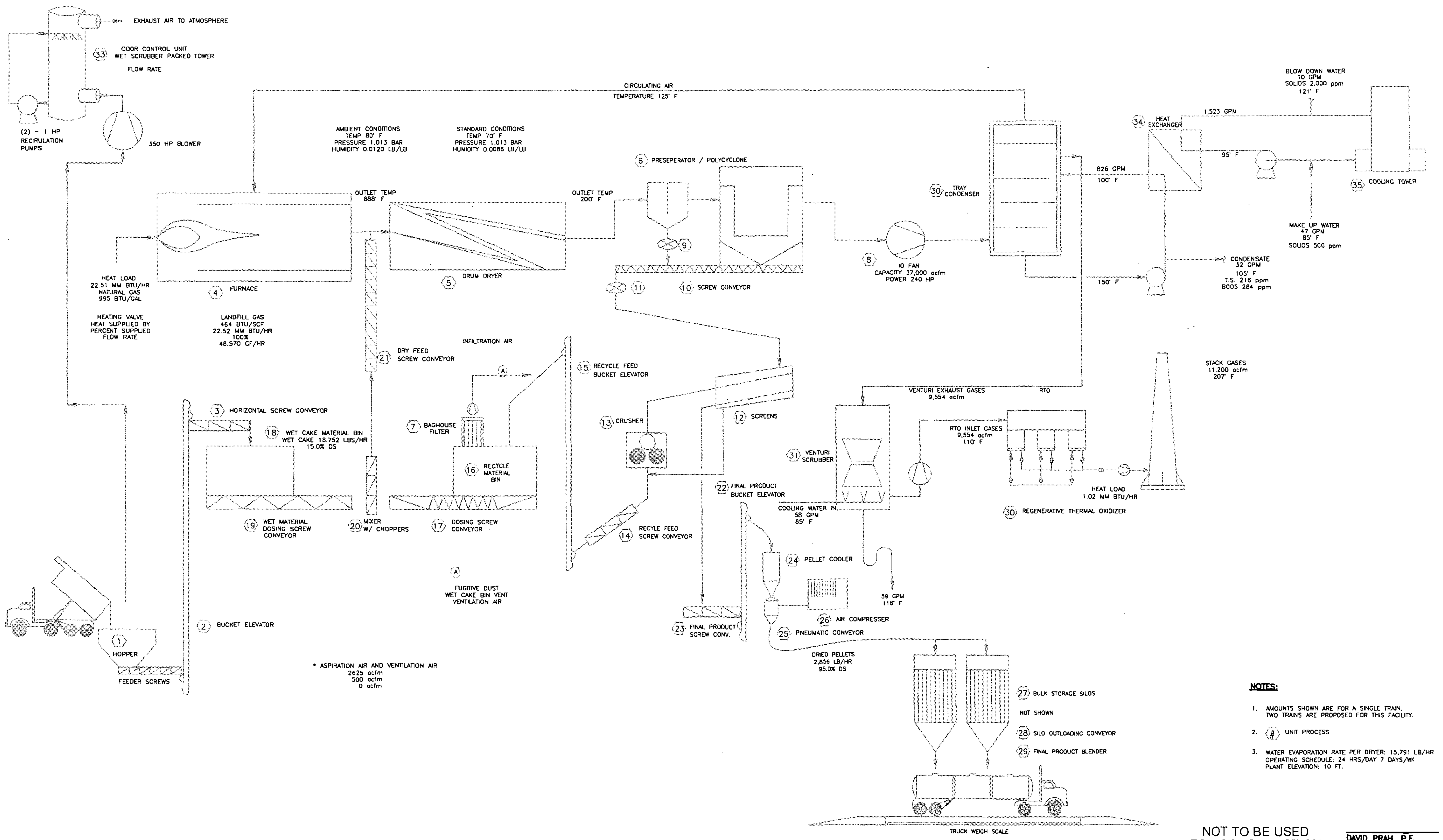
LIME RECALCINATION FACILITY

ENERGY AND MATERIAL BALANCE
DIAGRAM

PROJECT NO. 2678-33752
FILE NAME: FIGURE-1.dwg

SHEET NO.
Figure 1-4

L:\2678\33752\30p\Report\ FIGURE-1 09/23/02 14:16:50 4:15:18 bandam



NOTES:

1. AMOUNTS SHOWN ARE FOR A SINGLE TRAIN. TWO TRAINS ARE PROPOSED FOR THIS FACILITY.
2. ⟨#⟩ UNIT PROCESS
3. WATER EVAPORATION RATE PER DRYER: 15,791 LB/HR
   OPERATING SCHEDULE: 24 HRS/DAY 7 DAYS/WK
   PLANT ELEVATION: 10 FT.

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FOR CONSTRUCTION

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NO. 43393

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: J. HILL
DRAWN BY: J.L. GERTH
SHEET CHK'D BY: D. PRAH
CROSS CHK'D BY: M. LEWIS
APPROVED BY: D. PRAH
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SOLID WASTE AUTHORITY OF PALM BEACH COUNTY
7501 NORTH JOG ROAD

LIME RECALCINATION AND BIOSOLIDS PELLETIZATION FACILITY

BIOSOLIDS PROCESS FLOW DIAGRAM AND MASS & HEAT BALANCE SCHEMATIC PER TRAIN

PROJECT NO. 2678-39373
FILE NAME: FIGURE3-2.DWG

SHEET NO.
FIGURE 1-5

L:\2678\39373\FIGURES\ FIGURE3-2 07/31/03 14:38:51 5.47.20 gerthj

Each biosolids dyer train will have the following additional air emissions sources:

- a recycle material bin exhaust vent;
- exhaust vents on two fertilizer pellet storage silos; and
- a cooling tower.

All of these are potential sources of PM emissions. The recycle bin and storage silo vents will have fabric filters to control the PM emissions. The locations of these sources are shown on Figure 1-3.

1.2.3 Landfill Gas Flares

The Class I Landfill would supply the approximately 2,700 standard cubic feet per minute (scfm) of landfill gas needed by the LRF and BPF at their design capacities (81 MMBtu/hr of landfill gas with a heat content of 500 Btu/scf). The Class I Landfill is shown in Figure 1-2. It extends from 45th Street to the extension of Dyer Road (north of the scale houses). The gas would be provided to the LRF and BPF projects through a pressurized line under 45th Street.

The Class I Landfill has an existing landfill gas collection and control system that combusts the gas in an 1,800-scfm open flare. This flare, and its associated 1,800-scfm blower, is currently operating at very close to their capacity. Independently from the LRF and BPF projects, SWA is proposing to replace the 1,800-scfm Class I Flare with a new 3,500-scfm Class I Flare as soon as possible (in 2004). The 3,500-scfm Class I Flare would be installed whether or not the LRF and/or BPF projects went forward. Because of the urgent need for this flare, SWA is requesting that the Florida Department of Environmental Protection (FDEP) issue a separate minor preconstruction permit for this flare, rather than include it in the approval process for the major PSD modification for the LRF and BPF projects. This request is based on the assumption that the 3,500-scfm Class I Flare meets the requirements in Rule 62-212.400(2)(a)2.c., FAC for exemption from major source PSD permitting (see discussion below).

Class I Landfill build-out conditions, as depicted in Figure B-3 (Volume II), were used to determine maximum Class I Landfill gas production. The 3,500-scfm Class I Flare will not be sufficient to handle all the gas produced by the Class I Landfill at build-out. The capacity of this flare could be reached sometime between 2010 and 2015. Two more flares, a 2,000-scfm Flare and a 1,000-scfm Flare would be needed at the Class I Landfill by about 2020, the approximate build-out year. The 6,500-scfm capacity of the three flares together (and without the LRF and/or BPF) could handle the expected maximum Class I Landfill gas generation rate of about 6,000 scfm. In addition, the three flares could be used in combinations of one or two to handle smaller gas flows as the LRF and BPF come on-line (between about 2004 and 2007), and are drawing off the 2,700 scfm of gas that these facilities need. All three flares would be open flares, installed near each other at a flare station just north of the Composting Facility (see Figure 1-2).

The 3,500-scfm Class I Flare is proposed to be exempt from major source PSD permitting, because it qualifies as a "pollution control project." Rule 62-212.400(2)(a) 2., FAC exempts "pollution control projects" from PSD permit application requirements. Paragraph c. of this section exempts emissions from landfill gas collection and control projects "that would occur solely as a result of a project undertaken for the purpose of complying with the non-methane organic compound emission reduction requirements of 40 Code of Federal Regulations (CFR) Part 60, Subpart Cc or WWW, adopted and incorporated by reference at Rule 62-204.800, FAC, provided the owner or operator demonstrates to the Department that such increase would not cause or contribute to a violation of any ambient air quality standard, maximum allowable increase, or visibility limitation."

Since the 3,500-scfm flare on the Class I Landfill would be installed solely to meet the requirements of the New Source Performance Standards for Municipal Solid Waste Landfills, referenced in the quote above, and would not be functionally linked to the LRF or BPF projects, it can qualify for the PSD exemption. Qualifying for the exemption also requires, however, that the Flare's air pollutant emissions not cause or contribute to a violation of any ambient air quality standard, maximum allowable increase (PSD Increment) or visibility limitation. FDEP offered guidance on this in a letter dated April 8, 2003, to SWA, based on a review of this application, submitted in January, 2003: "No modeling of the new 3,500 scfm flare was provided. . . The applicant should demonstrate through air quality dispersion modeling that any pollutants that would become PSD significant because of the addition of the proposed 3,500 scfm flare emissions will not violate any ambient air quality standard, maximum allowable increase or visibility limitation for these pollutants. Combining emissions from the LRF and BPF projects would result in PSD significant impacts for the pollutants CO (69.5+118 TPY), NO_X (70.9+21.8 TPY) and PM_{10} (12+5.6 TPY)." (letter dated April 8, 2003, from Steven L. Palmer, P.E., Siting Coordination Office, FDEP, to Marc C. Bruner, Ph.D., Director of Planning and Environmental Programs, SWA) For these reasons, the dispersion modeling (see Section 1.3, below) in this revised PSD Permit modification application includes the air pollutant emission increases for the 3,500-scfm Class I Flare, in addition to those for the LRF and BPF.

The emissions from the additional 1,000-scfm and 2,000-scfm Class I flares have also been included in the dispersion modeling. The 1,000-scfm and 2,000-scfm flares have been included:

- to determine if they can also meet the conditions of the exemption from PSD permitting;
- to address concerns raised by FDEP, both for this current LRF and BPF project, and when permitting was done for the existing 1,800-scfm flare (March, 1999), about

how much landfill gas would be generated at landfill build-out, and about granting incremental approvals for each landfill gas collection and control system expansion; and

- to give SWA maximum flexibility on when they could install the 1,000-scfm and 2,000-scfm flares, and on how to operate the Class I Landfill gas collection and control system. The current proposed plan is to install the 1,000-scfm and 2,000-scfm flares at about the same time as the LRF and BPF. Each flare has a turndown ratio of 10:1 (that is, they can operate at flows down to 1/10th of their maximum design flow rate). Having a range of flare sizes also available at the Class I Landfill Flare Station would allow SWA to combust possibly large swings in leftover gas flow to the flares as the LRF and BPF come on- (and off-) line. The three flares could be used in any combination of one, two or three to handle fluctuating flows, and all three together could handle the Class I Landfill expected build-out flow by themselves, if the LRF and BPF projects were not built.

All three flares, therefore, the immediately needed 3,500-scfm Class I flare, as well as the planned 1,000-scfm and 2,000-scfm flares have been included in the dispersion modeling to evaluate their combined air pollutant concentration impacts with those of the LRF and BPF, and to determine if they qualify for the PSD permitting exemption.

1.3 Air Quality Impact Assessment

An air quality impact assessment was conducted for criteria air pollutant emissions from the LRF, BPF and the three Class I landfill gas flares described above. (Note that the existing permitted 1,800-scfm Class I flare will be decommissioned and replaced by the 3,500-scfm Class I flare, so the potential-minus-actual net emissions increase was modeled for the 3,500-scfm flare.) The Industrial Source Complex, Short-Term, Version 3 (ISCST3) dispersion model was used to predict the potential air quality impacts, in accordance with the modeling protocol submitted to FDEP on May 13, 2002. A comparison was conducted of the maximum predicted ground-level concentrations and the background concentrations to the Florida and National Ambient Air Quality Standards. This comparison demonstrated that the LRF, BPF and flare projects together would not violate ambient air quality standards. In fact, maximum ground-level concentrations due to these projects alone will be no more than one percent of any of the standards. When BPF, LRF and flare concentrations are added to existing background pollutant concentrations, the resulting maximum concentration will be no more than 52 percent of any of the standards. A comparison of the maximum air quality impacts to the PSD Class II increments demonstrated that the LRF, BPF and flare projects will have an insignificant impact on Class II increment consumption, by consuming no more than four percent of any applicable increment.

An analysis was also conducted of project impacts at the nearest Class I (pristine) air quality area: the Everglades National Park, 128 km (80 miles) south-southwest of SWA's facilities. The results show that less than 0.1 percent of any Class I increment will be consumed there, and that visibility (clarity of the air) at this area will not be impaired. A similar analysis was conducted for the Big Cypress National Preserve, which although not an officially designated Class I Area, is a sensitive area slightly nearer to the project parcel: 112 km (70 miles) southwest of SWA's facilities. The modeled results for this location show that the projects would consume no more than 0.2 percent of any Class I increment, and will not impair visibility. A detailed discussion of air quality impacts from the proposed LRF, BPF and flares is provided in Sections 6.0 and 7.0 of this Volume.

The dispersion modeling impact analyses for the combined net emissions increases due to the LRF, BPF and three Class I Landfill flares together show that the flares "would not cause or contribute to a violation of any ambient air quality standard, maximum allowable increase, or visibility limitation." Therefore, the 3,500-scfm flare, 1,000-scfm flare, and 2,000-scfm flare all qualify for the exemption from PSD permit application requirements in Rule 62-212.400(2)(a) 2., FAC, as discussed in Section 1.2.3, above. Because the flares are exempt from PSD permitting requirements, they are not considered in any of the analyses in this PSD application, except for the dispersion modeling. They are not included, for example, in the Best Available Control Technology evaluation in Section 4.0. The flares also are not included in the evaluation of whether or not PSD pre-construction monitoring is required. SWA plans to submit a separate minor modification preconstruction air permit application to FDEP for the three Class I Landfill flares, and requests that the application for the 3,500-scfm Class I flare, in particular, be processed and approved separately from this PSD major modification application.

The predicted pollutant ground-level concentrations from the LRF and BPF are compared to PSD de minimis monitoring levels in Table 6-4. The highest predicted impacts are below the de minimis monitoring levels. Therefore, in accordance with guidance in 40 CFR 51.166(i)(8), and as allowed under Rule 62-212.400(3)(e), FAC, SWA requests that FDEP concur with the determination that pre-construction monitoring is not required for the LRF and BPF projects.

The proposed LRF, BPF and Class I flares maximum expected emission rates, based on regulatory requirements, vendor information, and the results of the Best Available Control Technology (BACT) analysis (for the BPF and LRF) are summarized in **Table 1-1**. The basis for these emission rates is described in Section 3.0 Air Pollutant Emissions; Section 4.0 BACT Review, and in **Appendix A** of this Volume, the Emission Factor Support Document.

Table 1-1 presents two sets of emission rate totals: one for the LRF, BPF and three Class I flares, and one for the LRF and BPF alone. The first total is compared with the PSD Significant Net Emissions Increase thresholds to indicate which pollutants would be included in the dispersion modeling analysis. For completeness, the dispersion modeling was conducted for CO, NO_X, SO_2, and PM_{10}, even though Table 1-1 shows that it is not strictly required for SO_2. Since the dispersion modeling demonstrated that the flares can be exempt from PSD permitting, the second total for the LRF and

Table 1-1 SWA Lime Recalcination Facility, Biosolids Pelletization Facility, and Class I Landfill Flares Proposed Maximum Potential Controlled Emission Rates and PSD Applicability

PSD Pollutant		Air Pollutant Emission Rates, By Emissions Unit													
		Lime Recalcination Facility (LRF)				Biosolids Pelletizing Facility (BPF)					Flares				
		Rotary Lime Kiln (a)	Cross-Bar Lime Product Cooler (b)	Two Hydrated Lime Storage Silos (c)	LRF Subtotal (tons/year)	Two Rotary Dryers (d)	Four Fertilizer Pellet Storage Silos (c)	Two Recycle Bins (e)	Two Cooling Towers (f)	BPF Subtotal (tons/year)	3,500-scfm, 1,000-scfm, and 2,000-scfm Flares (g)	Existing 1,800-scfm Flare to be Replaced (g)	LRF, BPF and Flares TOTAL (h)	LRF and BPF Only TOTAL	PSD Significant Net Emissions Increase (i)
Carbon Monoxide (CO)	Basis	150 ppmv @ 10% O_2	---	---	---	0.39 lb/hr each	---	---	---	---	0.37 lb/MMBtu	750 lb/10^6 dscf CH_4			
	Tons/Year	*38.9*	---	---	*38.9*	*3.4*	---	---	---	*3.4*	*362.7*	*-101.6*	**261.1**	42.3	100
Nitrogen Oxides (NO_X)	Basis	0.44 lb/MMBtu	---	---	---	2.24 lb/hr each	---	---	---	---	0.068 lb/MMBtu	40 lb/10^6 dscf CH_4			
	Tons/Year	*63.6*	---	---	*63.6*	*19.6*	---	---	---	*19.6*	*39.1*	*-5.4*	**116.9**	**83.2**	40
Sulfur Dioxide (SO_2)	Basis	100 ppmv sulfur in gas	---	---	---	0.93 lb/hr each	---	---	---	---	100 ppmv sulfur in gas	100 ppmv sulfur in gas			
	Tons/Year	*6.1*	---	---	*6.1*	*8.1*	---	---	---	*8.1*	*16.7*	*-4.5*	26.4	14.2	40
Particulate Matter (total) (PM)	Basis	0.005 gr/dscf @ 10% O_2	0.005 gr/dscf @ 10% O_2	0.015 gr/dscf actual	---	0.78 lb/hr each	0.015 gr/dscf actual	0.015 gr/dscf actual	0.019 lb/10^3 gal drift	---	17 lb/10^6 dscf CH_4	17 lb/10^6 dscf CH_4			
	Tons/Year	*2.5*	*0.3*	*0.0021*	*2.8*	*6.8*	*1.32E-03*	*3.0*	*3.00E-03*	*9.8*	*9.5*	*-2.3*	19.8	12.6	25
Particulate Matter < 10 Microns (PM_{10})	Basis	0.005 gr/dscf @ 10% O_2	0.005 gr/dscf @ 10% O_2	*0.015 gr/dscf actual*	---	*0.78 lb/hr each*	0.015 gr/dscf actual	*0.015 gr/dscf actual*	*0.019 lb/10^3 gal drift*	---	17 lb/10^6 dscf CH_4	17 lb/10^6 dscf CH_4			
	Tons/Year	*2.5*	*0.3*	*0.0021*	*2.8*	*6.8*	*1.32E-03*	*3.0*	*3.00E-03*	*9.8*	*9.5*	*-2.3*	**19.8**	12.6	15
Volatile Organic Compounds (VOC)	Basis	20 ppmv @ 3% O_2	---	---	---	0.3 lb/hr each	---	---	---	---	98% DRE	98% DRE			
	Tons/Year	*9.71*	---	---	*9.7*	*2.6*	---	---	---	*2.6*	*2.42*	*-0.7*	14.1	12.3	40
Lead (Pb)	Basis	---	---	---	---	8.3E-05 lb/hr each	---	---	---	---	---	---			
	Tons/Year	---	---	---	---	*7.27E-04*	---	---	---	*7.27E-04*	---	---	7.27E-04	7.27E-04	*0.6*
Mercury (Hg)	Basis	2.92E-04 ppmv in gas	---	---	---	2.17E-06 lb/hr each	---	---	---	---	2.92E-04 ppmv in gas	2.92E-04 ppmv in gas			
	Tons/Year	*3.46E-05*	---	---	*3.46E-05*	*1.90E-05*	---	---	---	*1.90E-05*	*2.35E-04*	*-3.18E-05*	2.03E-04	5.36E-05	0.1 (j)
Hydrogen Sulfide (H_2S)	Basis	---	---	---	---	0.026 lb/hr ea	---	---	---	---	---	---			
	Tons/Year	---	---	---	---	*0.23*	---	---	---	*0.23*	---	---	0.23	0.23	10
Total Hazardous Air Pollutants (HAPs)	Tons/Year	0.13	---	---	0.13	0.18	---	---	---	0.18	0.85	-0.12	0.73	0.31	25 (j)

Notes: See Section 3.0 and Appendix A for bases and calculations. Section 3.0 also describes air pollution control equipment. For conservatism, all PM is assumed to be PM10.

(a) Lime kiln emission rates are from vendor guarantees for CO and PM. NOx emission rate is BACT for a low-NOx burner (see Section 4.0). SO2, Hg, and total HAPs emission rates are based on AP-42 for landfill gas. VOC is the NMOC emissions limit from NSPS for MSW Landfills.

(b) PM emission rates from the cross-bar lime cooler are based on vendor-guaranteed PM outlet concentration for the baghouse and design air flow rate.

(c) PM emission rates from the silos are based on vendor-guaranteed PM outlet concentrations for baghouses on the exhaust vents, and on the volume of air estimated to be displaced from each silo in a year.

(d) Biosolids dryer emission rates are from upper-bound vendor estimates (see Appendix A) for all pollutants except NOx and total HAPs. NOx emission rate is BACT for a low-NOx burner (see Section 4.0). Total HAP emission rates are based on AP-42 for landfill gas, and on vendor estimates of sludge metals content.

(e) PM emission rates from the biosolids pellet recycle bin are based on vendor-guaranteed PM outlet concentration for baghouse and design air flow rate.

(f) PM emission rate is based on AP-42 for cooling towers, and design water circulation rate.

(g) Flare emission rate calculations are based on AP-42 for all pollutants. The flares are required to achieve a 98% destruction removal efficiency (DRE) for NMOC3-flare total shown is net of the 2,700 scfm gas flare to the LRF and BPB (VOC) by the NSPS for MSW Landfills. 3-flares shown is net of the 2.700 scfm gas flare to the LRF and BPF.

(h) The flares only combust landfill gas not being used by the LRF and BPF. Therefore, the total maximum potential emission rates are not the sum of the maximum potential emission rates of the the LRF, BPF, and 3 Flares, but are based on the worst-case operating condition for each pollutant. The worst case for CO and total HAPs is all landfill gas going to the Flares with the LRF and BPF not operating. For all other pollutants the worst case is the LRF and BPF operating at capacity, with the Flares combusting only the remaining gas flow rate of 3,800 scfm. The total also reflects the reduction in actual emissions resulting from decomissioning the existing 1,800-scfm flare.

(i) Rule 62-212.400, F.A.C., Table 212.400-2.

(j) The Clean Air Act Amendments Section 112(b)(6) exempts listed HAPs from PSD review.

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BPF alone is compared with the PSD Significant Net Emissions Increase thresholds to indicate which pollutants would be included in the BACT analysis. Table 1-1 shows that BACT is only required for NO_X emissions. Therefore, Section 4.0 considers NO_X only in the control equipment evaluations for the LRF and BPF.

Section 2
Air Quality Regulations

2.1 Introduction

The proposed new Lime Recalcination Facility (LRF) and Biosolids Pelletization Facility (BPF) to be added at the North County Resource Recovery Facility (NCRRF) will be designed to meet all applicable federal and state rules and regulations. These facilities will provide environmental benefits by processing waste products (water treatment plant lime sludges and wastewater treatment plant sewage sludge) for beneficial re-use, and by reclaiming energy in landfill gas that is normally simply flared. In most cases, the proposed facilities will be designed to provide greater control of air pollutant emissions than is required.

The LRF will process 313 wet tons of water treatment facility lime sludge at 55 percent solids (equal to 172 dry tons per day (dtpd), to produce 100 dtpd of quicklime. The lime will be recalcined in a rotary kiln with a 33-million-British-thermal-unit per hour (MMBtu/hr) landfill gas heat input to the burner. The air pollution control equipment will include an electrostatic precipitator (ESP) on the kiln exhaust for the control of particulate matter (PM) emissions. The LRF will also have a lo-NO_X burner for the control of nitrogen oxides (NO_X) emissions. The LRF's cross-bar cooler and two storage silos will have fabric filters on their exhaust vents for the control of PM emissions.

The BPF will have two identical trains that will process 200 wet tons per day (wtpd) each, equivalent to 33.75 dtpd each, of sewage sludge to produce fertilizer pellets. Each train will have its own dedicated air pollution control equipment and exhaust stack. The air pollution control equipment on each train will include a preseparator and polycyclone at the dryer exhaust end to remove the pellets and heavier dust particles from the dryer gas. The exhaust gases, containing products of combustion (NO_X, carbon monoxide (CO), and sulfur dioxide (SO_2)), PM, and volatile organic compounds (VOCs) driven off the sludge, will then go through a tray condenser and venturi scrubber. These devices will remove PM, and some SO_2. The gases will then go through a regenerative thermal oxidizer (RTO) to combust VOCs before exiting the exhaust stack. The BPF will also have a lo-NO_X burner for the control of NO_X emissions. Each train's burner will combust up to 23 MMBtu/hr; its RTO will combust an additional 1 MMBtu/hr. Each train, therefore, will burn 24 MMBtu/hr of landfill gas, and the BPF as a whole, 48 MMBtu/hr. Each train's recycle bin and two storage silos will have fabric filters on their exhaust vents for the control of PM emissions. The cooling towers will use potable water to minimize emissions of dissolved salts.

The landfill gas burners at the LRF and BPF will themselves serve as air pollution devices for controlling the emissions of non-methane organic compounds (NMOCs) from landfill gas. They will be designed to provide a 98 percent destruction removal efficiency for NMOCs, as required by the New Source Performance Standards (NSPS) for Municipal Solid Waste (MSW) Landfills, 40 Code of Federal Regulations (CFR) 60 Subpart WWW.

The LRF and BPF facilities together are one modification to the NCRRF Prevention of Significant Deterioration (PSD) and Title V "major" source, as described in Section 2.4, below. The combined maximum potential emissions of NO_X from these three two facilities will exceed the PSD "significant increase" threshold in Rule 62-212.400, Florida Administrative Code (FAC), Table 212.400-2, which makes these projects subject to the PSD review requirements under 62-212.400, FAC. As shown in **Table 2-1**, however, no other air emissions from these projects will exceed the PSD thresholds.

The three landfill gas flares proposed to be installed at the Class I Landfill are "contemporaneous" projects with the LRF and BPF, as described in Section 2.4, below. A separate cumulative emission rate total for the LRF, BPF and three flares is shown in Table 2-1. However, because the flares are exempt from PSD permit application requirements (see Section 1.2.3), they are included in this application's dispersion modeling analysis only.

This section will discuss the air quality regulations promulgated by the U.S. Environmental Protection Agency (EPA) and Florida Department of Environmental Protection (FDEP) applicable to the proposed projects.

2.2 Applicable Regulations

The proposed LRF and BPF projects have been reviewed for applicability to and compliance with the requirements in the CFR and FAC listed below. All of the 40 CFR citations shown have also been incorporated by reference into the FAC at Rule 62-204.800, FAC.

40 CFR 50	_ National Primary and Secondary Ambient Air Quality Standards.
40 CFR 51	_ Subpart I - Prevention of Significant Deterioration of Air Quality.
40 CFR 52	_ Subpart K - Approval and Promulgation of Implementation Plans, Florida.
40 CFR 60	_ Subpart HH – Standards of Performance for Lime Manufacturing Plants.
	_ Subpart WWW - Standards of Performance for Municipal Solid Waste Landfills.
40 CFR 61	_ Subpart E - National Emission Standard for Hazardous Air Pollutants (NESHAP) - Mercury.

Table 2-1 SWA Lime Recalcination Facility, Biosolids Pelletization Facility, and Class I Landfill Flares Proposed Maximum Potential Controlled Emission Rates and PSD Applicability

PSD Pollutant		Air Pollutant Emission Rates, By Emissions Unit													
		Lime Recalcination Facility (LRF)				Biosolids Pelletizing Facility (BPF)					Flares				
		Rotary Lime Kiln (a)	Cross-Bar Lime Product Cooler (b)	Two Hydrated Lime Storage Silos (c)	LRF Subtotal (tons/year)	Two Rotary Dryers (d)	Four Fertilizer Pellet Storage Silos (c)	Two Recycle Bins (e)	Two Cooling Towers (f)	BPF Subtotal (tons/year)	3,500-scfm, 1,000-scfm, and 2,000-scfm Flares (g)	Existing 1,800-scfm Flare to be Replaced (g)	LRF, BPF and Flares TOTAL (h)	LRF and BPF Only TOTAL	PSD Significant Net Emissions Increase (i)
Carbon Monoxide (CO)	Basis	150 ppmv @ 10% O_2	---	---	---	0.39 lb/hr each	---	---	---	---	0.37 lb/MMBtu	750 lb/10^6 dscf CH_4			
	Tons/Year	*38.9*	---	---	*38.9*	*3.4*	---	---	---	*3.4*	*362.7*	*-101.6*	**261.1**	42.3	100
Nitrogen Oxides (NO_X)	Basis	0.44 lb/MMBtu	---	---	---	2.24 lb/hr each	---	---	---	---	0.068 lb/MMBtu	40 lb/10^6 dscf CH_4			
	Tons/Year	*63.6*	---	---	*63.6*	*19.6*	---	---	---	*19.6*	*39.1*	*-5.4*	**116.9**	**83.2**	40
Sulfur Dioxide (SO_2)	Basis	100 ppmv sulfur in gas	---	---	---	0.93 lb/hr each	---	---	---	---	100 ppmv sulfur in gas	100 ppmv sulfur in gas			
	Tons/Year	*6.1*	---	---	*6.1*	*8.1*	---	---	---	*8.1*	*16.7*	*-3.8*	27.1	14.2	40
Particulate Matter (total) (PM)	Basis	0.005 gr/dscf @ 10% O_2	0.005 gr/dscf @ 10% O_2	0.015 gr/dscf actual	---	0.78 lb/hr each	0.015 gr/dscf actual	0.015 gr/dscf actual	0.019 lb/10^3 gal drift	---	17 lb/10^6 dscf CH_4	17 lb/10^6 dscf CH_4			
	Tons/Year	*2.5*	*0.3*	*0.0021*	*2.8*	*6.8*	*1.32E-03*	*3.0*	*3.00E-03*	*9.8*	*9.5*	*-2.3*	19.8	12.6	25
Particulate Matter < 10 Microns (PM_{10})	Basis	0.005 gr/dscf @ 10% O_2	0.005 gr/dscf @ 10% O_2	0.015 gr/dscf actual	---	0.78 lb/hr each	0.015 gr/dscf actual	0.015 gr/dscf actual	0.019 lb/10^3 gal drift	---	17 lb/10^6 dscf CH_4	17 lb/10^6 dscf CH_4			
	Tons/Year	*2.5*	*0.3*	*0.0021*	*2.8*	*6.8*	*1.32E-03*	*3.0*	*3.00E-03*	*9.8*	*9.5*	*-2.3*	**19.8**	12.6	15
Volatile Organic Compounds (VOC)	Basis	20 ppmv @ 3% O_2	---	---	---	0.3 lb/hr each	---	---	---	---	98% DRE	98% DRE			
	Tons/Year	*9.71*	---	---	*9.7*	*2.6*	---	---	---	*2.6*	*2.42*	*-0.6*	14.2	12.3	40
Lead (Pb)	Basis	---	---	---	---	8.3E-05 lb/hr each	---	---	---	---	---	---			
	Tons/Year	---	---	---	---	*7.27E-04*	---	---	---	*7.27E-04*	---	---	7.27E-04	7.27E-04	*0.6*
Mercury (Hg)	Basis	2.92E-04 ppmv in gas	---	---	---	2.17E-06 lb/hr each	---	---	---	---	2.92E-04 ppmv in gas	2.92E-04 ppmv in gas			
	Tons/Year	*3.46E-05*	---	---	*3.46E-05*	*1.90E-05*	---	---	---	*1.90E-05*	*2.35E-04*	*-3.18E-05*	2.03E-04	5.36E-05	0.1 (j)
Hydrogen Sulfide (H_2S)	Basis	---	---	---	---	0.026 lb/hr ea	---	---	---	---	---	---			
	Tons/Year	---	---	---	---	*0.23*	---	---	---	*0.23*	---	---	0.23	0.23	10
Total Hazardous Air Pollutants (HAPs)	Tons/Year	0.13	---	---	0.13	0.18	---	---	---	0.18	0.85	-0.12	0.73	0.31	25 (j)

Notes: See Section 3.0 and Appendix A for bases and calculations. Section 3.0 also describes air pollution control equipment. For conservatism, all PM is assumed to be PM10.

(a) Lime kiln emission rates are from vendor guarantees for CO and PM. NOx emission rate is BACT for a low-NOx burner (see Section 4.0). SO2, Hg, and total HAPs emission rates are based on AP-42 for landfill gas. VOC is the NMOC emissions limit from NSPS for MSW Landfills.

(b) PM emission rates from the cross-bar lime cooler are based on vendor-guaranteed PM outlet concentration for the baghouse and design air flow rate.

(c) PM emission rates from the silos are based on vendor-guaranteed PM outlet concentrations for baghouses on the exhaust vents, and on the volume of air estimated to be displaced from each silo in a year.

(d) Biosolids dryer emission rates are from upper-bound vendor estimates (see Appendix A) for all pollutants except NOx and total HAPs. NOx emission rate is BACT for a low-NOx burner (see Section 4.0). Total HAP emission rates are based on AP-42 for landfill gas, and on vendor estimates of sludge metals content.

(e) PM emission rates from the biosolids pellet recycle bin are based on vendor-guaranteed PM outlet concentration for baghouse and design air flow rate.

(f) PM emission rate is based on AP-42 for cooling towers, and design water circulation rate.

(g) Flare emission rate calculations are based on AP-42 for all pollutants. The flares are required to achieve a 98% destruction removal efficiency (DRE) for NMOC (VOC) by the NSPS for MSW Landfills.

(h) The flares only combust landfill gas not being used by the LRF and BPF. Therefore, the total maximum potential emission rates are not the sum of the maximum potential emission rates of the LRF, BPF, and 3 Flares, but are based on the worst-case operating condition for each pollutant. The worst case for CO and total HAPs is all landfill gas going to the Flares with the LRF and BPF not operating. For all other pollutants the worst case is the LRF and BPF operating at capacity, with the Flares combusting only the remaining gas flow rate of 3,800 scfm. The total also reflects the reduction in actual emissions resulting from decomissioning the existing 1,800-scfm flare.

(i) Rule 62-212.400, F.A.C., Table 212.400-2.

(j) The Clean Air Act Amendments Section 112(b)(6) exempts listed HAPs from PSD review.

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40 CFR 63 — Subpart B - Requirements for Maximum Achievable Control Technology (MACT) Determinations for Major Sources in Accordance with Clean Air Act Sections 112(g) and 112(j).

-- Subpart AAAA - National Emissions Standards for Hazardous Air Pollutants (NESHAP) for MSW Landfills.

-- Subpart AAAAA - proposed National Emissions Standards for Hazardous Air Pollutants for Lime Manufacturing Plants.

40 CFR 64 — Compliance Assurance Monitoring Rule.

40 CFR 70 — State Operating Permit Programs (Title V Air Operating Permits).

14 CFR 77 — Federal Aviation Administration: Objects Affecting Navigable Airspace

62-210 FAC — Stationary Sources - General Requirements.

62-212 FAC — Stationary Sources - Preconstruction Review.

62-296 FAC — Stationary Source - Emission Standards.

62-297 FAC — Stationary Source - Emissions Monitoring.

2.3 Florida State Program Authority

The State of Florida has been delegated full authority by the EPA to administer the State Implementation Plan (SIP). Additionally, FDEP has accepted delegation from the EPA to issue permits for new and modified sources, and thereby satisfy requirements of PSD regulations (40 CFR Part 51.166). EPA's role in permitting the proposed source includes a review of assessment protocols for compliance with the SIP and guidance for policy decisions on an as-needed basis.

2.4 Prevention of Significant Deterioration, Non-Attainment New Source Review and Title V Applicability

The Clean Air Act (CAA) was amended in 1977 to incorporate a PSD program. To carry out the policies of the 1977 CAA amendments, EPA adopted revised PSD regulations on August 7, 1980. These revised regulations contained the PSD increments mandated by Congress and identified the types of emission sources subject to the PSD regulations (40 CFR 51.166, incorporated at 62-212.400, FAC).

For PSD purposes, a major stationary source is defined by EPA in two main ways. One definition of a major stationary source includes any source belonging to a list of 28 specified categories which has the potential to emit 100 tons per year (tpy) or more of any criteria pollutant regulated under the CAA. The NCRRF is classified, for PSD purposes, as a municipal waste incinerator capable of charging more than 50 tons of refuse per day, which is one of the 28 major source categories, in Section 169 of Title I of the CAA. Since the existing NCRRF has the potential to emit more than 100 tpy of at least one regulated pollutant, the NCRRF, together with all other SWA-controlled emissions units on the same property and in the same major two-digit Standard Industrial Classification (SIC) Code, is an existing major stationary source for PSD purposes. The NCRRF and other air emissions sources (the Class I and III Landfills, ash handling facilities, lime and chemical storage silos, Materials Recycling Facility, auto spray booth, and Composting Facility), have the following major-source air permits and approvals:

- PSD Permit No. PSD-FL-108, originally issued December 12, 1986. This permit has been modified as listed below:
  - PSD-FL-108A, January 14, 1992 – upgrades to NCRRF
  - PSD-FL-108B, February 21, 1996 – Class I and III Landfills gas system expansion
  - PSD-FL-108C, August 14, 1997 – a waiver for testing for beryllium and fluorides at the NCRRF
  - PSD-FL-108D, May 11, 1999 - Class I and III Landfills gas system expansion
  - PSD-FL-108E, September 11, 2002 – Change in Class III Landfill surface methane monitoring frequency
- Title V Air Operating Permit, Permit No. 0990234-003-AV, originally issued October 30, 2000.

A modification to an existing major stationary source is subject to PSD regulations if it is located in a Section 107 attainment area and it is a major modification. The project parcel and vicinity are currently considered to be in attainment with air quality standards for all criteria pollutants (40 CFR 81.310 and Rule 62-204, FAC). A major modification is a physical change in, or change in the method of operation of a major stationary source which will result in a "significant net emissions increase" of a regulated pollutant. In this case, the physical change is the addition of the LRF and BPF. Each proposed modification at the NCRRF is required to take into account all other permitted air emission increases and decreases that have occurred in the five years prior to the proposed modification. These sources are considered "contemporaneous". Since the LRF, BPF and the three new flares at the Class I Landfill could all be built within five years of each other, they must be considered together in the PSD applicability determination. Similarly, the decommissioning of the existing 1,800-scfm flare at the Class I Landfill would occur with the addition of the new 3,500-scfm flare. The rules for calculating the "net emissions increase" for these projects state that maximum potential emission rates be used for the new sources, and actual annual average emission rates (over the most recent two years) be used for the calculation of decreases for the decommissioned sources.

The calculated net emissions increases for all PSD pollutants are shown in Table 2-1. The maximum potential annual emission rates presented in Table 2-1 for the new sources were calculated with the assumption that each unit could operate 365 days per year at 100 percent load. Two totals are presented. The first is for all of the "contemporaneous" projects: the LRF, BPF, and the Class I Landfill 3,500-scfm flare, 1,000-scfm flare, and the 2,000-scfm flare. Comparison of this first total with the PSD Significant Net Emissions Increase thresholds (Rule 62-212.400, F.A.C., Table 212.400-2) indicates that an air quality impact assessment (dispersion modeling analyses) is required for these projects for CO, NO_X and PM_{10} emissions. These analyses are presented in Sections 6.0 and 7.0 of this application. They show that the combined impacts of the contemporaneous projects would not cause or contribute to exceedance of any ambient air quality standard, PSD Increment, or visibility impairment criterion. This allows the proposed flares to qualify for a "pollution control project exemption" from further PSD permit requirements (see Section 1.2.3).

The second emission rate total shown in Table 2-1 is just for the LRF and BPF. Table 2-1 shows that the net emissions increase for the LRF and BPF projects alone will exceed the PSD Significant Net Emissions Increase threshold for NO_X. The LRF and BPF projects, therefore, are subject to all PSD requirements with respect to NO_X emissions.

In general, a PSD permit application must contain the following basic components:

- A complete description of the nature and operation of the source;
- A Best Available Control Technology (BACT) review for those pollutants emitted at or above the "significant net emissions increase" rates;
- An analysis of existing ambient air quality;
- An impact assessment for those pollutants emitted at or above "significant net emissions increase" rates demonstrating that emissions from the new source will not cause a violation of ambient air quality standards or PSD increments; and
- An assessment of the project's impact on air-quality-related values, including soils, vegetation, and visibility.

This permit application volume addresses these requirements. Section 4.0 presents the BACT analysis (for the LRF and BPF only). As shown in Table 2-1, a formal BACT analysis is required only for NO_X emissions, so only a NO_X control analysis is presented. Section 5.0 reviews existing ambient air quality and meteorology near the NCRRF. Air quality modeling analyses are performed in Section 6.0 to show that applicable ambient air quality standards and PSD increments will be met for all of the comtemporaneous projects. The air quality modeling analyses are also only required for CO, NO_X and PM_{10} emissions. However, since demonstrations for other pollutants are simple once the model has been set up for one pollutant, SO_2 modeling has been included in this section for informational purposes. Section 7.0 presents the additional impact analyses (all contemporaneous sources) required as part of the PSD review.

A source modification is subject to non-attainment new source review (NSR) if the modification results in a significant net emission increase of a pollutant for which the source is major and for which the area is designated as non-attainment. Since the project parcel and all nearby areas are considered to be in attainment of the Ambient Air Quality Standards (AAQS) for all criteria pollutants, the NSR requirements do not apply.

The Title V Air Operating Permit Program (40 CFR 70) is also administered by FDEP, and incorporated into their rules at Chapter 62-213, FAC. A modified major source is not required to have this permit before construction, but to apply for the Title V permit revision within 12 months after commencing operation. The Title V permit collects into one document all of the pre-construction permit requirements, all other air regulatory requirements, and provides consolidated monitoring, record keeping, testing, reporting, and enforcement provisions. The definition of a "source" is similar to that in the PSD rules: a single permit is issued for all emissions units having the same two-digit SIC code located on contiguous or adjacent property and under common control. A Title V Operating Permit modification is required for any new or modified emissions units at the major source, whether the change itself is major or minor. A Title V permit revision application must include a listing of all applicable air regulatory requirements. This is done in this Section 2.0. Because the Title V permit will incorporate these requirements, and the requirements of the PSD permit modification, it will not be addressed any further in this volume. The Title V permit application forms for the LRF and BPF projects are included in the consolidated set of forms in Volume II.

2.5 Ambient Air Quality Standards

The current federal and state Ambient Air Quality Standards (AAQS) are enumerated in the baseline air quality discussion in Section 5. As noted above and discussed in Section 5, ambient air quality in the project parcel's vicinity is currently better than the AAQS for all pollutants. Facility compliance with AAQS after the proposed improvements is demonstrated in the air quality modeling analysis in Section 6.

The EPA promulgated new National Ambient Air Quality Standards (NAAQS) in July, 1997, for particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), and a more stringent 8-hour-average ozone standard of 0.08 parts per million (ppm) to replace the current one-hour-average standard of 0.12 ppm. The American Trucking Association challenged these new standards in court. On May 14, 1999, U.S. Court of Appeals

(D.C. Circuit) issued an opinion that the process for setting these standards was unconstitutional, and that the standards were unenforceable. As a result, the new standards were held in abeyance. The EPA appealed this decision to the U.S. Supreme Court. On February 27, 2001, the U.S. Supreme Court overturned the D.C. Circuit Court ruling, and found that:

- EPA has the right to establish health-based standards;
- EPA need not consider cost when setting standards; and
- EPA must revise its implementation policy for the new 8-hour ozone standard

Some issues were remanded back to the D.C. District Court. On February 15, 2002, the EPA announced that it has initiated a process to obtain stakeholder feedback on options the Agency is developing for implementation of the 8-hour ozone NAAQS. The EPA plans to issue a final rule on the implementation strategy prior to designating areas for the 8-hour ozone NAAQS. The implementation rule will provide specific requirements for state and local air pollution control agencies and tribes to prepare implementation plans to attain and maintain the 8-hour NAAQS. In the interim, the one-hour ozone NAAQS remains in effect in all areas of the country.

Because procedures for implementing the new $PM_{2.5}$ and 8-hour ozone NAAQS are still being developed by the EPA, this PSD Permit modification application does not contain a compliance demonstration for these two standards. The EPA is required to designate areas in attainment or nonattainment of the new 8-hour ozone standard by April, 2004, but does not expect to do so for the new $PM_{2.5}$ standard until 2004 - 2005.

2.6 New Source Performance Standards

2.6.1 Standards of Performance for Lime Manufacturing Plants (40 CFR 60 Subpart HH)

These NSPS emissions limitations apply to any rotary lime kiln used in the manufacture of lime that commences construction or operation after May 3, 1977. The LRF will be subject to these standards.

The rule limits emissions of PM only, based on two standards. Rotary lime kilns are prohibited from discharging to the atmosphere flue gases that (40 CFR 60.342):

1) Contain PM in excess of 0.60 lb/ton of stone feed;
2) Exhibit greater than 15 percent opacity (six-minute average) when exiting from a dry emission control device.

The LRF is proposed to have a PM emissions limitation from the ESP exhaust of 0.005 grains per dry standard cubic foot (gr/dscf), corrected to 10 percent oxygen (10 percent O_2). Based on calculations described in Section 3.0 and Appendix A, this is equivalent to about 0.58 pounds per hour (lb/hr) of PM, or about 13.9 lb/day of PM. Since the LRF uses lime sludge feed with a 45 percent moisture content, rather than limestone feed, an adjustment for feed stock moisture is a possible approach to comparing PM emissions with the NSPS limit. Limestone moisture content varies from 0.16 percent to 1.55 percent, depending on its source (Boynton, R.S., 1966). At the low end of the moisture range (a conservative calculation), the PM limit of 0.60 lb per ton of stone feed is approximately equal to 0.601 lb per dry ton of lime feed. Since the LRF would process up to about 172 dry tons per day of lime sludge feed, its potential PM emission rate would be equal to 0.08 lb PM per dry ton of lime feed. This is well below the NSPS limit.

The 15 percent opacity limit in the NSPS is more stringent than the general opacity limits that will apply from the state rules: 20 percent opacity in Rule 62-296.320(4)(b); and 30 percent opacity in Rule 62-296.410(2)(b); both of which are discussed in more detail in Section 2.11, below. Therefore, this 15 percent opacity limit will apply to the LRF.

Compliance with the PM limit is required to be demonstrated with an initial stack test, conducted in accordance with 40 CFR 60.8. Compliance with the opacity limit is required to be demonstrated through installation and operation of a continuous opacity monitor (COM). The rule allows for visual monitoring of opacity once per day (three six-minute observations by Method 9) in lieu of a COM, but only if the kiln has multiple stack exhausts or a roof monitor. Since the LRF is proposed to have a single exhaust stack, a COM will be required.

2.6.2 Standards of Performance for Municipal Solid Waste Landfills (40 CFR 60 Subpart WWW)

These rules apply to the collection of landfill gas at the Class I and III Landfills, and to the destruction (removal) of NMOCs in the landfill gas before it is emitted to the air. Because gas collected from the Class I Landfill will be combusted in the LRF, BPF and in the three proposed Class I Landfill flares, these sources will be regulated as control devices for the landfill gas. Control devices for emissions of landfill gas are required to reduce NMOC concentrations by 98 weight-percent (40 CFR 60.752(b)(2)(iii)(B)). Because the proposed flares are exempt from PSD permitting, SWA is submitting a separate minor preconstruction air permit application for them. The applicability of this rule to the flares is addressed in that application.

The LRF and BPF burners would qualify as "enclosed combustion devices" for the control of NMOC emissions (40 CFR 60.752(b)(2)(iii)(B)). Enclosed combustion devices are required to reduce NMOC by 98 weight percent, or reduce the outlet NMOC concentration to less than 20 parts per million by volume, dry basis (ppmvd), as hexane, corrected to 3 percent oxygen, whichever is less stringent. Compliance with either the reduction standard or concentration standard is based on an initial stack test, required under 40 CFR 60.8, and using test methods in 40 CFR 60.754(d). SWA proposes to meet these requirements for the LRF and BPF burners.

2.7 National Emission Standards for Hazardous Air Pollutants

Applicability of the EPA NESHAPs, in 40 CFR 61, to the projects was reviewed and is summarized below. These federal NESHAPS are adopted in the state regulations by reference in Rule 62-204.800(9)(b). There is one NESHAP that will be applicable to the BPF.

2.7.1 National Emission Standard for Mercury (40 CFR 61 Subpart E)

The National Emission Standard for Mercury (NESHAP Subpart E at 40 CFR 61.50 et. seq.) is applicable to existing and new plants that incinerate or dry wastewater treatment plant sludge. The BPF will be subject to these standards.

The rule limits emissions of mercury from sludge drying plants to not exceed 7.1 pounds of mercury per 24-hour period.

The BPF will control mercury emissions by having hot exhaust gases containing volatilized gaseous mercury go through a tray condenser in each of the two trains, to condense the gaseous mercury onto particulate matter. The tray condenser will be followed by a venturi scrubber to remove the PM. Each BPF dryer is proposed to have a mercury emissions limit at its stack of 2.17×10^{-6} lb/hr. This is equivalent to about 1.04×10^{-4} lb/day of mercury emissions for both trains, significantly below the 7.1 lb/day NESHAP.

Compliance with the mercury emissions limit is required to be demonstrated with an initial stack test by Method 101A, conducted in accordance with 40 CFR 60.8. Stack samples are required to be taken over a period or periods as are necessary to determine the maximum emissions that will occur in a 24-hour period. The rule allows for an alternative demonstration of compliance by sludge sampling and analysis for mercury, in accordance with Method 105. Mercury emissions for a 24-hour period are then calculated as a function of mercury concentration in the sludge, and the measured sludge charging rate for 24 hours.

If the initial stack test or sludge sampling indicate that mercury emissions could exceed 3.5 lb/day, then stack testing or sludge sampling is required to be conducted at least once per year. Otherwise, the initial stack stack test the only required testing.

2.8 Maximum Achievable Control Technology Requirements

The CAA Amendments of 1990 contained changes to Section 112 of the Act to control hazardous air pollutant (HAP) emissions from major sources of HAPs. A major source is one that has the potential to emit 10 tons per year of a single HAP, or 25 tons per year of any combination of HAPs. The NCRRF is an existing major source of

HAPs. HAPs expected to be emitted by the proposed projects are shown in Appendix A. Table 2-1 shows that the proposed projects' maximum potential emissions of these pollutants will be well below the 10 ton per year threshold for any individual HAP, and below the 25 ton per year threshold for all HAPs. Therefore, although the NCRRF is a major source of HAPs, the proposed modifications are minor sources of HAPs.

On December 27, 1996, EPA promulgated rules in 40 CFR 63 Subpart B requiring case-by-case control technology determinations, in accordance with CAA Section 112(g)(2)(B), for constructed or reconstructed major sources of HAPs, unless an emission limitation established under CAA Section 112 will be met. Since neither the NCRRF or the proposed projects are constructed or reconstructed major sources of HAPs, this rule does not apply.

2.8.1 National Emissions Standards for Municipal Solid Waste Landfills (40 CFR 63 Subpart AAAA)

The new National Emissions Standards for Hazardous Air Pollutants (NESHAP) for MSW Landfills, 40 CFR 63 Subpart AAAA, were promulgated on January 16, 2003. These rules have the same applicability criteria (for non-bioreactor landfills) as do the NSPS for MSW Landfills, described in Section 2.6.2, above. This new MSW MACT standard does not contain any emissions limits beyond what is required by the NSPS, but references and incorporates the NSPS, and adds some to the NSPS by containing new monitoring, recordkeeping and reporting requirements. These primarily apply to the Class I and Class III Landfill gas collection and control systems. The applicability of this rule to the proposed Class I Landfill flares is addressed separately in the separate minor preconstruction air permit application for them.

The LRF and BPF burners would be regulated as enclosed combustion control devices for the Class I Landfill's gas under this MACT rule, however, just as they are under the MSW Landfill NSPS. The NSPS requires that the enclosed combustion device be operated within the temperature range established at the most recent performance test in which compliance was demonstrated with the 98 percent NMOC destruction efficiency (or NMOC outlet concentration of 20 ppmdv at 3 percent) (40 CFR 60.752(b)(2)(iii)(B)(2)). The NSPS also require that enclosed combustion devices have a temperature monitoring device with a continuous recorder to monitor that the burners are operated within the compliance temperature range (40 CFR 60.756(b)(1)), and that the burner is out of compliance in any three-hour period in which the average burner temperature was more than 28° C below the average temperature during the compliance test (40 CFR 60.758(c)(1)(i)). The new MACT standards add to this by providing definitions of acceptable data quality for the continuous temperature monitoring device, and by defining what a deviation is (40 CFR 63.1965). The new MACT standards also require reporting of deviations for out-of-range monitoring parameters (temperature at the enclosed combustion devices) every six months in a semi-annual compliance report (40 CFR 63.1980). The new MACT standards require the preparation of a Startup, Shutdown, Malfunction (SSM) Plan for the Class I and Class III Landfill gas collection and control systems (40 CFR

63.1955(c)). Since the LRF and BPF burners would be part of the control system for the Class I Landfill, they would have to be included in the SSM Plan for the Class I Landfill.

2.8.2 National Emissions Standards for Lime Manufacturing Plants (40 CFR 63 Subpart AAAAA)

The draft proposed National Emissions Standards for Hazardous Air Pollutants for Lime Manufacturing Plants (40 CFR 63 AAAAA) was published in the Federal Register on December 20, 2002. The public comment period on the draft rule ran through February 18, 2003. The final rule was signed August 25, 2003, but has not yet been published in the Federal Register. Since the LRF would be constructed after the proposal date of December 20, 2002, it would be required to comply with the final rule.

The rule contains a particulate matter (PM) emissions limit, to control heavy metals emissions, that is more stringent than the PM emissions limit in the existing Lime Manufacturing Plant NSPS (see Section 2.6.1, above). The rule does not contain any other HAPs limits. The new PM limit is 0.1 lb/ton of stone feed, and applies to the combined total of PM emissions from both the lime kiln exhaust and the lime cooler exhaust. To determine compliance with the limit, one would add together the PM emission rates from both the kiln and the cooler, in lb/day, and divide that total by the "lime stone feed rate" to the kiln, in tons/day, and that number, in lb PM / ton of "stone feed," would be compared with the limit of 0.1. As noted for Section 2.6.1, above, the LRF receives lime sludge, rather than "stone feed", so the dry sludge feed rate of 172 dtpd is used as a surrogate for "stone feed."

The LRF kiln's four-field ESP is proposed to have an outlet emissions limit of 0.005 gr/dscf at 10percent O_2, which is equivalent to 0.58 lb/hr. The cross-bar cooler exhaust fabric filter is proposed also to have an outlet emissions limit of 0.005 gr/dscf at 10percent O_2, which is equivalent to 0.08 lb/hr from the cooler. Their combined daily maximum potential to emit, therefore, would be 15.8 lb/day, or 0.09 lb PM / ton of "stone feed". This would comply with the MACT standard.

The new MACT standard also requires that PM emissions from "process stone handling operations," including storage bins and silos, and bulk loading or unloading systems, not exceed 0.05 grams per dry standard cubic meter (g/dscm) or 7 percent opacity if emitted through a stack. Fugitive PM emissions must not exceed 10 percent opacity. The LRF will be designed to meet these limits with baghouses on the lime storage silo exhausts, and by conducting product truck loading in an enclosed area. Since the lime sludge will be wet when delivered to the LRF, there will be no fugitive PM emissions from the front end of the LRF. The rule requires that a continuous PM detector or continuous opacity monitor be used on the ESP exhaust to maintain continuous compliance with the PM limit. Initial and annual performance tests are required. A monthly one-minute visible emissions check of each process handling operation is also required.

2.9 Compliance Assurance Monitoring Rule

The Compliance Assurance Monitoring (CAM) Rule, 40 CFR 64 was written to provide a "reasonable assurance" of continuous compliance with emissions limitations or standards in cases where the underlying requirement for an emissions unit does not require continuous emissions monitoring, and for units that are part of major sources that have Title V operating permits. The rule applies to a pollutant-specific emissions limit for a unit at a major source required to have a Title V permit, if the unit satisfies all of the following criteria:

1) The unit is subject to an emissions limitation, other than an exempt (defined below) emissions limitation;

2) The unit uses a control device to achieve compliance with the emissions limitation; and

3) The unit has potential pre-control device emissions of the regulated air pollutant that will equal or exceed the amount, in tons per year required for a source to be classified as a major source (100 tons/year for criteria air pollutants, and 10 tons/year for an individual HAP).

The exempt emissions limitations include any NESHAPs or NSPS proposed after November 15, 1990. (The other exemptions are not relevant to this project.)

The LRF rotary kiln will be required to meet emissions limits for PM and opacity (based on the Lime Manufacturing NSPS), for NMOC (based on the MSW Landfill NSPS and MACT) and for NO_x (based on BACT requirements). The Lime Manufacturing NSPS were promulgated in 1984, so the PM and opacity limits for the LRF kiln are not exempt, and Criterion 1), above, is met. The LRF will have an ESP to control PM emissions and opacity, so Criterion 2), above is also met. Uncontrolled PM emissions from the LRF kiln could be up to 1,770 tons per year, so Criterion 3), above, is also satisfied. (Uncontrolled PM emissions are based on an emission factor of 97 lbs. PM per ton of lime produced, from EPA, *Compilation of Air Pollutant Emission Factors,* Report No. AP-42, Vol. I, Fifth Edition, Section 11.17, February, 1998, Table 11.7-2, "gas-fired calcimatic kiln".) Therefore, a CAM plan could be required for PM emissions from the LRF kiln's ESP. The Lime Manufacturing NSPS requires installation of a COM, so this will satisfy a possible CAM rule requirement for opacity.

The MACT standards for Lime Manufacturing Plants (see Section 2.8) were signed as a final rule on August 25, 2003, and will be promulgated soon. These MACT standards will contain a PM limit that is more stringent than that in the NSPS, and will have PM compliance monitoring requirements that meet the requirements of the CAM rule. The new MACT standard, therefore, will supplant the NSPS PM limit, as well as fulfill the CAM requirement without a separate CAM plan. It is likely that the new Lime Manufacturing Plant MACT standard can be incorporated into the Title V permit with this revision, replacing the requirement to provide a CAM plan.

The NMOC emission limit for the LRF rotary kiln will not be subject to the requirement for a CAM plan, because the NSPS for Municipal Solid Waste Landfills was promulgated in 1996, and the MACT standard for Municipal Solid Waste Landfills was promulgated in 2003. Therefore, this emission limit is exempt, based on Criterion 1), above.

The LRF rotary kiln will have a BACT-based emission limit for NO_X (see Section 4.0). This limit is not exempt, so Criterion 1) applies. If the proposed low-NO_X burner were considered a control device, Criterion 2) will apply. As shown in Section 4.0, the uncontrolled NO_X emission rate from the LRF kiln will be 94 tons/year. Therefore, Criterion 3) is not met, and a CAM plan will not be required for NO_X emissions.

The BPF rotary dryer will be required to meet emissions limits for mercury (based on the Mercury NESHAP), opacity (based on FDEP requirements), and for NO_X (based on BACT requirements). The Mercury NESHAP was promulgated in October, 1975, so Criterion 1) applies. As described in Section 2.7.1, above, the BPF's tray condenser and venturi scrubber will serve to remove some mercury from the flue gas. However, no removal credit is taken for mercury emissions in the proposed mercury emission rate for the BPF (see Appendix A), so a control device is not necessary to meet the emission limit, and Criterion 2) does not apply. In addition, Table 2-1 shows the uncontrolled mercury emission rate from the BPF to be well below 10 tons/year, so Criterion 3) does not apply, and a CAM plan is not required for mercury emissions.

Each BPF rotary dryer will have a BACT-based emission limit for NO_X (see Section 4.0). This limit is not exempt, so Criterion 1) applies. If the proposed low-NO_X burner were considered a control device, Criterion 2) will apply. However, as shown in Section 4.0, the uncontrolled NO_X emission rate from each BPF dryer will be 9.8 tons/year. Therefore, Criterion 3) is not met, and a CAM plan is not required for NO_X emissions.

Both of the BPF's rotary dryers will be subject to Florida's Visible Emissions Standard for process sources of 20 percent opacity (see Section 2.10, below). Although this limit is not exempt, the CAM Rule appears to apply only to federally enforceable emissions limitations (40 CFR 64.1 Definition of "emission limitation"). In addition, each BPF dryer's uncontrolled PM emissions will be less than 68 tons/year, so Criterion 3) is not met, and a CAM plan for opacity is not required. (Uncontrolled PM emission rate is based on a vendor-guaranteed 95-percent PM removal efficiency for the venturi scrubber; see Appendix A.)

In conclusion, a CAM plan will only be required for ESP control of PM emissions from the LRF kiln. However, the plan is not due to be submitted until the 2005 renewal of the NCRRF's Title V permit. By that time, the expected Lime Manufacturing MACT standard will likely replace the CAM plan requirement.

2.10 Federal Aviation Administration Requirements for Objects Affecting Navigable Airspace

Federal Aviation Administration (FAA) regulations in 14 CFR 77 govern stack heights and lighting of stacks and other tall structures near airports. The rules require that the FAA be notified for any proposed new construction that:

- would be greater than 200 feet in height above ground level; or
- would be of greater height than an imaginary surface extending outward and upward at one of the following slopes:
  - 100 to 1 for a horizontal distance of 20,000 feet from the nearest point to the nearest runway with at least one runway longer than 3,200 feet;
  - 50 to 1 for a horizontal distance of 10,000 feet from the nearest point of the nearest runway with its longest runway no more than 3,200 feet in actual length.

The notification is required to be submitted to the FAA regional office on FAA Form 7560-1 Notice of Proposed Construction or Alteration. The FAA regional office then reviews the form, and responds with its requirements for lighting and/or height limitations.

The tallest structures associated with the proposed project will be the LRF and BPF stacks. The proposed new stacks for the LRF and BPF will be 100 feet and 138 feet above ground level, respectively. Since these are less than 200 feet, the first criterion for providing FAA notice does not apply. The nearest airport, West Palm Beach International Airport, is approximately seven miles southeast of the NCRRF. The West Palm Beach Airport has at least one runway longer than 3,200 feet. Seven miles is 36,960 feet, which exceeds the 20,000-foot distance in the second criterion. Therefore, neither stack will be subject to FAA notice requirements.

2.11 Florida Air Regulations

Florida's air regulations concerning air permits are contained in Rules 62-210, FAC, 62-212, FAC, 62-213, FAC. Specifically, Section 62-210.300 FAC, requires appropriate permits prior to modification "to any source which emits or can reasonably be expected to emit any air pollutant...unless exempted pursuant to Department rules or statutes." Compliance with these air permit requirements are discussed in Section 2.4, above.

As discussed in Sections 2.6 and 2.7 above, NSPS and NESHAP requirements for the proposed projects are adopted, mostly by reference, into the FAC under 62-204.800. Other air quality requirements in the FAC applicable to the facilities after the proposed improvements are discussed below. These requirements are contained either in Rule 62-296, FAC, which contains Emission Standards for Stationary Sources, or in Rule 62-297, FAC, which contains Emission Monitoring Requirements for Stationary Sources.

The LRF and BPF must meet the Florida General Pollutant Emission Limiting Standards in FAC Rules 62-296.320(1) (Volatile Organic Liquids), 62-296.320(2) (Odors), 62-296.320(3) (Open Burning), 62-296.320(4)(b) (Process Source Opacity), 62-296.410 (Combustion Source Opacity) and 62-296.320(4)(c) (Fugitive Dust). The PM emissions limiting standards of Rule 62-296.320(4)(a), FAC, do not apply to the LRF, BPF (or to the flares), because they qualify for the exemption given to units that "salvage materials by burning".

Rule 62-296.320(1), FAC states that "No person shall store, pump, handle, process, load, unload or use in any process or installation, VOCs or organic solvents without applying known and existing vapor emission control devices or systems deemed necessary and ordered by the Department." None of the proposed facilities will store or use volatile organic solvents. A small emergency back-up diesel motor will likely be included on the parcel to keep the LRF kiln rotating in the event of a power failure. If so, it will have a 500-gallon diesel fuel (No. 2 fuel oil) storage tank. No. 2 fuel oil has a low Reid Vapor Pressure (approximately 0.005 psia) that will not likely warrant a vapor emission control device. However, SWA's tank will have a vapor emission control device if required to by FDEP.

The BPF will have an enclosed wastewater sludge receiving area with an odor control device, likely a wet scrubber packed tower, on its exhaust vent. In addition, the standard operating procedure at the sludge receiving area will specify that the roll-up doors be kept closed whenever they are not actively being used. The RTO on the sludge dryer exhaust will control VOCs and odors driven off the sludge by the dryer. These measures will meet the requirements of Rule 62-296.320(2), FAC, which prohibits the discharge of objectionable odors. No other units at the proposed projects will be odor sources.

The general Visible Emissions Standard, Rule 62-296.320(4)(b), FAC, sets a limit of 20 percent opacity for process sources. This is less stringent than the opacity requirements of the Lime Manufacturing NSPS of 15 percent opacity (6-minute average), but the limit will apply to emissions from the BPF dryers.

Rule 62-296.410(2), which limits visible emissions from carbonaceous fuel-burning equipment, will set an opacity limit of 20 percent (except that 40 percent opacity is permissible for not more than two minutes in any hour) for the BPF burners, which will have a heat input capacity of 23 MMBtu/hr each. Since the process source opacity limit of 20 percent all the time is more stringent, and more directly applicable to a source that will have both process and combustion emissions, this combustion-source opacity limit will not apply. Similarly, the LRF burner, with a 33 MMBtu/hr heat input capacity, will be subject to a 30 percent opacity limit under this combustion-source rule, which is less stringent than the Lime Manufacturing NSPS requirement of 15 percent opacity.

The NCRRF Title V permit incorporates the provisions limiting open burning and the generation of fugitive dust, and these will apply to the LRF and BPF projects, as well.

As discussed in Section 5.0, the entire State of Florida is either classified as attainment or considered to be in attainment (i.e., unclassifiable) with respect to the NAAQS for all pollutants. In addition, Palm Beach County is not part of any maintenance areas for lead or PM. Therefore, the proposed projects are not subject to the Reasonably Available Control Technology (RACT) requirements for these pollutants in Rule 62-296, FAC. The NO_X RACT provisions of Rule 62-296.500(b) do apply to facilities in Palm Beach County. However, new or modified NO_X emitting facilities subject to major-source PSD permitting, and preparing a BACT analysis, are exempt from these requirements. Since the LRF and BPF will be meeting NO_X BACT (see Section 4.0), these rules do not apply.

2.12 Conclusions

The proposed LRF and BPF will comply with the EPA NSPS (40 CFR 60, Subparts HH and WWW), EPA NESHAP (40 CFR 61 Subpart E and 40 CFR 63 Subparts AAAA and AAAAA), EPA's CAM Rule (40 CFR 64), and with Florida air regulations for permits and certificates (Rules 62-210, 62-212, and 62-213, FAC), and Florida general emissions limiting standards (Rule 62-296, FAC). In addition, the projects will meet PSD requirements, including BACT for NO_X emissions (see Section 4.0), and the NAAQS (see Section 6.0).

Section 3
Air Pollution Emissions

This section describes the types of air emissions expected from the Lime Recalcination Facility (LRF), Biosolids Pelletization Facility (BPF), and from the three Class I Landfill flares that are included in the dispersion modeling analyses in Sections 6 and 7 of this volume. Estimated emission rates are based on:

- test data and guarantees provided by equipment vendors,
- the results of the Best Available Control Technology (BACT) analysis in Section 4 of this volume,
- meeting emissions limits described in Section 2, and
- where no other information is available, on U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors, Report No. AP-42, Volume 1, Fifth Edition ("AP-42").

Table 3-1 summarizes these emissions estimates. Emission rate calculations are presented in greater detail in Appendix A.

3.1 Lime Recalcination Facility Emissions

The proposed LRF will combust 33 MMBtu/hr of landfill gas in a high-temperature (1,250° C) rotary kiln to convert water treatment plant lime sludge to quicklime. The facility will be designed to produce up to 100 dry tons per day of finished quicklime. The hot combustion gases will flow up, countercurrent to the downward flowing lime, through the slightly inclined rotary kiln. The air emissions points will be the feed end of the kiln (which is also the kiln exhaust), the lime cooler, and the dry finished lime storage silo. Figure 1-4 in Section 1 illustrates the process flow.

The lime kiln itself will emit three types of pollutants:

- products of landfill and natural gas combustion: nitrogen oxides (NO_X), carbon monoxide (CO), sulfur dioxide (SO_2);
- fine lime dust entrained in the exhaust through the kiln: particulate matter less than 10 micrometers in diameter (PM_{10}); and
- landfill gas constituents not completely destroyed by the burner: volatile organic compounds (VOCs), mercury, and individual VOCs that are hazardous air pollutants (HAPs).

Table 3-1 SWA Lime Recalcination Facility and Biosolids Pelletization Facility Estimated Maximum Potential Emission Rates

Source	Emissions, by Air Pollutant																									
	Particulate Matter				Sulfur Dioxide				Nitrogen Oxides				Carbon Monoxide				Lead				Volatile Organic Compounds				Total HAP	
	Emission Factor	Units	lb/hr	ton/year	Emission Factor	Units	lb/hr	ton/year	Emission Factor	Units	lb/hr	ton/year	Emission Factor	Units	lb/hr	ton/year	Emission Factor	Units	lb/hr	ton/year	Emission Factor	Units	lb/hr	ton/year	lb/hr	ton/year
Lime Recalcination Facility																										
Rotary Kiln (Landfill Gas)[4]	0.005	gr/dscf @ 10% O2	0.56	2.5	9.98E-04	lb/hr/scfm[1]	1.40	6.1	0.440	lbs/MMBtu	14.52	63.6	150.00	ppmv @ 10% O2	8.87	38.9	---	---	---	---	20	ppmv @ 3% O	2.22	9.71	---	0.13
Cross-bar lime cooler	0.005	gr/dscf @ 10% O2	0.08	0.3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Storage Silo (2 Silos)	1.50E-02	gr/dscf actual	4.76E-04	2.1E-03	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Facility Subtotal	---	---	---	2.9	---	---	---	6.1	---	---	---	**63.6**	---	---	---	38.9	---	---	---	---	---	---	---	9.7	0.03	0.13
Biosolids Pelletizing Facility																										
200-wtpd Train (Andritz)	0.78	lb/hour[3,4]	0.78	3.4	0.93	lb/hour[2]	0.93	4.1	2.24	lb/hour[2]	2.24	9.8	0.39	lb/hour[2]	0.39	1.7	8.3E-05	lb/hour[2]	8.3E-05	3.6E-04	0.3	lb/hour[2]	0.3	1.3	---	0.09
Odor Control Unit																										
Storage Silos (2 Silos)	0.015	gr/dscf actual	1.51E-04	6.61E-04	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Cooling Towers (2)	0.019	lbs/10^3 gal drift	3.42E-04	1.50E-03	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Recycle Bin w/ Baghouse	0.015	gr/dscf actual	3.38E-01	1.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
200-wtpd Train (Andritz)	0.78	lb/hour[3,4]	0.78	3.4	0.93	lb/hour[2]	0.93	4.1	2.24	lb/hour[2]	2.24	9.8	0.39	lb/hour[2]	0.39	1.7	8.3E-05	lb/hour[2]	8.3E-05	3.6E-04	0.3	lb/hour[2]	0.3	1.3	---	0.09
Odor Control Unit																										
Storage Silos (2 Silos)	0.015	gr/dscf actual	1.51E-04	6.61E-04	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Cooling Towers (2)	0.019	lbs/10^3 gal drift	3.42E-04	1.50E-03	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Recycle Bin w/ Baghouse	0.015	gr/dscf actual	3.38E-01	1.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Facility Subtotal	---	---	---	9.8	---	---	---	8.1	---	---	---	19.6	---	---	---	3.4	---	---	---	0.0	---	---	---	2.6	0.02	0.2
1800 SCFM Flare (880 SCFM Actual Flow)																										
Existing Flare[6]	17	lbs/10^6 dscf CH_4	0.53	2.3	9.98E-04	lb/hr/scfm[1]	1.03	4.5	40	lbs/10^6 dscf CH_4	1.24	5.4	750	lbs/10^6 dscf CH_4	23.19	101.6	---	---	---	---	---	---	0.15	0.7	0.03	0.12
1000 SCFM Flare																										
Proposed Flare[6]	17	lbs/10^6 dscf CH_4	0.56	2.5	9.98E-04	lb/hr/scfm[1]	1.00	4.4	0.068	lb/MMBtu	2.34	10.3	0.37	lb/MMBtu	12.74	55.8	---	---	---	---	---	---	0.15	0.64	0.03	0.13
2000 SCFM Flare Netted with Existing 1800 SCFM Flare																										
Proposed Flare[6]	17	lbs/10^6 dscf CH_4	0.58	2.53	9.98E-04	lb/hr/scfm[1]	1.12	4.89	0.068	lb/MMBtu	3.44	15.09	0.37	lb/MMBtu	2.28	9.99	---	---	---	---	---	---	0.14	0.60	0.03	0.15
3500 SCFM Flare - Operating at Capacity																										
Proposed Flare[6]	17	lbs/10^6 dscf CH_4	1.96	8.6	9.98E-04	lb/hr/scfm[1]	3.49	15.3	0.068	lb/MMBtu	8.19	35.9	0.37	lb/MMBtu	44.58	195.3	---	---	---	---	---	---	0.51	2.3	0.11	0.46
3500 SCFM Flare - Operating at 800 SCFM[7]																										
Proposed Flare[6]	17	lbs/10^6 dscf CH_4	0.45	2.0	9.98E-04	lb/hr/scfm[1]	0.60	3.5	0.068	lb/MMBtu	1.87	8.2	0.37	lb/MMBtu	10.19	44.6	---	---	---	---	---	---	0.12	0.5	0.02	0.11
Totals																										
Total (No Flares)	---	---	---	12.7	---	---	---	14.3	---	---	---	83.2	---	---	---	42.3	---	---	---	0.0	---	---	---	12.3	---	0.3
Total (Flares included)	---	---	---	19.6	---	---	---	26.4	---	---	---	116.8	---	---	---	261.0	---	---	---	0.0	---	---	---	14.1	---	0.7
Emission Thresholds																										
PSD Significant Increase (Major Modification)				25 (15 PM_{10})				40				40				100				0.6				40		25

Bold Text denotes an excedence of the PSD threshold

Notes:

[1] Assumes a 100 ppmv sulfur dioxide concentration in the landfill gas which is a conservative estimate for the Class I landfill (based on a 68.9 ppm concentration previously sampled at the Class I flare inlet)
Lime kiln combusts about 1,100 scfm of landfill gas. 200-wtpd sludge dryer combusts about 800 scfm of landfill gas.

[2] Emissions based on vendor information (Andritz), dated May 2, 2002, attached. BACT emission rate for low-NOx burner from North American Burner.

[3] Emissions are from the dryer stack only. Particulate matter emissions from screens, recycle bin, and storage silos not included.

[4] Emissions based on Vendor information (FFE Minerals USA Inc.) estimates of flue gas concentrations at ESP exit: 150 ppmv CO @ 10% O2; 0.005 gr/dscf PM. NO_X Emissions based on BACT for low-NOx burner (Coen): 0.44 lbs/MMBtu

[5] Emissions factors calculated based on estimated baghouse emission rate of 0.015 gr/dscf.

[6] NOx and CO emission factors are based on vendor guarantees (See Table A-15)

[7] 2700 SCFM is subtracted from flare capacity to account for demands of the Lime Recalcination Facility and the Biosolids Pellitization Facility.

The facility is proposed to include a four-field electrostatic precipitator (ESP) to remove PM_{10} from the kiln exhaust. The exhaust stack will be located just north of the LRF. The ESP is shown as Air Pollution Control in Figure 1-3 in Section 1.

In addition to the lime kiln itself, the LRF includes two other particulate matter emissions sources: the lime cooler, which cools the lime exiting the kiln by breaking the large pieces and blowing air through it; and the lime storage silos. Air blowing through the cross-bar lime product cooler will carry fine lime particles. Therefore, the cooler exhaust stack will have a baghouse for PM_{10} emissions control. From the cooler, quicklime is transported to the two storage silos for additional cooling time before transport to water treatment plants for use. PM_{10} will be emitted from the storage silo exhaust when the silos are filled. The exhausts will be controlled with baghouses. The lime will be conveyed from the silos to trucks by an enclosed pneumatic system to control fugitive dust during loading.

The emission rates presented below are maximum potential to emit, based on the design feed rate and facility operation 24 hours/day and 365 days/year.

3.1.1 Nitrogen Oxides

As described in Sections 1.0 and 2.0, BACT is required for NO_X emissions from both the LRF and BPF. The BACT analysis is presented in detail in Section 4. For the LRF, BACT was found to be a low-NO_X burner in the kiln. Based on guarantees provided by Coen, a low-NO_X burner manufacturer, the burner is expected to have a maximum potential to emit 0.44 pounds of NO_X per million British thermal unit of heat input (lb/MMBtu). The design landfill gas flow rate to the kiln is 1,400 normal cubic feet per minute (ncfm), equivalent to a heat input of 33 MMBtu/hour. Based on calculations shown in Appendix A, the kiln will emit 63.6 tons per year of NO_X.

3.1.2 Carbon Monoxide

Upper-bound emissions estimates were obtained from a kiln vendor, FFE Minerals USA Inc. The CO emission rate is based on the FFE Minerals CO exhaust gas concentration estimate of 150 parts per million by volume (ppmv), corrected to 10 percent O_2. Based on calculations shown in Appendix A, the resulting annual emission rate will be 38.9 tons per year. While a specific vendor has not yet been selected for the project, investigation of CO emissions data for similar lime kilns from other vendors has shown that this emission estimate is achievable by other lime kilns.

3.1.3 Sulfur Dioxide

Landfill gas contains hydrogen sulfide, as well as other sulfurous compounds, that will be converted to SO_2 when they are oxidized in the kiln burner flame. Testing performed by SWA found a total sulfur content of 69 ppmv in their Class I Landfill gas. It was assumed, for the purposes of calculating the maximum potential to emit, that 100 ppmv will be a reasonable upper bound on sulfur concentration in the landfill gas, and that all of the sulfur will convert to SO_2. Sulfur dioxide is an acid gas, and as it passes through the kiln and interacts with the alkaline lime, some is removed by the lime particles. It was assumed for this maximum potential emission rate calculation that no SO_2 removal will occur.

The SO_2 emission rate equation for flares in Section 2.4 of AP-42 was used. This equation calculates SO_2 emissions as a function of the sulfur content of the gas (100 ppmv in this case). Appendix A shows the calculation. The resulting annual SO_2 emission rate from the lime kiln will be 6.1 tons per year.

3.1.4 Total Volatile Organic Compounds

As discussed in Subsections 2.6.2 and 2.81 in Section 2, the LRF kiln burner will be regulated as an "enclosed combustion device" for the control of non-methane organic compounds (NMOC) emissions in the landfill gas. Therefore, the burner will meet the Municipal Solid Waste (MSW) Landfill New Source Performance Standards (NSPS) emissions limit for NMOC of 98 percent removal, or 20 ppmv, dry basis, as hexane, corrected to three percent oxygen, whichever is less stringent. The 20-ppmv limit is less stringent in this case, so it was used to calculate the maximum potential emission rate. It was also conservatively assumed that NMOC represents VOCs, even though not all NMOCs are VOCs. Appendix A shows the calculation. The resulting annual VOC emission rate from the lime kiln will be 9.7 tons per year.

3.1.5 Particulate Matter and PM_{10}

PM emissions from the lime kiln are primarily due to fine lime dust being carried through the kiln in the exhaust gas. An additional small amount will be produced by combustion of the landfill gas. Exhaust gases will be treated by an electrostatic precipitator to remove PM emissions before exiting out the stack. The ESP removes particles from the flue gas stream through electrical attraction. Particles are charged by electrodes in an electric field, and are then passed across an oppositely charged electrical grid (typically plates) in which they are collected. The proposed ESP will have four fields (four sets of plates). Periodically, the power to one of the four fields will be shut off and the plates in that field will be struck by rotating hammers to knock the accumulated particles into a hopper at the bottom of the ESP. The ESP will have a vendor-guaranteed PM outlet concentration of 0.005 grains per dry standard cubic foot (gr/dscf). It is conservatively assumed that all PM emissions will be PM_{10}. The resulting annual PM_{10} emission rate will be 2.5 tons per year (see Appendix A). The proposed ESP will be selected to meet the PM emissions limit in the National Emissions Standards for Lime Manufacturing Plants (40 CFR 63 Subpart AAAAA) (a.k.a "Lime MACT"), as discussed in Subsection 2.8.2 of Section 2, of 0.1 lb/ton of limestone feed. Since this limit applies to PM emissions from the kiln and cooler combined, the cooler baghouse, discussed below, will also be selected to meet this limit.

PM emissions from both the cooler and the storage silos will each be controlled by a jet-pulse type baghouse at the exhaust of the cooler and at the silo vents. Vendors

(FFE Minerals, Inc. or equal) are willing to guarantee the cooler exhaust baghouse to a PM outlet concentration of 0.005 gr/dscf. The estimated PM outlet concentration for the silo with baghouse, also based on vendor information, is 0.015 gr/dscf. The silo exhaust PM emission rate of 0.015 gr/dscf is equal to 0.034 grams/dscm, which will meet the Lime MACT standard for silo exhausts of 0.05 grams/dscm (see Subsection 2.8.2). Again, it is conservatively assumed that all PM emissions are all PM_{10}. The resulting annual potential emission rate from the cross-bar lime cooler will be 0.3 tons per year of PM or PM_{10}. It was assumed that the lime cooler will operate continuously, 24 hours a day. The silos, however, will be intermittent sources, emitting only when they are filled with lime and air is displaced out through the vent. The annual PM emission rate was calculated based on the design capacity amount of lime that will be produced in a year, the density of the lime, and the resulting volume of air that will be displaced through the silos by this lime. The silos will emit 0.002 tons per year of PM or PM_{10}.

3.1.6 Hazardous Air Pollutants

Landfill gas contains trace quantities of hazardous volatile organic compounds, which are by-products of solid waste decomposition, and mercury. Mercury in thermometers, lighting fixtures, and appliances can become a gas at the warm temperatures inside a landfill, and leave the landfill in the gas collection system. Typical concentrations of these compounds in landfill gas were taken from AP-42, Section 2.4, Table 2.4-1, and are shown in Appendix A. In calculating emission rates for these compounds, it was assumed that the LRF kiln burner will meet the required destruction efficiency of 98 percent for NMOC (see VOC discussion, above), and that this will also be the expected overall destruction efficiency for individual VOC HAPs. For mercury emissions, it was assumed that all of the mercury in the landfill gas would pass through the burner.

Appendix A shows that the LRF kiln's resulting total annual emission rate of all HAPs combined will be less than a ton per year (0.13 ton/year).

3.2 Biosolids Pelletization Facility

The BPF will combust 48 MMBtu/hr of landfill gas (and natural gas) in two 200-wtpd rotary dryers (23 MMBtu/hr each) to dry sewage sludge, and then screen the dried sludge into marketable fertilizer pellets.

Hot combustion gases (about 850° F at the dryer inlet) will flow through the dryer with the biosolids, driving off water and VOCs in the sludge. At the dryer exhaust end, a preseparator and polycyclone will remove the pellets and heavier dust particles from the gas stream and send these to screens for size sorting. The exhaust gases, containing products of combustion (NO_X, CO, and SO_2), PM_{10} (including trace quantities of metals), and VOCs, will then go through a tray condenser and venturi scrubber. These devices will remove PM_{10}, and some SO_2. The gases will then go through a 1 MMBtu/hr regenerative thermal oxidizer (RTO) to combust the VOCs before exiting the exhaust stack.

3.2.1 Nitrogen Oxides

As discussed above, BACT is required for NO_X emissions from both the LRF and BPF. The BACT analysis is presented in detail in Section 4. For the BPF, BACT was found to be a low-NO_X burner for the dryer. Based on estimates provided by North American Burner, and on review of recent air permits granted for similar facilities, each dryer burner is expected to have a maximum potential to emit 2.24 lb/hr of NO_X. Based on assumed continuous operation and calculations shown in Appendix A, each dryer will emit 9.8 tons per year of NO_X.

3.2.2 Carbon Monoxide

An estimated maximum potential CO emission rate of 0.39 lb/hr was obtained from a vendor, Andritz-Ruthner, Inc., for one 200-wtpd BPF dryer (see Appendix A). While a specific vendor has not been selected for the project, review of recently granted air permits for other biosolids dryers suggests that this CO emission rate will be achievable by other vendors. The resulting annual emission rate will be 1.7 tons per year for each of the two dryers.

3.2.3 Sulfur Dioxide

As discussed for the LRF, above, landfill gas contains sulfur compounds that will be converted to SO_2 emissions by the dryer burner. A vendor, Andritz-Ruthner, Inc., for the BPF has proposed an upper-bound emission rate of 0.93 lb/hr for each dryer (see Appendix A). Although the venturi scrubber will remove some of the SO_2 emissions from the exhaust gases, no credit has been taken for this in the calculations, for the purposes of estimating the maximum potential to emit. The resulting annual emission rate will be 4.1 tons per year for each of the two dryers.

3.2.4 Total Volatile Organic Compounds

The dominant source of VOCs in the BPF dryers will be those organic compounds driven off of the sludge as it is heated and dried. A small amount of additional VOCs will be from compounds in the landfill gas fuel not completely combusted by the burner, as discussed for the LRF, above. Both sets of VOCs from the dryer will be treated by the proposed RTO on each dryer exhaust. The RTO will have a guaranteed VOC removal efficiency of 98 percent. This will more than meet the MSW Landfill NSPS requirements, since the dryer burner itself will destroy approximately 98 percent of the landfill gas NMOC, and the RTO will then destroy 98 percent of what remains. A vendor (Andritz-Ruthner, Inc.) for the BPF has proposed an upper-bound VOC emission rate from each RTO of 0.30 lb/hr (see Appendix A). The resulting annual VOC emission rate will be 1.3 tons per year for each of the two dryers.

3.2.5 Particulate Matter and PM_{10}

PM emissions from a biosolids dryer are primarily due to dust being carried through the dryer, along with the dried pellets, in the exhaust gas. Combustion of landfill gas will produce an additional small amount of PM. A polycyclone on each dryer exhaust will remove the pellets and heavier particles. After leaving the polycyclone, the exhaust gases will pass through a tray condenser to cool them down (and condense volatilized metals onto the particles), and then through a venturi scrubber. The venturi scrubber will be guaranteed to have a 95 percent removal efficiency for PM_{10}. A vendor (Andritz-Ruthner, Inc.) for the BPF has proposed an upper-bound PM_{10} emission rate from each train's venturi scrubber and RTO of 0.78 lb/hr (see Appendix A). The resulting annual PM_{10} emission rate will be 3.4 tons per year for each of the two dryers.

Each dryer train's screens and recycle material (undersized pellets) bin will be a source of dust emissions. These are proposed to be controlled by a baghouse on the recycle material bin exhaust vent. The two pellet storage silos for each train (four total), located to the east of the BPF will also have baghouses on their exhaust vents. The estimated PM exhaust concentration for each baghouse is 0.015 grain per dry standard cubic foot (gr/dscf). It was assumed that the recycle material bin exhaust vents will operate continuously. The resulting annual PM and PM_{10} emission rate will be 1.5 tons per year per train. The silos, however, will be intermittent sources, emitting only when they are filled with pellets and air is displaced out through the vent. The annual PM emission rate was calculated based on the design capacity amount of pellets that will be produced in a year, the storage density of the pellets, and the resulting volume of air that will be displaced through the silos. All four silos, for both trains combined, will emit 0.001 tons per year of PM or PM_{10}. Pellets will be conveyed to trucks in an enclosed area to minimize fugitive dust emissions.

Each of the two dryer trains will have its own small cooling tower. It is anticipated that only about three pounds per year of PM would be emitted from each tower as dissolved solids in the mist. A conservative estimate of PM emission rates have been made based on the cooling tower's design water flow and evaporation rates and on emission factors from AP-42, Section 13.4, dated January 1995. The resulting annual PM or PM_{10} emissions rate will be 0.0015 tpy for each cooling tower, as presented in Appendix A.

For conservativeness, all PM_{10} emissions have been assumed equal to PM emissions.

3.2.6 Hazardous Air Pollutants

Similar to the LRF, the BPF will burn landfill gas containing trace quantities of hazardous VOCs and mercury. Typical concentrations of these compounds in landfill gas were taken from AP-42, Section 2.4, Table 2.4-1, and are shown in Appendix A. In calculating emission rates for these compounds, it was assumed that each BPF dryer burner will meet the required destruction efficiency of 98 percent for NMOC (see

VOC discussion, above), and that this will also be the expected overall destruction efficiency for individual VOC HAPs. Credit was not taken for the additional removal that will be provided by the RTO. For mercury emissions, it was assumed that all of the mercury (less than one tenth of a pound per year) in the landfill gas would pass through the burner.

In addition, the wastewater sludge entering the dryer will contain trace amounts of heavy metals, including arsenic, cadmium, chromium, lead, mercury, and nickel. These metals are assumed to remain attached to the particulate matter leaving the dryer. Metals will be removed, along with the PM, in each train's venturi scrubber. However, for conservatism in estimating the maximum potential to emit, no credit was taken for this control. A vendor (Andritz-Ruthner, Inc.) for the BPF has provided estimated metals emission rates for each dryer, based on data for metals concentration in sewage sludge and the worst-case assumption that none of these will be removed by the air pollution control devices (venturi scrubber and RTO). These emissions rates are shown in Appendix A. The metals emission rates were added to the emission rates of other HAPs from the combustion of landfill gas.

Appendix A shows that each BPF dryer's resulting total annual emission rate of all HAPs combined will be less than a ton per year (0.10 ton/year).

3.3 Landfill Gas Flares

The LRF and BPF will together have a design capacity landfill gas demand of 2,700 standard cubic feet per minute (scfm), or about 81 MMBtu/hr of landfill gas with a heat content of 500 Btu/scf. The Class I Landfill gas collection system would provide this gas, through pressurization equipment and a 4,500-scfm pressurized line under 45th Street.

Class I Landfill gas is currently collected and combusted in an 1,800 scfm flare. SWA is expanding the landfill gas collection and control system to be in compliance with the requirements of the NSPS for Municipal Solid Waste Landfills, 40 CFR 60 Subpart WWW. As discussed in Subsection 1.2.3 of Section 1, SWA plans to replace the existing 1,800 scfm flare with a new 3,500 scfm blower and flare at a new Flare Station to be located north of the Compost Facility.

Although the LRF and BPF could demand up to 2,700 scfm of the Class I Landfill gas, SWA has considered installation of two additional flares, a 1,000 scfm flare and a 2,000 scfm flare, to handle future landfill gas system expansions and/or buildout conditions of up to 6,000 scfm. This will provide redundancy if the BPF and LRF projects are delayed, not built to capacity, and/or for when they are off-line, as well as gas turn-down capability.

As discussed in Sections 1.0 and 2.0, the flares are independent projects from the LRF and BPF, and exempt from PSD permitting, but they are contemporaneous with the LRF and BPF projects. In addition, to qualify for the exemption from PSD permitting, the flares must be shown not to cause or contribute to any exceedance of an ambient air quality standard, allowable increase, or visibility limitation. For these reasons, the flares have been included in the dispersion modeling for the BPF and LRF projects, and their emission rates discussed here.

3.3.1 Total Volatile Organic Compounds

The flares will be required to meet the NSPS for MSW Landfills emissions limit for NMOC of 98 percent removal (see Subsection 2.6.2 in Section 2). Because all three proposed flares, as well as the existing 1,800-scfm flare, are open flares, this NMOC removal efficiency cannot readily be confirmed with emissions testing. An assumption is built into NSPS that open flares complying with the performance specifications in 40 CFR 60.18 provide the 98 percent removal (40 CFR 60.752(b)(2)(iii)(A) and 61 FR 9906, March 12, 1996). Since all of the Class I Landfill flares fulfill, and will continue to fulfill these requirements, 98 percent removal efficiency was used in calculating VOC emission rates.

The NMOC inlet concentration of 595 ppmv (as hexane) was taken from AP-42, Section 2.4. It was conservatively assumed that NMOC represents VOCs, even though not all NMOCs are VOCs. Appendix A shows the calculation. The resulting annual VOC emission rates from the flares are listed below:

- 3,500-scfm flare: 2.3 tons/yr
- 1,000-scfm flare: 0.6 tons/yr
- 2,000-scfm flare: 1.3 tons/yr
- Existing 1,800-scfm flare: -0.7 tons/yr, based on existing two-year actual average flow of 1,034 scfm. Since this flare is being replaced, its emissions are subtracted from those above.

The total net increase in VOC emissions from the flares would be 3.6 tons per year. However, if the BPF and LRF were drawing 2,700 scfm of gas, this total would be 1.8 tons per year.

3.3.2 Nitrogen Oxides

Nitrogen oxides are produced as a secondary emission from the combustion of landfill gas. The NO_X emission rate for the existing 1,800-scfm flare was calculated based on the AP-42 emission factor of 40 pounds of NO_X per million dry standard cubic feet (dscf) of methane burned (AP-42, Section 2.4, Municipal Solid Waste Landfills, Table 2.4-5), consistent with currently permitted emission rates for this open flare. The actual emission rate was calculated based on the most recent two-year average gas methane content and flow rate (880 scfm) to the existing flare (see Appendix A).

For the proposed 3,500-scfm, 1,000-scfm, and 2,000-scfm open flares, the emission rates for CO and NO_X are based on vendor emissions estimates, which, in turn, are from emission rates in AP-42's Industrial Flares Section, Section 13.5, Table 13.5-1. The NO_X emission rate is 0.068 lb/MMBtu of heat input to the flare. The calculations are shown in Appendix A. The resulting maximum potential annual NO_X emission rates for the flares are shown below:

- 3,500-scfm flare: 35.9 tons/yr
- 1,000-scfm flare: 10.3 tons/yr
- 2,000-scfm flare: 20.5 tons/yr
- Existing 1,800-scfm flare: -5.4 tons/yr, based on existing two-year actual average flow of 1,034 scfm. Since this flare is being replaced, its emissions are being subtracted from those above.

The total net increase in NO_X emissions from the flares would be 61.3 tons per year. If the BPF and LRF were drawing 2,700 scfm of gas, however, this total would be 33.6 tons per year.

3.3.3 Carbon Monoxide

Another secondary emission from the combustion of landfill gas is CO. Similar to the approach for NO_X emissions, the CO emission rate for the existing 1,800-scfm flare was calculated based on the AP-42 emission factor of 750 lb CO / million dscf of methane burned (AP-42, Section 2.4, Municipal Solid Waste Landfills, Table 2.4-5), which is also its currently permitted PSD emission rate. For the proposed 3,500-scfm, 1,000-scfm, and 2,000-scfm open flares, the vendor-recommended CO emission rate is 0.37 lb/MMBtu of heat input to the flare (AP-42, Section 13.5, Industrial Flares, Table 13.5-1). The calculations are shown in Appendix A. The resulting maximum potential annual CO emission rates for the flares are shown below:

- 3,500-scfm flare: 195.3 tons/yr
- 1,000-scfm flare: 55.8 tons/yr
- 2,000-scfm flare: 111.6 tons/yr
- Existing 1,800-scfm flare: -101.6 tons/yr, based on existing two-year actual average flow of 1,034 scfm. Since this flare is being replaced, its emissions are being subtracted from those above.

The total net increase in CO emissions from the flares would be 261.1 tons per year. If the BPF and LRF were drawing 2,700 scfm of gas, however, this total would be 110.4 tons per year.

3.3.4 Sulfur Dioxide

Emissions of SO_2 from a flare are directly related to the amount of sulfur found in the landfill gas. As discussed for the LRF and BPF, above, sulfur dioxide emission rates for both the existing 1,800-scfm flare and the proposed three new flares were based on equations in Section 2.4 of AP-42, and an assumed landfill gas sulfur content of 100 ppmv. Sulfur dioxide calculations for both the existing and proposed flares are presented in Appendix A. The resulting maximum potential annual SO_2 emission rates for the flares are shown below:

- 3,500-scfm flare: 15.3 tons/yr
- 1,000-scfm flare: 4.4 tons/yr
- 2,000-scfm flare: 8.8 tons/yr
- Existing 1,800-scfm flare: -4.5 tons/yr, based on existing two-year actual average flow of 1,034 scfm. Since this flare is being replaced, its emissions are being subtracted from those above.

The total net increase in SO_2 emissions from the flares would be 24.0 tons per year. If the BPF and LRF were drawing 2,700 scfm of gas, however, this total would be 12.1 tons per year.

3.3.5 Particulate Matter and PM_{10}

PM and PM_{10} emissions from landfill gas combustion were estimated for the existing and proposed flares using AP-42, Section 2.4, emission factors. It was assumed that all PM is PM_{10}. The calculations are shown in Appendix A. The resulting maximum potential annual PM_{10} emission rates for the flares are shown below:

- 3,500-scfm flare: 8.6 tons/yr
- 1,000-scfm flare: 2.5 tons/yr
- 2,000-scfm flare: 4.9 tons/yr
- Existing 1,800-scfm flare: -2.3 tons/yr, based on existing two-year actual average flow of 1,034 scfm. Since this flare is being replaced, its emissions are being subtracted from those above.

The total net increase in PM_{10} emissions from the flares would be 13.7 tons per year. If the BPF and LRF were drawing 2,700 scfm of gas, however, this total would be 7.0 tons per year.

3.3.6 Hazardous Air Pollutants

As discussed for the LRF and BPF, combustion of landfill gas will result in emissions of trace amounts of hazardous VOCs and mercury. Typical concentrations of these compounds in landfill gas were taken from AP-42, Section 2.4, Table 2.4-1, and are shown in Appendix A. In calculating emission rates for these compounds, it was assumed that the flares will meet the required destruction efficiency of 98 percent for NMOC (see VOC discussion, above), and that this will also be the expected overall destruction efficiency for individual VOC HAPs. It was assumed that all of the mercury in the landfill gas (about one-half of a pound per year in all three proposed flares together), would pass through the flares.

Appendix A shows that the three proposed Class I Landfill flares' resulting maximum potential total annual emission rate of all HAPs combined, without netting out the existing flare, would be less than a ton per year (0.85 ton/year).

3.4 Operation Scenarios

It is necessary to determine the worst-case operating scenario for purposes of comparison with PSD emission rate thresholds and for the dispersion modeling analyses. For the proposed facility there are four possible worst-case scenarios:

- Both the LRF and BPF operating: all landfill gas being used by the proposed LRF and BPF at their design heat input capacities (33 MMBtu/hr and 48 MMBtu/hr, respectively, for a total demand of 2,700 scfm of landfill gas), with the excess gas (3,800 scfm) going to the Class I Landfill flares;
- The LRF operating (1,100 scfm), with excess gas (5,400 scfm) being combusted by the Class I Landfill flares;
- The BPF operating (1,600 scfm), with excess gas (4,900 scfm) being combusted by the Class I Landfill flares; and
- All gas (6,500 scfm) being combusted by the Class I Landfill flares: Neither the LRF nor BPF are operating.

Emissions for the various sources under each scenario were calculated. For each pollutant, the scenario resulting in the highest total project emission rate at full build-out of the Class I Landfill was used for analyses:

- PM_{10}: Both the LRF and BPF operating, with 3,800 scfm of gas going to the flares;
- SO_2: Both the LRF and the BPF operating, with 3,800 scfm of gas going to the flares;
- NO_X: Both the LRF and BPF operating, with 3,800 scfm of gas going to the flares;

- CO: All gas being combusted by the flares, with the BPF and LRF both shut down;
- Lead: Both the LRF and BPF operating, with 3,800 scfm of gas going to the flares;
- VOC: Both the LRF and the BPF operating, with 3,800 scfm of gas going to the flares; and
- Total HAPs: All gas being combusted by the flares, with the BPF and LRF both shut down.

Emissions for all sources/scenarios are shown in Table 3-1. Emissions not used in the calculation of total facility emission rates are grayed out. Detailed emission rate calculations, including the calculation of emissions for the various scenarios, are presented in Appendix A.

Section 4
Best Available Control Technology Review

4.1 Description of Best Available Control Technology Review

This section contains a Best Available Control Technology (BACT) analysis of nitrogen oxides (NO_X) control technologies for the proposed facilities to be located at SWA's landfill. The new facilities consist of a 100 dry ton per day (dtpd) Lime Recalcination Facility (LRF) and a 68 dtpd Biosolids Pelletization Facility (BPF). The LRF contains one train (i.e. one rotary kiln and associated air pollution control (APC) equipment). The BPF contains two trains (i.e. two biosolids dryers and associated APC systems.) The combined uncontrolled NO_X emissions from the new facilities will be approximately 120 tons per year, which is greater than the Prevention of Significant Deterioration (PSD) Significant Increase Increment for a Major Modification (i.e. 40 tons per year). Therefore, since the project's NO_X emissions constitute a PSD significant net increase, the new facilities are classified as a Major Modification and a BACT analysis is required for the pollutant (in this case NO_X) which exceeds the PSD significance level.

A BACT analysis is an evaluation of the "best available" air pollution control technology for a particular emission source (in this case the LRF and BPF) and for particular pollutants (in this case only NO_X). The evaluation must consider the environmental, economic and energy impacts of each control technology. Furthermore, the analysis must be "top-down," that is, it must start with the most stringent control alternative and work down to the least effective control alternative. The most effective control technology which is determined to be technically and economically feasible is BACT.

Specifically, a BACT analysis consists of the following steps:

- Review BACT determinations of recent, similar type facilities;
- Identify all possible control technologies;
- Evaluate technical feasibility of alternative technologies;
- Develop capital and operations and maintenance (O&M) costs for the technically feasible alternatives;
- Evaluate environmental, economic and energy impacts; and
- Make final a BACT determination.

For this project, since the two facilities, LRF and BPF, are independent and quite different, each facility will be separately evaluated to determine the feasible NO_X control alternatives. Then the feasible alternatives for each facility will be evaluated in various combinations to determine the most cost effective overall control alternative for the whole facility.

4.2 Basis of Best Available Control Technology Analysis

Uncontrolled NO_X emissions for each facility are based on vendor provided emissions data. The uncontrolled NO_X emissions are as follows:

	NO_X Concentration in Flue Gas in ppmdv corrected to 10 percent oxygen	NO_X Emission in lb/ hr per Train	NO_X Emission in tons/ yr per Train
LRF	220	21.5	94.2
BPF	60	2.98	13.1

The above uncontrolled NO_X emissions will be considered the baseline case against which all control technologies will be evaluated.

Technical and economic data on the various control technologies was obtained mainly from contacting numerous suppliers of NO_X control systems. Capital and O&M costs were based on data supplied from control system suppliers. In addition, the Office of Air Quality Planning and Standards (OAQPS) Cost Control Manual (U.S. Environmental Protection Agency (EPA) OAQPS, 1996) was used to provide various installation cost factors and O&M cost data.

It should be noted that the fuel to be used in both facilities is landfill gas. Thus the baseline case assumed the use of landfill gas for fuel. This was an important consideration in this analysis since many of the catalyst suppliers were unwilling to offer performance guarantees due to the strong likelihood of contaminants in the landfill gas which could incapacitate their systems.

4.3 Best Available Control Technology Reviews

LRF BACT Review

A review of BACT determinations of recently permitted lime kiln facilities throughout the United States was performed using the EPA RACT/BACT/LAER Clearinghouse (RBLC) database (EPA RBLC). The industrial sector, Lime/Limestone Handling/Kilns/Storage/, was searched for BACT determinations over the time period January 1992 to October 2002. The search identified 39 facilities which had either lime kilns or lime handling or processing equipment. Of these 39 facilities, 24 lime kiln installations were identified. The output from the RBLC search is presented in **Appendix B**.

Of the 24 lime kiln installations listed, none of these had advanced NO_X control technologies such as selective catalytic reduction (SCR), low temperature ozone oxidation, multi-chemical wet scrubbing, or flue gas recirculation. One of the installations had a low NO_X burner. Most of the installations had (as listed for NO_X control) either "No Control Feasible" (12 installations) or "Pollution Prevention" using proper design and operation or combustion controls (11 installations). One had "Add-On Controls" using low excess air with computerized control and oxygen monitoring. Thus, based on the RBLC review, BACT for lime kilns is proper design and operation with low excess air. As previously stated, one plant had a low NO_X burner.

BPF BACT Review

The RBLC database was searched for BACT determinations on municipal biosolids drying plants. However, there were no sewage biosolids dryers in the RBLC database. Therefore, the BACT review was based upon recently permitted biosolids dryer facilities. In general, the rotary drum biosolids drying process has been modified and improved over the last ten years to increase thermal efficiency, reduce pollutant emissions and to provide assured control of odors. These improvements include:

- Cooling and condensing of the dryer exhaust gas
- Recirculation of 60 percent to 90 percent of the cooled dryer exhaust to the dryer furnace
- Wet scrubbing of the non-recirculated portion of the dryer exhaust for control of particulate matter and acid gases
- Regenerative thermal oxidation of the non-recirculated portion (of the dryer exhaust) to control volatile organic compounds (VOCs) and odors

Some of these features control NO_X emissions. Specifically, recirculation of the dryer exhaust is flue gas recirculation which reduces thermal NO_X at the burner. Also the condenser and wet scrubber provide some additional removal of NO_X and ammonia. Thus, most of the present-day biosolids drying systems have incorporated effective NO_X control measures. The BPF will have all of the above process features and thus a high degree of NO_X control will be achieved.

It is noted that some of the recently permitted biosolids drying facilities (namely, Massachusetts Water Resource Authority in Boston, MA and the Greater Lawrence Sanitary District in North Andover, MA) have low NO_X burners on the dryer in addition to the above features. According to the major suppliers of biosolids drying systems, no biosolids drying facility has an advanced NO_X control technology such as selective catalytic reduction, low temperature ozone oxidation or multi-chemical wet scrubbing.

4.4 NO_X Control Technologies

The following NO_X control technologies are evaluated for the LRF:

1. Low Temperature Selective Catalytic Reduction (SCR)
2. Non-Ammoniated SCR
3. Low Temperature Ozone Oxidation
4. Multi-Chemical Wet Scrubbing System
5. Low NO_X Burner
6. Flue Gas Recirculation (FGR)

The following NO_X control technologies are evaluated for the BPF:

1. Low Temperature SCR
2. Low Temperature Ozone Oxidation
3. Multi-Chemical Wet Scrubbing System
4. Low NO_X Burner

It should be noted that the biosolids drying process utilized in the BPF incorporates recirculation of the condensed dryer exhaust gases back to the furnace of the dryer for use as combustion air. This gas recirculation is routinely done on biosolids dryers to accomplish energy conservation and minimize odor control requirements. Hence, the BPF already includes FGR and thus it does not need to be evaluated for the BPF.

A brief description of each of the proposed technologies follows.

Low Temperature SCR

In the SCR process, ammonia is injected into the flue gas stream which is then sent through an SCR catalyst. The ammonia reacts with the NO_X in the flue gas on the surface of the catalyst to produce nitrogen gas (N_2) and water. The size of the catalyst bed is determined by the flue gas flow rate and the amount of NO_X control required. Low temperature SCR utilizes a platinum/palladium oxide catalyst which is effective over the temperature range of 300°F to 550°F. Most SCR systems are carried out at a higher temperature (600°F to 750°F) and use a vanadium/titanium oxide catalyst.

In the last ten years, high temperature SCR systems have been applied to a wide range of gas-fired and coal-fired boilers and industrial furnaces and have achieved 90 percent to 94 percent control of NO_X in recent applications (Texas Institute, 2000).

Neither high temperature nor low temperature SCR has ever been applied to a lime kiln or a biosolids dryer.

Non-Ammoniated SCR

Non-ammoniated SCR is a catalytic reduction process which does not need ammonia. In this process the catalyst has a potassium carbonate absorber coating which first oxidizes nitrogen oxide (NO) to nitrogen dioxide (NO_2) and then absorbs the NO_2 onto the surface of the catalyst. When the coating becomes saturated with NO_2, the catalyst is then regenerated by passing a dilute hydrogen reducing gas over the surface of the catalyst. The hydrogen in the gas reacts with the nitrites and nitrates to form water and elemental nitrogen. The system is designed such that approximately 20 percent of the catalyst is in the regeneration cycle while 80 percent is in the oxidation/absorption cycle. The regeneration cycle takes place in the absence of oxygen and hence tight sealing of the catalyst compartments from the flue gas stream is required. The regeneration cycle requires the injection of steam and natural gas into the section of saturated catalyst.

Non-ammoniated SCR systems have been applied to several gas-fired turbines and some process heaters and typically achieve 80 percent to 90 percent NO_X control. In general, non-ammoniated SCR systems are 2 to 3 times more costly than standard SCR systems. A non-ammoniated SCR system has never been installed on a lime kiln or on a biosolids dryer.

Low Temperature Ozone Oxidation

Low temperature ozone oxidation is a patented process by BOC Gases for removal of NO_X from gas streams. In this system ozone is injected into the flue gas stream at a temperature below 350°F. The ozone oxidizes the NO_X to a water soluble form such as N_2O_5. The gas stream is then passed through a wet scrubber where the N_2O_5 is absorbed into the scrubber water. The process requires an ozone generator as well as a supply of liquid oxygen which is converted to ozone in the ozone generator. Also for application to the LRF, the flue gas would have to be cooled to below 350°F for the process to be effective. Another drawback of the process is that it generates considerable quantities of acidic wastewater that would have to be neutralized prior to discharge to a sewer system. The facility site has an existing deep well injection system and the wastewater could also be disposed of by deep well injection. The process can achieve high levels of NO_X removal, over 95 percent. However, there are only a handful of industrial applications of this process. For application to the LRF and BPF, a NO_X control efficiency of 90 percent was assumed.

Multi-Chemical Wet Scrubbing System

Multi-chemical wet scrubbing is a chemical oxidation process offered by Tri-Mer Corporation. The typical system consists of four scrubber towers. In the first tower cooling water sprays reduce the flue gas temperature to approximately 150°F. In the next 3 towers the following chemicals are added: sodium sulfide, sodium chlorite, sodium hydroxide and sulfuric acid. The chemistry is proprietary, but appears to be based on oxidation of the NO and NO_2 to water soluble forms followed by reduction/absorption reactions. NO_X removals as high as 99 percent have been reported. The process can handle extremely high levels of NO_X (i.e. hundreds of pounds per hour), but chemical usage costs can become quite high. Chemical storage tanks and feed systems are required for each of the chemicals. Capital cost for the system is high but, other than keeping the chemical feed systems and scrubber water recirculation pumps running, O&M requirements are relatively straightforward. The system does produce a neutralized wastewater stream containing soluble salts which could be discharged to the on-site sanitary sewer or to the deep well injection system. Tri-Mer reports over 100 installations mostly in the chemical and metal-finishing industry. Most of Tri-Mer's installations are in the 20 to 12,000 standard cubic feet per minute (scfm) size range which would be well suited for the LRF and BPF. For these sources a NO_X control efficiency of 90 percent was used.

Low NO_X Burner

In a low NO_X burner the air and fuel addition are staged or distributed over several different zones at the flame front of the burner to create fuel rich and fuel lean zones and thereby control oxygen concentrations and localized temperatures. For instance, in the primary zone, a portion of the fuel would be burned with a slight amount of excess air to maintain a stable flame. (Flame stability is an important consideration when staging air and fuel flow to a burner.) In the second zone, excess fuel would be added to maintain a fuel-rich zone to limit oxygen concentration and to reduce any NO_X to molecular nitrogen and water. In the third zone a slight amount of air would be added to complete the combustion while maintaining low excess air conditions, thereby limiting the temperature and oxygen concentration. There are many variations of low NO_X burners. The most advanced designs have been developed for large gas-fired utility and industrial boilers. Unfortunately there has not been a great demand for low NO_X burners specifically for lime kilns or biosolids dryers. Hence, only moderate levels of NO_X control can be expected from low NO_X burners on these combustion units.

Based on manufacturer's recommendations, the following NO_X emission factors were selected for the lime kiln and biosolids dryer equipped with low NO_X burners:

Lime Kiln	0.44 lb/MMBtu
Biosolids Dryer	2.24 lb/hr

These factors correspond to NO_X control removal efficiencies of 32 percent and 25 percent for the lime kiln and biosolids dryer, respectively.

Flue Gas Recirculation

Flue Gas Recirculation (FGR) is a relatively simple NO_X control technology in which cooled flue gas from the combustion process is recirculated back to the inlet of the furnace and used as burner combustion air. The recirculated flue gas reduces the oxygen concentration of the combustion air thereby reducing the flame temperature. Also, less oxygen is present in the flame zone which reduces the generation of thermal NO_X. FGR can typically achieve NO_X reductions of 10 percent to 35 percent.

4.5 Evaluation of Control Technologies for Lime Recalcination Facility

As previously stated, each of the facilities (LRF and BPF) will first be evaluated separately and then the technically feasible alternatives for each facility will be combined to determine the most effective NO_X control strategy.

4.5.1 Low Temperature Selective Catalytic Reduction

Technical and Economic Evaluation

The following catalyst suppliers and SCR system suppliers were contacted to obtain proposals for SCR systems: CRI Catalysts, CSM Worldwide, Siemens, and Hamon-Research Cottrell. In general, the catalyst and equipment suppliers were very reluctant to offer any type of SCR system (either high or low temperature) for two reasons. First, the flue gas will contain some lime dust (CaO) which is not collected in the ESP. Calcium is a poison for SCR catalysts and deactivation of the catalyst will proceed at an accelerated rate. Second, landfill gas typically contains silica compounds (siloxanes) and possibly phosphorous and alkali-metals which can act as poisons to the catalyst. By far the biggest concern of the vendors was the likely presence of silica compounds which are becoming more and more prevalent in landfill gas. This is believed to be due to the increased use of silicon as a dispersant in household products. Some of the vendors noted that some SCR systems on combustion units using landfill gas in California had failed. In any event SCR suppliers were unwilling to offer an SCR system for this application. Thus, the use of SCR catalyst for this project was deemed to be technically infeasible.

Energy, Environmental and Social Impact Evaluation

The energy, environmental and social impacts of implementing this alternative could not be determined since low temperature SCR was judged to be technically unfeasible.

Overall Evaluation

Since low temperature SCR was judged to be technically unfeasible, it was eliminated from consideration as BACT.

4.5.2 Non-Ammoniated Selective Catalytic Reduction

Technical and Economic Evaluation

The non-ammoniated SCR catalyst is also susceptible to fouling by silica compounds which are likely to be present in the landfill gas. Therefore, this alternative was also judged to be technically infeasible.

Energy, Environmental and Social Impact Evaluation

The energy, environmental and social impacts of implementing this alternative could not be determined since non-ammoniated SCR was judged to be technically unfeasible.

Overall Evaluation

Since non-ammoniated SCR was judged to be technically unfeasible, it was eliminated from consideration as BACT.

4.5.3 Low Temperature Ozone Oxidation

Technical and Economic Evaluation

Low temperature ozone oxidation does not require a catalyst and is technically feasible. The drawbacks to this alternative are its high capital and operating costs, wastewater stream which must be disposed of, and relatively few installations upon which to base operating experience. Capital and O&M costs are presented in **Table 4-1** and were developed from data provided by BOC Gas and from cost factors from the OAQPS Cost Control Manual. The total annual cost is $1,266,000 and the cost per ton of NO_X removed is $15,100. Since this is a high unit cost for NO_X removal, this alternative is judged to be economically infeasible.

Energy, Environmental and Social Impact Evaluation

The energy impact for low temperature ozone oxidation would be approximately 308 kilowatts of electrical power usage. The environmental impact would be the removal of 84 tons per year of NO_X from the atmosphere. However, a 250 gallons per minute (gpm) stream of wastewater containing nitrates and dilute nitric acid would be generated. This wastewater stream would have to be discharged to the onsite sanitary sewer system or else disposed of in the existing deep well injection system. On an annual basis, approximately 131 million gallons per year of wastewater would have to be disposed of by either of these means. The social impact of this alternative is that it would provide jobs for one addition plant operator and one addition maintenance mechanics.

Overall Evaluation

The energy and social impacts of this alternative would be moderate. The primary environmental impact is the removal of 84 tons per year of NO_X from the atmosphere. There is a slight negative impact of having to discharge 131 million gallons per year of nitrated wastewater to the local wastewater treatment plant (WWTP) or to the deep well injection system. The cost per ton of NO_X removed $15,100) is quite high and is judged to be economically unfeasible. Due to the severe economic impact, the overall evaluation of this alternative is that it should not be considered BACT.

Table 4-1 - Low Temperature Ozone Oxidation System for LRF Capital and O&M Costs

CAPITAL COSTS		
Direct Costs		
Purchased Equipment Costs		
Oxidation reactor, flue gas heat exchanger, wet scrubber, ozone generator, interconnecting ductwork, pumps and piping, instrumentation & controls, NOx analyzer	$1,083,000	
Sales Tax and Freight	$87,000	
1. Purchased Equipment Cost = A	$1,170,000	
Direct Installation Costs		
Foundations and Supports 0.12xA	$140,000	
Steel Supports, Ladders and Platforms 0.12xA	$140,000	
Handling and Erection 0.40xA	$468,000	
Electrical 0.10xA	$117,000	
Piping 0.30xA	$351,000	
Painting 0.02xA	$23,000	
2. Total Direct Installation Cost	$1,239,000	
Indirect Costs		
Engineering 0.10xA	$117,000	
Construction and Field Expenses 0.20xA	$234,000	
Contractor Fees 0.10xA	$117,000	
Start-Up, Performance Test & Contingencies 0.05*A	$59,000	
3. Total Indirect Cost	$527,000	
TOTAL CAPITAL INVESTMENT (1+2+3)	$2,936,000	
TOTAL ANNUALIZED CAPITAL COST (i =10%, 10 yrs, crf = 0.16275)		$478,000
ANNUAL O&M COSTS		
Operating Labor		
(8 hr/day x 365day/yr x $17/hr x 1.35 for fringe benefits)	$67,000	
Supervisory Labor		
(15% of operating labor)	$10,000	
Maintenance Labor		
(8 hr/day x 365 days/yr x $18/hr x 1.35 f.b.)	$71,000	
Maintenance Materials		
(100% of maintenance labor)	$71,000	
Liquid Oxygen (31,500 hundred ft^3/monthx$0.35/hundred ft^3x 12m/yr)	$132,000	
Power - Additional ID Fan Power cost		
(0.000157 x 21152 acfm x 10 inches wc x 1/0.65 = 51 hp)		
(51hp x 0.75 kw/hp x 8760 hr/yr x $0.07/kwhr)	$23,000	
Power - for ozone generator and pumps		
(270 kw x 8760 hr/yr x $0.07/kwhr)	$166,000	
Wastewater Disposal		
(250 gal/min x 60 min/hr x 8760 hr/yr x $1.00/1000 gal)	$131,000	
Property Taxes, Administration & Insurance		
(0.04 x Total Capital Investment)	$117,000	
TOTAL ANNUAL O&M COST		$788,000
TOTAL ANNUAL COST		$1,266,000
Tons of NOx Removed per Year		**84**
TOTAL COST PER TON OF NOx REMOVED		**$15,100**

4.5.4 Multi-Chemical Wet Scrubbing System

Technical and Economic Evaluation

Application of multi-chemical wet scrubbing technology to the LRF is technically feasible and this technology has a solid track record with over 100 installations in industrial use. The drawbacks to this technology are its high capital and operating costs, high chemical usage, and generation of a significant wastewater stream requiring disposal. The capital and O&M costs were developed based on data from Tri-Mer Corporation and are presented in **Table 4-2**. The total annual cost is $1,223,000 and the total cost per ton of NO_X removed is $14,600. The cost per ton of NO_X removed is quite high and therefore this alternative is judged to be economically infeasible.

Energy, Environmental and Social Impact Evaluation

The energy impact for multi-chemical wet scrubbing would be approximately 72 kilowatts of electrical power usage. The environmental impact would be the removal of 85 tons per year of NO_X from the atmosphere. A 250 gpm neutralized wastewater stream containing nitrates and soluble salts would be generated and would have to be disposed of in the sanitary sewer system or the deep well injection system. On an annual basis, approximately 130 million gallons per year of wastewater would have to be disposed of either of these two means. The social impact of this alternative is that it would provide jobs for one addition plant operator and one addition maintenance mechanic.

Overall Evaluation

The energy and social impacts of this alternative would be minimal. The environmental impact would be beneficial since 84 tons per year of NO_X would be removed from the atmosphere. There would be a slightly adverse impact from having to discharge 130 million gallons per year of wastewater to the sanitary sewer system or to the deep well injection system. Due to the high cost per ton of NO_X removed ($14,600), this alternative is judged to be economically infeasible. Overall evaluation of this alternative is that it has a severe economic impact, and thus should not be considered BACT.

4.5.5 Low NO_X Burner

Technical and Economic Evaluation

Use of a low NO_X burner on the lime kiln is technically feasible and would be relatively simple and inexpensive to install. The equipment cost for a low NO_X burner for the lime kiln is approximately $200,000 which is about twice the cost of a conventional burner. Thus, the incremental equipment cost to implement this technology is $108,000. This incremental cost is used in the economic analysis of low NO_X burner presented in **Table 4-3**. Also note that there would be no additional direct installation costs or indirect costs for a low NO_X burner versus a conventional burner. Therefore these costs are zero in Table 4-3.

Table 4-2 - Multi-Chemical Wet Scrubbing System for LRF Capital and O&M Costs

CAPITAL COSTS		
Direct Costs		
Purchased Equipment Costs		
Four scrubber towers with packing, chemical storage tanks and feed systems, interconnecting ductwork, pumps and piping, structural steel frame, instrumentation & controls, NOx analyzer	$750,000	
Sales Tax and Freight	$60,000	
1. Purchased Equipment Cost = A	$810,000	
Direct Installation Costs		
Foundations and Supports 0.12xA	$97,000	
Steel Supports, Ladders and Platforms 0.12xA	$97,000	
Handling and Erection 0.40xA	$324,000	
Electrical 0.10xA	$81,000	
Piping 0.30xA	$243,000	
Painting 0.02xA	$16,000	
2. Total Direct Installation Cost	$858,000	
Indirect Costs		
Engineering 0.10xA	$81,000	
Construction and Field Expenses 0.20xA	$162,000	
Contractor Fees 0.10xA	$81,000	
Start-Up, Performance Test & Contingencies 0.05*A	$41,000	
3. Total Indirect Cost	$365,000	
TOTAL CAPITAL INVESTMENT (1+2+3)	$2,033,000	
TOTAL ANNUALIZED CAPITAL COST (i =10%, 10 yrs, crf = 0.16275)		$331,000
ANNUAL O&M COSTS		
Operating Labor		
(8 hr/day x 365day/yr x $17/hr x 1.35 for fringe benefits)	$67,000	
Supervisory Labor		
(15% of operating labor)	$10,000	
Maintenance Labor		
(8 hr/day x 365 days/yr x $18/hr x 1.35 f.b.)	$71,000	
Maintenance Materials		
(100% of maintenance labor)	$71,000	
Chemicals		
($2.45/lb of NOx removed x 85 tons/yr x 2000 lb/ton))	$417,000	
Power - Additional ID Fan Power cost		
(0.000157 x 12000 acfm x 10 inches wc x 1/0.65 = 29 hp)		
(29 hp x 0.75 kw/hp x 8760 hr/yr x $0.07/kwhr)	$13,000	
Power - for chemical feed and recirculation pumps		
(50 kw x 8760 hr/yr x $0.07/kwhr)	$31,000	
Wastewater Disposal		
(250 gal/min x 60 min/hr x 8760 hr/yr x $1.00/1000 gal)	$131,000	
Property Taxes, Administration & Insurance		
(0.04 x Total Capital Investment)	$81,000	
TOTAL ANNUAL O&M COST		$892,000
TOTAL ANNUAL COST		$1,223,000
Tons of NOx Removed per Year		**84**
TOTAL COST PER TON OF NOx REMOVED		**$14,600**

Table 4-3 - Low NOx Burner for LRF Capital and O&M Costs

CAPITAL COSTS		
Direct Costs		
Purchased Equipment Costs		
Low NOx burner	$100,000	
Sales Tax and Freight	$8,000	
1. Purchased Equipment Cost = A	$108,000	
Direct Installation Costs[1]		
Handling and Installation	$0	
Electrical	$0	
Piping	$0	
Painting	$0	
2. Total Direct Installation Cost	$0	
Indirect Costs[2]		
Engineering	$0	
Construction and Field Expenses	$0	
Contractor Fees	$0	
Start-Up, Performance Test & Contingencies	$0	
3. Total Indirect Cost	$0	
TOTAL CAPITAL INVESTMENT (1+2+3)	$108,000	
TOTAL ANNUALIZED CAPITAL COST (i =10%, 10 yrs, crf = 0.16275)		$18,000
ANNUAL O&M COSTS		
Operating Labor		
(No additional operating labor required.)	$0	
Supervisory Labor		
(No additional supervisory labor required.)	$0	
Maintenance Labor		
(1 hr/day x 365 days/yr x $18/hr x 1.35 f.b.)	$9,000	
Maintenance Materials		
(100% of maintenance labor)	$9,000	
Power		
(10 hp x 0.75 kw/hp x 8760 hr/yr x $0.07/kwhr)	$5,000	
Insurance		
(0.01 x Total Capital Investment)	$1,000	
TOTAL ANNUAL O&M COST		$24,000
TOTAL ANNUAL COST		$42,000
Tons of NOx Removed per Year		**30**
TOTAL COST PER TON OF NOx REMOVED		**$1,400**

Notes:

1. No additional direct installation costs for a Low NOx burner versus a conventional burner.
2. No additional indirect costs for a Low NOx burner versus a conventional burner.

Regarding O&M costs, no additional operating labor is required for the low NO_X burner as opposed to a conventional burner. A slight amount of additional power would be required for the primary combustion air fan. Also it is estimated that a small amount of additional maintenance labor and maintenance materials would be required in comparison with a conventional burner. The total annual cost for the low NO_X burner is $42,000 and the total cost per ton of NO_X removed is $1,400. The cost per ton of NO_X removed is quite reasonable and hence this technology is judged to be economically feasible.

Energy, Environmental and Social Impact Evaluation
The energy impact for low NO_X burner would be approximately 7.5 kilowatts of additional electrical power usage. The environmental impact would be the removal of 30 tons per year of NO_X from the atmosphere. There are no other adverse environmental impacts. The social impact of this alternative is that it would provide a slight amount of additional labor for a maintenance mechanic.

Overall Evaluation
The energy and social impacts of this alternative would be insignificant. The overall evaluation of this alternative is that it has favorable environmental and economic impacts and therefore should be ranked highly as a candidate BACT technology.

4.5.6 Flue Gas Recirculation

Technical and Economic Evaluation

It should be noted that FGR has never been used on a limestone or lime mud reburning kiln. Thus, use of this technology on a lime kiln would be a new and as yet untried application. The feasibility of applying FGR to a lime recalcination kiln was discussed with an experienced lime kiln manufacturer. The following problem areas were noted. FGR would consist of taking the hot 4000° F flue gas out of the ESP and recirculating it back to the inlet of the kiln and using it as combustion air. The recirculated flue gas has some residual particulate matter (lime dust) in it and when this dust is put through the burner flame it will melt and fuse resulting in the deposition of fused lime on the inside of the kiln. Alternatively the hot sticky particles of lime could fuse together forming balls of fused lime. Either scenario would be a major operational and maintenance problem (Gunkel, 2002).

Another potential problem is that the recirculated flue gas is very low in oxygen concentration (i.e. only 3.3 percent O_2). Using this low oxygen gas to make up a significant portion of the combustion air to the burner will affect combustion at the flame and could drive up carbon monoxide levels. Thus, the amount of FGR would have to be limited to a small percentage of the combustion air which would limit the effectiveness of FGR as a NO_X control technology.

Lastly the recirculated flue gas is high in carbon dioxide (CO_2) concentration, approximately 30 percent by volume. The lime recalcination process drives off the carbonate (CO_3) in the lime mud as gaseous CO_2. Recirculating the flue gas will increase the CO_2 concentration in the gas phase in the kiln and could hinder the lime recalcination process. Due to the above technical risks and the likelihood that FGR would adversely affect the lime recalcination process, FGR is not recommended as a NO_X control technology.

Energy, Environmental and Social Impact Evaluation

The energy, environmental and social impacts of implementing this alternative could not be determined, since FGR was judged to be technically infeasible.

Overall Evaluation

Since FGR was judged to be technically infeasible, it was eliminated from consideration as BACT.

4.6 Evaluation of Control Technologies for Biosolids Pelletization Facility

As previously stated, the BPF will contain the following features:

- Cooling and condensing of the dryer exhaust gas
- Recirculation of 60 percent to 90 percent of the cooled dryer exhaust to the dryer furnace
- Wet scrubbing of the non-recirculated portion of the dryer exhaust for control of particulate matter and acid gases
- Regenerative thermal oxidation of the non-recirculated portion (of the dryer exhaust) to control VOCs and odors

Some of these features (i.e. recirculation of the dryer exhaust, condensing and wet scrubbing of the dryer exhaust prior to discharge) will significantly reduce NO_X emissions.

In addition to the above NO_X control measures, the following control technologies were evaluated for the BPF:

1. Low Temperature SCR
2. Low Temperature Ozone Oxidation
3. Multi-Chemical Wet Scrubbing System
4. Low NO_X Burner

4.6.1 Low Temperature Selective Catalytic Reduction

Technical and Economic Evaluation

Low temperature SCR could be applied to the BPF. The SCR system would be located downstream of the venturi scrubber and regenerative thermal oxidixer (RTO). It is assumed that any silica compounds released from the burning of landfill gas in the dryer would be captured by the venturi scrubber. The estimated capital and O&M costs were developed for both dryer trains and are presented in **Table 4-4**. The total annual cost is $662,000 and the cost per ton of NO_X removed is $28,100. The main problem with controlling NO_X emissions from the BPF is that there are so few tons of NO_X being emitted that the cost per ton of NO_X removed becomes a very large number. The total cost per ton of NO_X removed would certainly dictate that this alternative is economically infeasible.

Energy, Environmental and Social Impact Evaluation

The energy impact for low temperature SCR would be approximately 60 kilowatts of additional electrical power usage. The environmental impact would be the removal of 23.6 tons per year of NO_X from the atmosphere. There are no other adverse environmental impacts. The social impact of this alternative is that it would provide jobs for one addition plant operator and one additional maintenance mechanic.

Overall Evaluation

The energy and social impacts of this alternative would be minimal. The environmental impact would be beneficial, since 23.6 tons per year of NO_X would be removed from the atmosphere. Due to the high cost per ton of NO_X removed ($28,100), this alternative is judged to be economically infeasible. Overall evaluation of this alternative is that it has a severe economic impact, and thus should not be considered BACT.

4.6.2 Low Temperature Ozone Oxidation

Technical and Economic Evaluation

Low temperature ozone oxidation could also be applied to the BPF and therefore is technically feasible for this application. The oxidation system would be located on both dryer trains downstream of the RTO prior to the exhaust stack. The estimated capital and O&M costs are presented in **Table 4-5**. The total annual cost is $992,000 and the total cost per ton of NO_X removed is $42,000. Again, the amount of NO_X being removed (23.6 tons per year) is relatively small in comparison to the total annual cost and thus the cost per ton of NO_X removed is a large number. This alternative is also economically infeasible.

Energy, Environmental and Social Impact Evaluation

The energy impact for low temperature ozone oxidation would be approximately 104 kilowatts of additional electrical power usage. The environmental impact would be the removal of 23.6 tons per year of NO_X from the atmosphere. The process would generate 160 gpm or 84 million gallons per year of wastewater containing nitrates and

Table 4-4 - Low Temperature SCR System for BPF Capital and O&M Costs

CAPITAL COSTS		
Direct Costs		
Purchased Equipment Costs		
SCR reactor, urea injection system, catalyst, urea storage and feed system, interconnecting ductwork, pumps and piping, instrumentation & controls, NOx analyzer	$510,000	
Sales Tax and Freight	$41,000	
1. Purchased Equipment Cost = A	$551,000	
Direct Installation Costs		
Foundations and Supports 0.12xA	$66,000	
Steel Supports, Ladders and Platforms 0.12xA	$66,000	
Handling and Erection 0.40xA	$220,000	
Electrical 0.10xA	$55,000	
Piping 0.30xA	$165,000	
Painting 0.02xA	$11,000	
2. Total Direct Installation Cost	$583,000	
Indirect Costs		
Engineering 0.10xA	$55,000	
Construction and Field Expenses 0.20xA	$110,000	
Contractor Fees 0.10xA	$55,000	
Start-Up, Performance Test & Contingencies 0.05*A	$28,000	
3. Total Indirect Cost	$248,000	
TOTAL CAPITAL INVESTMENT (1+2+3)	$1,382,000	
TOTAL ANNUALIZED CAPITAL COST (i =10%, 10 yrs, crf = 0.16275)		$225,000
ANNUAL O&M COSTS		
Operating Labor		
(8 hr/day x 365day/yr x $17/hr x 1.35 for fringe benefits)	$67,000	
Supervisory Labor		
(15% of operating labor)	$10,000	
Maintenance Labor		
(12 hr/day x 365 days/yr x $18/hr x 1.35 f.b.)	$106,000	
Maintenance Materials		
(100% of maintenance labor)	$106,000	
Catalyst Replacement - once every 3 years		
Annualized cost	$56,000	
Power - Additional ID Fan Power cost		
(0.000157 x 11200 acfm x 6 inches wc x 1/0.65 = 16 hp/fan)		
(16hp/fan x 0.75 kw/hp x 8760 hr/yr x $0.07/kwhr x 2 fans)	$15,000	
Power - for urea feed and injection system		
(36 kw x 8760 hr/yr x $0.07/kwhr)	$22,000	
Property Taxes, Administration & Insurance		
(0.04 x Total Capital Investment)	$55,000	
TOTAL ANNUAL O&M COST		$437,000
TOTAL ANNUAL COST		$662,000
Tons of NOx Removed per Year		**23.6**
TOTAL COST PER TON OF NOx REMOVED		**$28,100**

Table 4-5 - Low Temperature Ozone Oxidation System for BPF Capital and O&M Costs

CAPITAL COSTS		
Direct Costs		
Purchased Equipment Costs		
Oxidation reactor, flue gas heat exchanger, wet scrubber, ozone generator, interconnecting ductwork, pumps and piping, instrumentation & controls, NOx analyzer	$1,100,000	
Sales Tax and Freight	$88,000	
1. Purchased Equipment Cost = A	$1,188,000	
Direct Installation Costs		
Foundations and Supports 0.12xA	$143,000	
Steel Supports, Ladders and Platforms 0.12xA	$143,000	
Handling and Erection 0.40xA	$475,000	
Electrical 0.10xA	$119,000	
Piping 0.30xA	$356,000	
Painting 0.02xA	$24,000	
2. Total Direct Installation Cost	$1,260,000	
Indirect Costs		
Engineering 0.10xA	$119,000	
Construction and Field Expenses 0.20xA	$238,000	
Contractor Fees 0.10xA	$119,000	
Start-Up, Performance Test & Contingencies 0.05*A	$59,000	
3. Total Indirect Cost	$535,000	
TOTAL CAPITAL INVESTMENT (1+2+3)	$2,983,000	
TOTAL ANNUALIZED CAPITAL COST (i =10%, 10 yrs, crf = 0.16275)		$485,000
ANNUAL O&M COSTS		
Operating Labor		
(8 hr/day x 365day/yr x $17/hr x 1.35 for fringe benefits)	$67,000	
Supervisory Labor		
(15% of operating labor)	$10,000	
Maintenance Labor		
(8 hr/day x 365 days/yr x $18/hr x 1.35 f.b.)	$71,000	
Maintenance Materials		
(100% of maintenance labor)	$71,000	
Liquid Oxygen for Ozone Generation	$22,000	
Power - Additional ID Fan Power cost		
(0.000157 x 8800 acfm x 10 inches wc x 1/0.65 = 20 hp/fan)		
(20hp/fan x 0.75 kw/hp x 8760 hr/yr x $0.07/kwhr x 2 fans)	$18,000	
Power - for ozone generator and pumps		
(37 kw/train x 2 trains x 8760 hr/yr x $0.07/kwhr)	$45,000	
Wastewater Disposal		
(160 gal/min x 60 min/hr x 8760 hr/yr x $1.00/1000 gal)	$84,000	
Property Taxes, Administration & Insurance		
(0.04 x Total Capital Investment)	$119,000	
TOTAL ANNUAL O&M COST		$507,000
TOTAL ANNUAL COST		$992,000
Tons of NOx Removed per Year		**23.6**
TOTAL COST PER TON OF NOx REMOVED		**$42,000**

dilute nitric acid. This wastewater stream would have to be discharged to the sanitary sewer system or the deep well injection system. The social impact of this alternative is that it would provide jobs for one addition plant operator and one additional maintenance mechanic.

Overall Evaluation

The energy and social impacts of this alternative would be minimal. The environmental impact would be beneficial, since 23.6 tons per year of NO_X would be removed from the atmosphere. There would also be a significant wastewater stream generated which would have to be disposed of by discharge to either the sanitary sewer or the deep well injection system. Due to the high cost per ton of NO_X removed ($42,000), this alternative is judged to be economically infeasible. Overall evaluation of this alternative is that it has a severe economic impact, and thus should not be considered BACT.

4.6.3 Multi-Chemical Wet Scrubbing System

Technical and Economic Evaluation

This technology could also be applied to the BPF. The scrubbing system would be located downstream of the venturi scrubber prior to the RTO. The estimated capital and O&M costs for both dryer trains are presented in **Table 4-6**. The total annual cost is $1,085,000 and the total cost per ton of NO_X removed is $46,000. Similar to the two previous alternatives this technology is not economically feasible for the BPF.

Energy, Environmental and Social Impact Evaluation

The energy impact for multi-chemical wet scrubbing would be approximately 150 kilowatts of additional electrical power usage. The environmental impact would be the removal of 23.6 tons per year of NO_X from the atmosphere. The process would generate 160 gpm or 84 million gallons per year of wastewater containing nitrates and soluble salts. This wastewater stream would have to be discharged to the sanitary sewer system or the deep well injection system. The social impact of this alternative is that it would provide jobs for one addition plant operator and one additional maintenance mechanic.

Overall Evaluation

The energy and social impacts of this alternative would be minimal. The environmental impact would be beneficial, since 23.6 tons per year of NO_X would be removed from the atmosphere. There would also be a significant wastewater stream generated which would have to be disposed of. Due to the high cost per ton of NO_X removed ($46,000), this alternative is judged to be economically infeasible. Overall evaluation of this alternative is that it has a severe economic impact, and thus should not be considered BACT.

Table 4-6 - Multi-Chemical Wet Scrubbing System for BPF Capital and O&M Costs

CAPITAL COSTS		
Direct Costs		
Purchased Equipment Costs		
Four scrubber towers with packing, chemical storage tanks and feed systems, interconnecting ductwork, pumps and piping, structural steel frame, instrumentation & controls, NOx analyzer	$1,044,000	
Sales Tax and Freight	$84,000	
1. Purchased Equipment Cost = A	$1,128,000	
Direct Installation Costs		
Foundations and Supports 0.12xA	$135,000	
Steel Supports, Ladders and Platforms 0.12xA	$135,000	
Handling and Erection 0.40xA	$451,000	
Electrical 0.10xA	$113,000	
Piping 0.30xA	$338,000	
Painting 0.02xA	$23,000	
2. Total Direct Installation Cost	$1,195,000	
Indirect Costs		
Engineering 0.10xA	$113,000	
Construction and Field Expenses 0.20xA	$226,000	
Contractor Fees 0.10xA	$113,000	
Start-Up, Performance Test & Contingencies 0.05*A	$56,000	
3. Total Indirect Cost	$508,000	
TOTAL CAPITAL INVESTMENT (1+2+3)	$2,831,000	
TOTAL ANNUALIZED CAPITAL COST (i =10%, 10 yrs, crf = 0.16275)		$461,000
ANNUAL O&M COSTS		
Operating Labor		
(8 hr/day x 365day/yr x $17/hr x 1.35 for fringe benefits)	$67,000	
Supervisory Labor		
(15% of operating labor)	$10,000	
Maintenance Labor		
(8 hr/day x 365 days/yr x $18/hr x 1.35 f.b.)	$71,000	
Maintenance Materials		
(100% of maintenance labor)	$71,000	
Chemicals		
($2.45/lb of NOx removed x 23.6 tons/yr x 2000 lb/ton))	$116,000	
Power - Additional ID Fan Power cost		
(0.000157 x 8800 acfm x 10 inches wc x 1/0.65 = 20 hp/fan)		
(20 hp/fan x 0.75 kw/hp x 8760 hr/yr x $0.07/kwhr x 2 fans)	$18,000	
Power - for chemical feed and recirculation pumps		
(120 kw x 8760 hr/yr x $0.07/kwhr)	$74,000	
Wastewater Disposal		
(160 gal/min x 60 min/hr x 8760 hr/yr x $1.00/1000 gal)	$84,000	
Property Taxes, Administration & Insurance		
(0.04 x Total Capital Investment)	$113,000	
TOTAL ANNUAL O&M COST		$624,000
TOTAL ANNUAL COST		$1,085,000
Tons of NOx Removed per Year		**23.6**
TOTAL COST PER TON OF NOx REMOVED		**$46,000**

4.6.4 Low NO_X Burner

Technical and Economic Evaluation

A low NO_X burner could certainly be used in place of a conventional burner on the furnace of the dryer. Based on the dryer manufacturer's performance data, a low NO_X burner on the BPF dryer could achieve a 25 percent reduction in NO_X emissions. Thus, the NO_X emission rate for each train would be 2.24 lb/hr versus 2.98 lb/hr with a conventional burner. Thus, from both trains, the NO_X reduction would be a total of 6.6 tons per year. The additional capital cost for low NO_X burners versus convention burners would be $140,000 for the equipment only. Note that there would be no additional direct installation costs or indirect costs for low NO_X burners versus conventional burners. Therefore these costs are zero in **Table 4-7**.

The estimated capital and O&M costs are presented in Table 4-7. The total annual cost is $41,000 and the total cost per ton of NO_X removed is $6,200. This cost per ton of NO_X removed is moderately high, but is judged to be economic feasibility.

Energy, Environmental and Social Impact Evaluation

The energy impact for low NO_X burner would be approximately 12 kilowatts of additional electrical power usage. The environmental impact would be favorable but slight, since only 6.6 tons per year of NO_X would be removed from the atmosphere. There are no other adverse environmental impacts. The social impact of this alternative is negligible, since it would not provide any additional jobs.

Overall Evaluation

The overall evaluation of this alternative is that: the energy and social impacts would be insignificant, the environmental impact is beneficial, and the economic impact is acceptable. Therefore this alternative is ranked highly as a candidate BACT technology.

4.7 Determination of Best Available Control Technology

For the LRF the overall evaluation of the control technologies is summarized as follows:

1. Low Temperature SCR – technically infeasible
2. Non-Ammoniated SCR - technically infeasible
3. Low Temperature Ozone Oxidation
    - Beneficial environmental impact - removal of 84 tons NO_X per year
    - Economically infeasible -$15,100 per ton NOX removed
4. Multi-Chemical Wet Scrubbing System
    - Beneficial environmental impact - removal of 84 tons NO_X per year

Table 4-7 - Low NOx Burner for BPF Capital and O&M Costs

CAPITAL COSTS		
Direct Costs		
Purchased Equipment Costs		
Low NOx burner	$130,000	
Sales Tax and Freight	$10,000	
1. Purchased Equipment Cost = A	$140,000	
Direct Installation Costs[1]		
Handling and Installation	$0	
Electrical	$0	
Piping	$0	
Painting	$0	
2. Total Direct Installation Cost	$0	
Indirect Costs[2]		
Engineering	$0	
Construction and Field Expenses	$0	
Contractor Fees	$0	
Start-Up, Performance Test & Contingencies	$0	
3. Total Indirect Cost	$0	
TOTAL CAPITAL INVESTMENT (1+2+3)	$140,000	
TOTAL ANNUALIZED CAPITAL COST (i =10%, 10 yrs, crf = 0.16275)		$23,000
ANNUAL O&M COSTS		
Operating Labor		
(No additional operating labor required.)	$0	
Supervisory Labor		
(No additional supervisory labor required.)	$0	
Maintenance Labor		
(4 hr/week x 52 weeks/yr x $18/hr x 1.35 f.b.)	$5,000	
Maintenance Materials		
(100% of maintenance labor)	$5,000	
Power		
(16 hp x 0.75 kw/hp x 8760 hr/yr x $0.07/kwhr)	$7,000	
Insurance		
(0.01 x Total Capital Investment)	$1,000	
TOTAL ANNUAL O&M COST		$18,000
TOTAL ANNUAL COST		$41,000
Tons of NOx Removed per Year		**6.6**
TOTAL COST PER TON OF NOx REMOVED		**$6,200**

Notes:

1. No additional direct installation costs for a Low NOx burner versus a conventional burner.
2. No additional indirect costs for a Low NOx burner versus a conventional burner.

- Economically infeasible -$14,600 per ton NOX removed

5. Low NO_X Burner

   - Beneficial environmental impact - removal of 30 tons NO_X per year
   - Economically feasible - $1,400 per ton NO_X removed

The only technology which was determined to be both technically and economically feasible is the Low NO_X Burner. Therefore, the Low NO_X Burner is BACT and it will control NO_X emissions to 63.6 tons per year.

For the BPF the overall evaluation of the control technologies is summarized as follows:

1. Low Temperature SCR

   - Beneficial environmental impact - removal of 23.6 tons NO_X per year
   - Economically infeasible - $28,100 per ton NO_X removed

2. Low Temperature Ozone Oxidation

   - Beneficial environmental impact - removal of 23.6 tons NO_X per year
   - Economically infeasible - $42,000 per ton NO_X removed

3. Multi-Chemical Wet Scrubbing System

   - Beneficial environmental impact - removal of 23.6 tons NO_X per year
   - Economically infeasible - $46,000 per ton NO_X removed

4. Low NO_X Burner

   - Beneficial environmental impact - removal of 6.6 tons NO_X per year
   - Economically feasible - $6,200 per ton NO_X removed

For the BPF, the only technology which was determined to be both technically and economically feasible is the Low NO_X Burner. Therefore, the Low NO_X Burner is BACT for the BPF and it will control NO_X emissions to 9.8 tons per year for each train, a total of 19.6 tons per year for both trains.

Section 5
Existing Ambient Air Quality and Meteorology

According to Federal and Florida Prevention of Significant Deterioration (PSD) regulations (40 Code of Federal Regulations [CFR] 51.166 and 62-212.400 Florida Administrative Code [FAC]), an applicant for a PSD permit is required to conduct an air quality analysis to demonstrate that the emissions from the new project will not cause or contribute to a violation of any applicable ambient air quality standard or PSD increment. An assessment of existing air quality and a dispersion modeling analysis are used to determine compliance with the New Source Review regulations. Because these projects only exceed the PSD significant net emissions increase threshold for nitrogen oxides (NO_X), the air quality assessment is only required for NO_X. However, a full analysis of all criteria pollutants is provided here for informational purposes.

5.1 Ambient Air Quality Status

The U.S. Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for certain "criteria" pollutants, as mandated by the Clear Air Act Amendments of 1970. These standards have been set at two levels. Primary NAAQS are designed to protect public health with an adequate margin of safety. Secondary NAAQS are designed to protect the public welfare, including property, materials, and plant and animal life. The State of Florida has adopted State AAQS (FAAQS) that are at least as stringent as the NAAQS and incorporate both the Federal Primary and Secondary standards (62-204.240 FAC). The sulfur dioxide FAAQS for annual and 24-hour averaging periods are more stringent (lower) than the NAAQS. These National and Florida ambient air quality standards are shown in **Table 5-1**. The six criteria pollutants with National and Florida ambient air quality standards are sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), fine particulate matter less than 10 micrometers in diameter (PM_{10}), lead (Pb), and ozone (O_3). The ambient air quality standards for PM_{10} replaced the standards for total suspended particulates (TSP) in 1987 at the Federal level and in March 1996 at the State level.

The EPA promulgated new NAAQS in July, 1997, for particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), and a more stringent 8-hour-average ozone standard of 0.08 parts per million (ppm) to replace the current one-hour-average standard of 0.12 ppm. As described in Section 2.5, these standards have been challenged in court, and their implementation held in abeyance. The U.S. Supreme Court has found the standards constitutional, but the EPA must rework their implementation.

Because procedures for implementing the new $PM_{2.5}$ and 8-hour ozone NAAQS are still being developed by the EPA, this permit modification application does not contain a compliance demonstration for these two standards.

Table 5-1 National and Florida Ambient Air Quality Standards

Pollutant	Avg. Time	Florida Standard	National Primary Standard	National Secondary Standard	Significant Impact Level	PSD Increments Class II	PSD Increments Class I
NO$_2$ (µg/m^3)	Annual	100	100	100	1	25	2.5
SO$_2$ (µg/m^3)	3-Hr	1300	-	1300	25	512	25
	24-Hr	260	365	-	5	91	5
	Annual	60	80	-	1	20	2
CO (µg/m^3)	1-Hr	40000	40000	-	2000	-	-
	8-Hr	10000	10000	-	500	-	-
Pb (µg/m^3)	Qtr	1.5	1.5	1.5	-	-	-
O$_3$ (ppm)	1-Hr	0.12	0.12	0.12	-	-	-
PM$_{10}$ (µg/m^3)	24-Hr	150	150	150	5	30	8
	Annual	50	50	50	1	17	4

Notes:

All short-term (1-hour, 3-hour, and 24-hour) standards except ozone are not to be exceeded more than once per 12 month period.

Annual standards are 12-month arithmetic means, never to be exceeded. Quarterly standards are also never to be exceeded.

The 1-hour ozone standard should not be exceeded more than an average of one day per year over three years.

Note that the National NO$_2$ standard is promulgated at 0.053 ppm.

1 ppm NO$_2$ = 1887 µg/m^3 NO$_2$

1 ppm CO = 1140 µg/m^3 CO

1 ppm O$_3$ = 1961 µg/m^3 O$_3$

Under Section 110 of the Clean Air Act, each state is required to develop a State Implementation Plan (SIP), which specifies how all areas within the state will achieve and maintain compliance with the NAAQS. For regulatory purposes under the SIP, all areas in the United States are designated as either attainment, non-attainment, or unclassifiable with the NAAQS for each criteria pollutant. Attainment areas are areas that comply with the NAAQS, and continued compliance is expected under the current SIP requirements. Non-attainment areas are areas either which currently do not comply with the NAAQS or which significantly contribute to nearby areas that do not comply with the NAAQS. "Maintenance" areas are attainment areas that have recently attained the NAAQS. Although in attainment, these areas are still subject to some of the same stringent requirements to which nonattainment areas are subject. Unclassifiable areas are areas where insufficient data exists to classify the area as either attainment or non-attainment and are generally presumed to be in attainment with the NAAQS.

Palm Beach County is part of the Southeast Florida Intrastate Air Quality Control Region (AQCR), which also includes Broward, Dade, Indian River, Martin, Monroe, Okeechobee, and St. Lucie Counties (40 CFR 81.49). The attainment status of the North County Resource Recovery Facility (NCRRF) and of Palm Beach County for each criteria pollutant is shown in **Table 5-2**. Palm Beach County, as well as all of Florida, is currently either Unclassifiable or in Attainment for all NAAQS.

5.2 Preconstruction Ambient Monitoring

40 CFR 51.166(i)(8) and 62-212.400(5)(f), FAC require that ambient monitoring data for air quality in the area of the facility shall be provided to the Florida Department of Environmental Protection (FDEP). For any pollutant (other than nonmethane hydrocarbons) for which national or state ambient air quality standards have been established, continuous air quality monitoring data sufficient to determine whether emissions of that pollutant would cause or contribute to a violation of any ambient air quality standard or any applicable maximum allowable increase must be provided.

The proposed facility would qualify for an exemption from the pre-construction monitoring requirements if:

- The emissions of the pollutant would not have an impact on any area equal or greater to that listed in **Table 5-3**, known as "significant monitoring concentrations" or "de minimis ambient impacts";
- The ambient concentration in the area of the facility is less than the concentration listed in Table 5-3; or
- The pollutant is not listed in Table 212.400-3 under 62-212.400 FAC, or outlined in 40 CFR 51.166(i)(8)(i).

Table 5-2 Attainment Status (1) for Areas Including the Solid Waste Authroity of Palm Beach County

Pollutant	State Designation (2)	Federal Designation (3)
Total Suspended Particulate Matter (TSP)	Attainment (62-204.340(4)(b)1 FAC)	Attainment (40 CFR 81.310)
Particulate Matter with Diameter Less Than 10 Microns (PM_{10})	Unclassifiable (entire state 62-204.340(3)(a) FAC)	Cannot be classified
Sulfur Dioxide (SO_2)	Unclassifiable (62-204.340(3)(b)3 FAC)	Attainment (40 CFR 81.310)
Nitrogen Dioxide (NO_2)	Attainment (entire state 62-204.340(1)(e) FAC)	Cannot be classified or attainment (40 CFR 81.310)
Carbon Monoxide (CO)	Attainment (entire state 62-204.340(1)(d) FAC)	Unclassifiable or Attainment (40 CFR 81.310)
Ozone (O_3)	Maintenance Area (62-204.340(4)(a)3 FAC)	Unclassifiable or Attainment (40 CFR 81.310)
Lead (Pb)	Unclassifiable (entire state 62-204.340(3)(c) FAC)	Not Designated (40 CFR 81.310)

Notes:

(1) Florida Administrative Code (FAC) Chapter 62-204 and Code of Federal Regulations (CFR) Title 40, Part 81.310. EPA defines Palm Beach County as part of the Southeast Florida Intrastate Air Quality Control Region (40 CFR 81.49).

(2) As of March 13, 1996

(3) As of July 20, 2000.

Table 5-3 De Minimis Ambient Impact Levels

Pollutant	Concentration (µg/m³)	Averaging Period	Jurisdiction	
Beryllium	0.001	24-hour		Federal
Carbon Monoxide	575	8-hour	Florida	Federal
Fluorides	0.25	24-hour	Florida	
Hydrogen Sulfide	0.2	1-hour	Florida	Federal
Hydrogen Sulfide	0.04	1-hour		Federal
Lead	0.1	Quarterly	Florida	Federal
Mercury	0.25	24-hour	Florida	Federal
Nitrogen Dioxide	14	Annual	Florida	Federal
Ozone	(1)	-	Florida	Federal
PM_{10}	10	24-hour	Florida	Federal
Reduced Sulfur Compounds	10	1-hour		Federal
Sulfur Dioxide	13	24-hour	Florida	Federal
Total Reduced Sulfur	10	1-hour		Federal
Vinyl Chloride	15	24-hour		Federal

(1) No de minimis air quality level is provided for ozone. However, any net increase of 100 tons per year or more of volatile organic compounds subject to PSD would be required to perform and ambient impact analysis, including the gathering of ambient air quality data.

Modeling, in conjunction with FDEP ambient air quality data, was used to determine if there would be any facility impact greater than the "de minimis" impacts.

Information on the preconstruction modeling analysis can be found in Section 6.3, Screening Modeling Analysis. Table 6-4 located in that section demonstrates the proposed SWA modifications would meet the criteria for an exemption from preconstruction monitoring. SWA requests, therefore, that FDEP concur with the determination that preconstruction monitoring is not required for this project.

5.3 Available Ambient Monitoring Data

This application uses available Florida monitoring reports for 1999 to 2001 to develop background concentrations of PSD criteria pollutants in the vicinity of SWA. This period represents the most recent three-year period for which complete ambient monitoring data was available as of January, 2003, when this application was first considered complete. Because there were no monitoring stations located within Palm Beach County reporting Pb, data was considered from:

- Monitoring reports for 1997 to 1999, the most recent three-year period for which complete ambient Pb monitoring data is available in Palm Beach County;
- Monitors outside of the county, reports for 1999 to 2001.

Monitoring sites are typically selected to determine:

- the highest concentrations expected in a given area;
- representative concentrations in areas of high population densities;
- ambient pollutant impacts of significant sources; and
- general background concentration levels.

For these reasons, most available monitoring sites in southeastern Florida are located in areas of heavy urban or industrial growth. Therefore, many sites in the Florida monitoring network will be overly conservative when used to estimate background levels at the SWA site, which is more rural. **Table 5-4** lists the Palm Beach County monitoring stations along with what data is available from each. **Figure 5-1** presents a map showing the locations of each monitoring station used for this analysis.

5.4 Selection of Background Pollutant Concentrations

As discussed above, Pb was no longer monitored in Palm Beach County after 1999. In the three previous years before monitoring ended (1997 to 1999), Pb levels were negligible, most likely leading to the end of Pb monitoring in the area. For purposes of this analysis, the last three years of available Pb monitoring data (1997-1999) will be used.

Background concentrations available for use in this analysis are presented in **Table 5-5**. The available monitoring station/data closest in proximity to SWA's NCRRF was used for each pollutant that was modeled:

- Palm Beach Monitor: CO, NO_2, and Pb (for 1997 to 1999)
- Riviera Beach Monitor: SO_2
- Delray Beach (Congress Ave): PM_{10}

The criteria pollutant background concentrations used in the refined modeling analysis for the Lime Recalcination Facility (LRF) and Biosolids Pelletization Facility (BPF) are summarized in Table 5-5. The methodology employed to calculate representative pollutant background concentrations is described below.

For each pollutant, the annual average background concentration has been set equal to the highest annual average concentration observed during the last three years. For each pollutant and each short-term averaging period, the background concentration has been set equal to the highest of the second-highest concentrations observed during the last three years, pursuant to EPA guidance.

Table 5-4 Monitoring Stations in Palm Beach County, Closest to NCRRF Site

Site ID	City	Site Address	Distance from SWA	Location Type	Years	Pollutants Monitored					
						CO	NO_2	SO_2	PM_{10}	Pb	O_3
120990008	Belle Glade	38754 State Rd 80, Belle Glade		Rural	1996 - 2001				x		
120990018		Jog Road & Beeline Highway Pump Station	1 mile	Rural	1996 - 1999					x	
120991004	Palm Beach	3700 Belevedere Road	8.75 miles	Suburban	1996 - 2001	x	x				
120991006	West Palm Beach	50 South Military Trail		Urban / Center City	1997 - 2000	x					
120992003	Delray Beach	345 S. Congress Ave, Delray Beach	26 miles	Urban / Center City	1996 - 2001				x		
120992004	Delray Beach	210 Nw 1st Avenue	25 miles	Suburban	1996 - 2001						x
120993004	Riviera Beach	1050 15th Street W	6.5 miles	Suburban	1996 - 2001			x			

Source: US EPA - AIRData Monitor Address Report, Florida Air Quality Monitors (All Years)

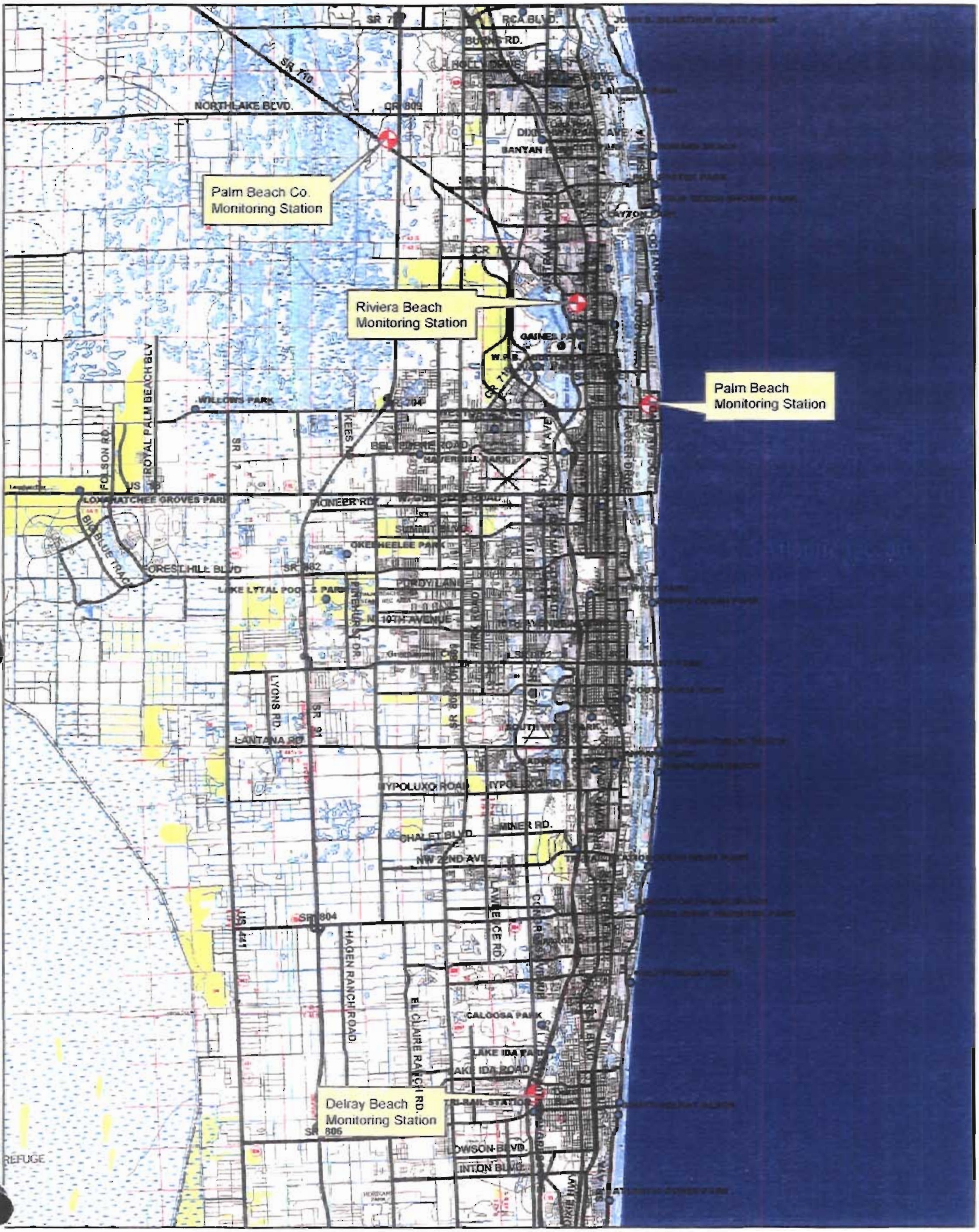


Figure 5-1
Monitoring Locations

Table 5-5 Ambient Air Quality Summary Monitoring Stations Located Nearest to SWA

		National Ambient Air Quality	Florida Ambient Air Quality	Monitoring Station	Approximate Distance from SWA	Maximum Concentration [1]			Second Highest Concentration [2]			Three year summary	
Pollutant	Averaging Time	Standards	Standards		(miles)	1999	2000	2001	1999	2000	2001	High	2nd High
Carbon Monoxide	1-hour	35 ppm	35 ppm	Palm Beach 3700 Belevedere Road	8.75	4.2	3.8	3.3	4	3.8	3.1	4.2	4.0
	8-hour	9 ppm	9 ppm			3.3	2.7	2.5	2.8	2.6	2.2	3.3	2.8
Nitrogen Dioxide	Annual Mean	0.053 ppm	0.053 ppm	Palm Beach 3700 Belevedere Road	8.75	0.01	0.02	0.02	NA	NA	NA	0.02	NA
Sulfur Dioxide [3]	3-hour	1300 µg/m³	1300 µg/m³	Riviera Beach 1050 15th Street W	6.5	44.2	33.8	13.0	36.4	31.2	10.4	44.2	36.4
	24-hour	365 µg/m³	260 µg/m³			33.8	26.0	7.8	33.8	20.8	7.8	33.8	33.8
	Annual Mean	80 µg/m³	60 µg/m³			2.6	2.6	2.6	NA	NA	NA	2.6	NA
Particulate Matter (PM_{10})	24-hour	150 µg/m³	150 µg/m³	Delray Beach 345 S. Congress Ave	26	47	40	49	33	38	42	49.0	42.0
	Annual Mean	50 µg/m³	50 µg/m³			20.1	19	25.8	NA	NA	NA	25.8	NA
Lead	Calendar Quarter	1.5 µg/m³	1.5 µg/m³	Palm Beach Co. Jog Road & Beeline Highway	1	0.001			0.001			0.001	
Ozone	1-hour	0.12 ppm	0.12 ppm	Delray Beach 210 NW 1st Avenue	25	0.108	0.096	0.102	0.104	0.093	0.098	0.108	0.104

Source: The EPA AIRSData website (http://www.epa.gov/airsdata). No stations in Palm Beach County had Pb data past 1999.

(1) Concentration units for a given pollutant are the same as those shown for the corresponding federal standard.
(2) Concentration units for a given pollutant are the same as those shown for the corresponding federal standard. "NA" means not applicable; there is only one average annual concentration
(3) Reported in ppm. Converted to µg/m³ using 1 ppm SO_2 = 2601 µg/m³ SO_2.

The CO monitor closest to the NCRRF is the Palm Beach monitor (Site ID 120991004) located less than nine miles away to the east. While this monitor is significantly closer to the ocean, it is located along a major highway, therefore, making it a conservative choice for the NCRRF, which is located in a rural area. The maximum, second-highest concentrations as shown in Table 5-5 are:

- 4.0 ppm for the one-hour averaging period (11 percent of the NAAQS/FAAQS); and
- 2.8 ppm for the eight-hour averaging period (31 percent of the NAAQS/FAAQS).

The Palm Beach monitoring site is also the closest available NO_2 monitor. The maximum annual NO_2 concentration for the last three years was 0.02 ppm, 30 percent of the annual NAAQS and FAAQS.

For SO_2 data, the closest monitor is in Riviera Beach (Site ID 120993004) located less than seven miles away to the northeast. This monitor is located along a street in a suburban area. The maximum, second-highest concentrations as shown in Table 5-5 are:

- 36.4 $\mu g/m^3$ for the three-hour averaging period (3 percent of the NAAQS/FAAQS);
- 33.8 $\mu g/m^3$ for the 24-hour averaging period (9 percent of the NAAQS, 13 percent of the FAAQS);
- 2.6 $\mu g/m^3$ for the annual averaging period (3 percent of the NAAQS, 4 percent of the FAAQS).

The PM_{10} data are from a Delray Beach monitor (Site ID 120992003) located approximately 26 miles to the southeast. This monitor is located in a commercial section of a suburban area. The maximum, second-highest concentrations as shown in Table 5-5 are:

- 42 $\mu g/m^3$ for the one-hour averaging period (28 percent of the NAAQS/FAAQS); and
- 26 $\mu g/m^3$ for the annual averaging period (52 percent of the NAAQS/FAAQS).

Ozone is not directly emitted into the atmosphere but results from a series of complex photochemical reactions. O_3 measurements are available from a Delray Beach monitor (Site ID 120992004). The high, second-high one-hour concentration, shown in Table 5-5 is 0.104 ppm (198 $\mu g/m^3$). This concentration is 87 percent of the one hour O_3 standard of 0.12 ppm (235 $\mu g/m^3$).

5.5 Available Meteorological Data

Screening meteorological data includes 54 unidirectional combinations of wind speed, stability, and mixing heights determined by EPA to produce the worst-case impacts. These data are included as default in the SCREEN3 model. These data can also be reproduced for all 36 directions from 0 to 350 degrees (10-degree increments) and used in the Industrial Source Complex, Short-Term, Version 3 (ISCST3) model to account for spatial orientation of multiple sources.

Five years of meteorological data have been provided by FDEP. This set of five years of meteorological data, from 1987 to 1991 was used for all refined and cumulative source modeling performed with ISCST3 as described in Section 6. Surface observations, along with mixing height observations, are from the National Weather Service observing station (WBAN number 12844) at West Palm Beach Airport (Morrison Field). The first two days of meteorological data are shown in **Appendix C**.

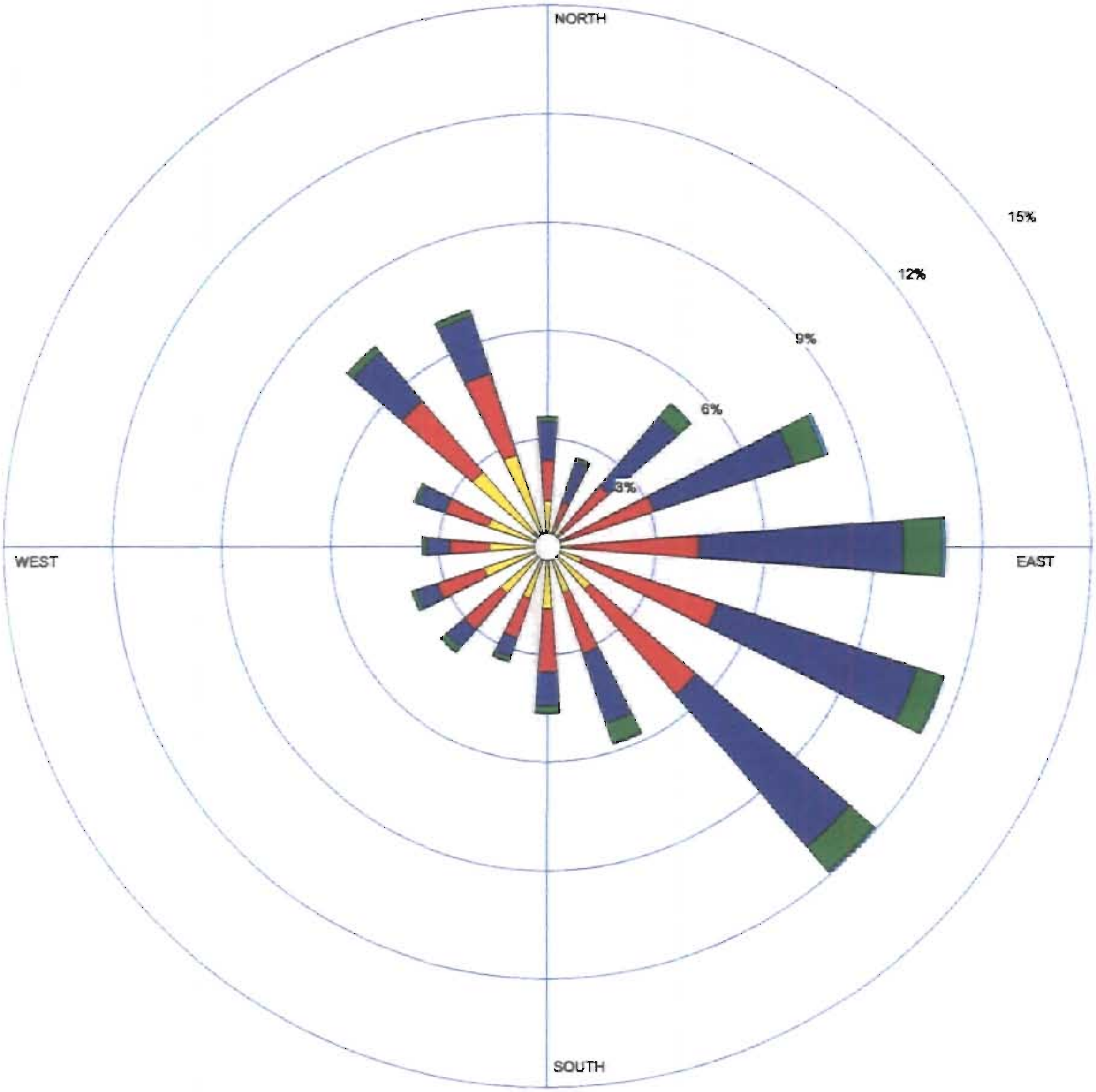
The CALPUFF Model, run in a screening mode, can accept ISC preprocessed meteorological data. However, for deposition and visibility modeling, additional data not normally included in the basic ISC meteorological data file are needed. The most recent five consecutive years of surface data available with the additional information are 1986 to 1990. These five years of surface data were combined with the corresponding mixing height data, using the PCRAMMET preprocessor, to create an "enhanced" ISC meteorological data file. The additional analysis required at the Class I and sensitive areas located at a distance of greater than 50 km from the source used these enhance meteorological data files. As with the basic meteorological data files provided by FDEP, both surface and mixing height observations were obtained from the NWS observation station at West Palm Beach Airport.

The location coordinates of the NWS observation station at West Palm Beach Airport are 26.683° North Latitude, 80.117° West Longitude. The anemometer height is 33 feet (10 meters), and GMT time zone difference is +5. The West Palm Beach Airport is approximately seven miles to the southeast of the project parcel.

A windrose depicting the five years of West Palm Beach Airport meteorological data (wind direction and velocity) shown in **Figures 5-2** and **5-3**.

WIND ROSE PLOT

Station #12844 - WEST PALM BEACH/INT'L ARPT, FL

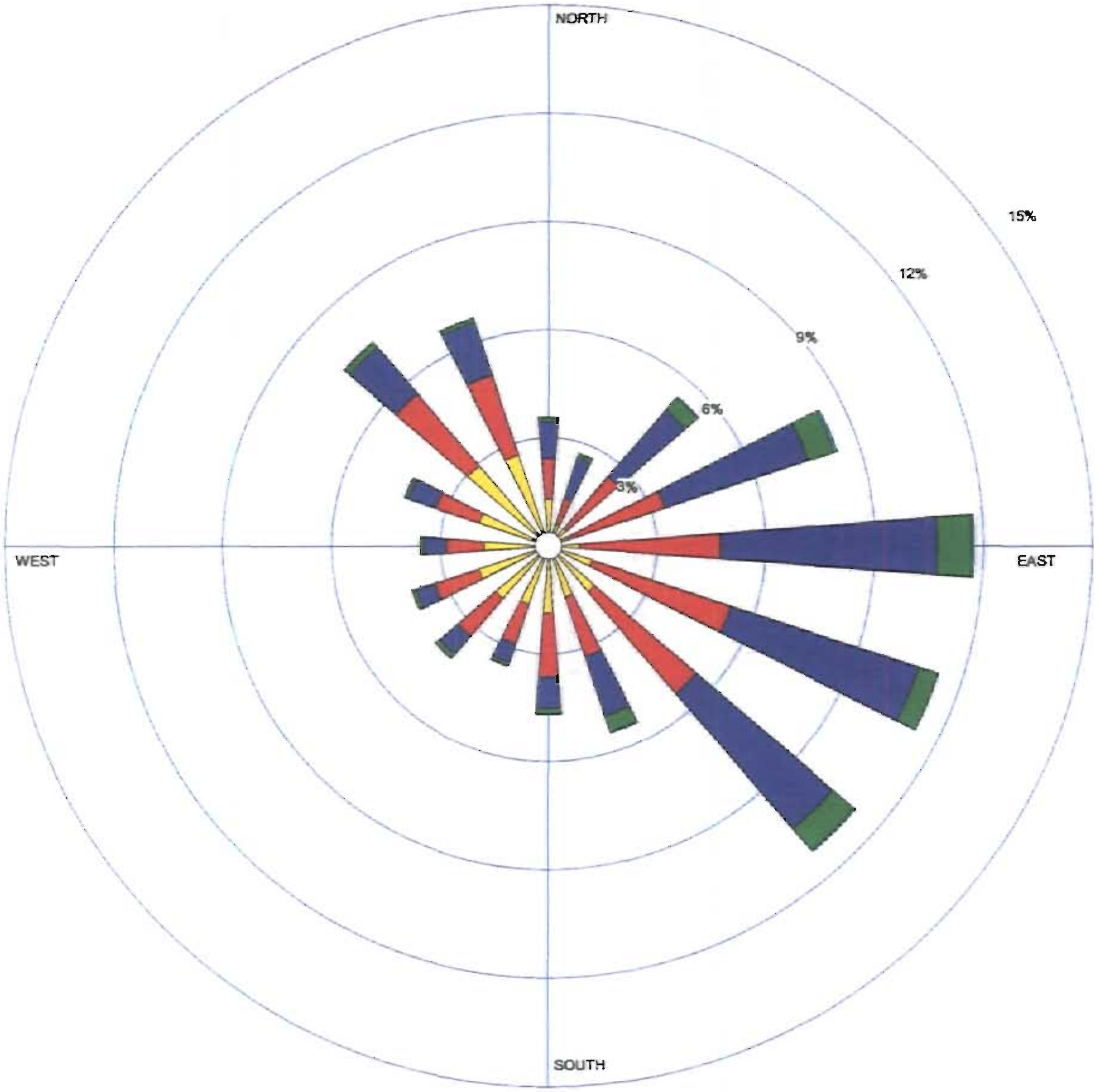


Wind Speed (m/s) 🟦 > 11.06 🟩 8.49 - 11.06 🟦 5.40 - 8.49 🟥 3.34 - 5.40 🟨 1.80 - 3.34 ⬛ 0.51 - 1.80	MODELER **T. Raine**	DATE **5/8/02**	COMPANY NAME **CDM**
	DISPLAY **Wind Speed**	UNIT **m/s**	COMMENTS **Five years of meteorlogical data provided by FDEP (1987 to 1991), for ISCST modeling. Surface and mixing height data both from WPB Airport.** **INTERNAL REVIEW DRAFT**
	AVG. WIND SPEED **5.15 m/s**	CALM WINDS **2.69%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1987 1988 1989 1990 1991** **Jan 1 - Dec 31** **Midnight - 11 PM**	PROJECT/PLOT NO. **Figure 5-2**

WRPLOT View 3.5 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #12844 - WEST PALM BEACH/INT'L ARPT, FL



Wind Speed (m/s)

- 🟦 > 11.06
- 🟩 8.49 - 11.06
- 🟦 5.40 - 8.49
- 🟥 3.34 - 5.40
- 🟨 1.80 - 3.34
- ⬛ 0.51 - 1.80

MODELER
T. Raine

DATE
5/8/02

COMPANY NAME
CDM

DISPLAY
Wind Speed

UNIT
m/s

COMMENTS
Five years of meteorlogical data (1986 to 1990), for CALPUFF modeling. Surface and mixing height data both from WPB Airport.
INTERNAL REVIEW DRAFT

AVG. WIND SPEED
5.00 m/s

CALM WINDS
1.94%

ORIENTATION
Direction
(blowing from)

PLOT YEAR-DATE-TIME
1986 1987 1988 1989 1990
Jan 1 - Dec 31
Midnight - 11 PM

PROJECT/PLOT NO.

Figure 5-3

WRPLOT View 3.5 by Lakes Environmental Software - www.lakes-environmental.com

Section 6
Air Quality Analysis

The purpose of this section is to present the predicted air quality impacts for the Lime Recalcination Facility (LRF), Biosolids Pelletization Facility (BPF), and the three proposed Class I Landfill flares in accordance with the protocol submitted to the Florida Department of Environmental Protection (FDEP) on May 13, 2002. These pollutant concentrations were estimated using U.S. Environmental Protection Agency (EPA) guideline dispersion models and techniques discussed with and approved by FDEP prior to starting the analyses.

6.1 Model Selection

6.1.1 Industrial Source Complex, Short Term, Version 3

Appendix W to 40 Code of Federal Regulations (CFR) Part 51 (Guideline on Air Quality Models, "Guideline") lists preferred EPA dispersion models for use in air quality analyses. The guideline lists the Industrial Source Complex (ISC3) dispersion model as a preferred model to assess pollutant concentrations from a wide variety of sources. ISC3 is a steady-state Gaussian plume model which can account for settling and dry deposition of particles; downwash; area, line and volume sources; plume rise as a function of downwind distance; separation of sources; and limited terrain adjustment.

The ISC model is appropriate for the following applications:

- Industrial source complexes;
- Rural or urban areas;
- Flat or rolling (including complex) terrain;
- Transport distances less than 50 kilometers;
- 1-hour to annual averaging times; and
- Continuous air emissions

Since there are multiple sources involved in the analysis, and short-term concentrations are desired, the most recent version (Version 02035) of the Industrial Source Complex, Short Term, Version 3 (ISCST3) dispersion model was used for the screening, the refined, and the cumulative impact analyses.

The ISCST3 model requires source emission rates and physical information (including stack height, gas temperature, and flow rate), hourly meteorological data (including wind speed and direction, temperature, Pasquill-Gifford stability class, and mixing heights), and receptor data (coordinates and elevations).

6.1.2 SCREEN3

A "cavity area" is the area on the downwind side of a building, and is characterized by strong turbulence and mixing. However, dispersion in this area is reduced due to building-induced recirculation of the pollutants and the lack of entrainment of cleaner air. Therefore, this area is a potential location of excessive pollutant impacts.

The SCREEN3 dispersion model was used to evaluate cavity impacts from the new sources. The Guideline identifies the latest version of SCREEN as the recommended screening dispersion model. SCREEN3, version 96043, was selected for the following reasons:

- it calculates impacts within the cavity region of nearby structures;
- it is EPA's preferred screening level model for point sources subject to building induced downwash;
- it uses a built-in set of meteorological conditions and automatically screens for the worst-case combination of wind speed and stability class; and
- it uses an automated receptor distance array, which finds the point of maximum impact to within 1 meter. This feature is helpful when selecting receptor grid distances for the refined analysis.

The SCREEN3 model requires the source emission rate and pertinent physical information (including stack height, gas temperature, and flow rate). It is presumed that the dominant building for downwash purposes has already been determined. It uses a standard set of worst-case meteorological data, and an automated set of receptors. Terrain data is not incorporated into the SCREEN3 model.

Since there are multiple facility sources involved in the analysis, the ISCST3 model was used in most phases of the analysis. However, the SCREEN3 model was used to assess cavity impacts as described below.

6.1.3 CALPUFF

CALPUFF is a multi-layer, multi-species non-steady-state Lagrangian Gaussian puff dispersion model which can simulate the effects of time-and space-varying meteorological conditions on pollutant transport, transformation, and removal. CALPUFF can use the three-dimensional meteorological fields developed by the CALMET model, or simple, single station winds in a format consistent with the meteorological files used to drive the ISCST3 steady-state Gaussian Model.

CALPUFF contains algorithms for near-source effects such as building downwash, transitional plume rise, partial plume penetration, subgrid scale terrain interactions as well as longer range effects such as pollutant removal (wet scavenging and dry deposition), chemical transformation, vertical wind shear, over water transport, and coastal interaction effects. It can accommodate arbitrarily varying point source and gridded area source emissions.

The most recent version of CALPUFF (Version 5.7) was used. CALPUFF was selected for the following reasons:

- it is a non-steady state puff dispersion model suitable for long-range (> 50 km) transport;
- its ability to model varying source types (point, area, volume);
- its ability to mimic the ISCST3 model in steady-state conditions; and,
- its ability to use simple meteorological data already processed for use in the ISCST3 model.

Since air quality impacts need to be evaluated at the Everglades National Park, located 128 km away from the proposed sources, and at the Big Cypress National Preserve, located 112 km from the proposed sources, a long-range transport model is appropriate. At FDEP's request, the CALPUFF model was used to analyze pollutant impacts at these Class I areas and any other areas indicated by FDEP and the National Park Service.

6.2 Modeling Parameters and Options

6.2.1 Sources

The dispersion modeling was initially performed only for the proposed new and modified sources at the North County Resource Recovery Facility (NCRRF). The existing sources at the NCRRF would be included in the cumulative source modeling if the Significant Impact Levels shown in **Table 6-1** could be exceeded by the new and modified sources. Temporary emissions were excluded from all analyses. However, non-continuous emitting sources, such as storage silos, were included in the analyses and are represented by appropriately factoring the continuous source emission rates.

Facility sources included in the analysis and their stack parameters are presented in **Table 6-2**.

6.2.2 Model Options

The ISCST3 model was set to calculate concentrations only. Averaging periods were selected based on the corresponding pollutant significance level. Pollutant decay was not used.

Table 6-1 Significance Levels for Air Quality Impacts

Pollutant	Averaging Time	EPA SILs ($\mu g/m^3$)	NPS Class I SILs [(1)] ($\mu g/m^3$)
SO_2	3-hour	25	0.48
	24-hour	5	0.07
	Annual	1	0.03
NO_2	Annual	1	0.03
CO	1-hour	2000	n/a
	8-hour	500	n/a
PM_{10}	24-hour	5	0.27
	Annual	1	0.08
Pb	Quarter	0.1	n/a

Notes:
(1) Significant Impact Levels currently recommended by the National Park Service (NPS). NPS SILs are more stringent, or lower than (about 1/2 to 1/3 of) those proposed by the U.S. EPA as part of New Source Review Reform (61 FR 38292, July 23, 1996).

The ISCST3 model was run using regulatory default options. These options, as identified in Section A.5 of Appendix A to Appendix W to 40 CFR Part 51 and Section 3.2.2 of Volume I of the User's Guide to ISCST3 include the following:

- Use of stack-tip downwash;
- Use of buoyancy induced dispersion;
- Use of final plume rise;
- Use of calms processing routines;
- Use of upper-bound concentration estimates for sources influenced by downwash from super-squat buildings;
- Use of default wind speed profile exponents; and
- Use of default vertical potential temperature gradients.

Table 6-2 Source and Building Parameters

Model Source ID	Emission Source	NAD 83, meters Coordinates Easting	NAD 83, meters Coordinates Northing	Stack Height Actual (m)	Stack Height GEP (m)	Diameter (m)	Source Height (ft)	Exit Temp (deg. K)	Exit Velocity (m/s)	Flow (m^3/s)	Pollutant Emissions (g/s) CO	Pb	PM_{10}	SO_X	NO_X	VOC
Lime Recalcination Facility																
LKILN	Rotary Lime Kiln with ESP	237846.7	269059.0	30.5	30.5	0.82		479	18.9	6.08			0.07325	0.176	1.83	0.2793
LIMECOOL	Fluidized Bed Cooler with Baghouse	237791.3	269037.2	18.0	0.0	0.58		325	3.2	0.76			0.00964			
LSILO1	North Lime Silo with Baghouse	237758.6	269040.2	23.0	0.0	0.21		ambient	2.44E-02	8.74E-04			3.00E-05			
LSILO2	South Lime Silo with Baghouse	237758.6	269030.1	23.0	0.0	0.21		ambient	2.44E-02	8.74E-04			3.00E-05			
Biosolids Pelletizing Facility 1																
BPFS1	200 wtpd Sludge Dryer with RTO	238036.2	268990.4	42.0	42.0	0.58		370	20.0	4.18		1.04E-05	0.09828	0.1172	0.2822	0.0378
BSILO1N	North Pellet Silo with Baghouse 1	238079.5	269042.6	23.0	0.0	0.21		ambient	1.55E-02	5.54E-04			9.50E-06			
BSILO1S	South Pellet Silo with Baghouse 1	238078.9	269030.7	23.0	0.0	0.21		ambient	1.55E-02	5.54E-04			9.50E-06			
COOL1	Cooling Tower	238049.8	268959.5	4.2	0.0	2.58		ambient	5.4	28.4273			2.15E-05			
COOL2	Cooling Tower	238055.8	268959.5	4.2	0.0	2.58		ambient	5.4	28.4273			2.15E-05			
Biosolids Pelletizing Facility 2																
BPFS2	200 wtpd Sludge Dryer with RTO	238061.1	268990.4	42.0	42.0	0.58		370	20.0	4.18		1E-05	0.09828	0.1172	0.2822	0.0378
BSILO2N	North Pellet Silo with Baghouse 2	238078.3	269021.2	23.0	0.0	0.21		ambient	1.55E-02	5.54E-04			9.50E-06			
BSILO2S	South Pellet Silo with Baghouse 2	238077.7	269012.3	23.0	0.0	0.21		ambient	1.55E-02	5.54E-04			9.50E-06			
COOL3	Cooling Tower	238062.3	268959.5	4.2	0.0	2.58		ambient	5.4	28.43			2.15E-05			
COOL4	Cooling Tower	238068.2	268959.5	4.2	0.0	2.58		ambient	5.4	28.43			2.15E-05			
Class I Landfill Flare Modification																
FLARE1K	LFG Collection System Flare	237883.2	269761.92			0.20		1273	20.0	0.47	1.6049		0.07073	0.1257	0.295	
FLARE2K	LFG Collection System Flare (Netted with 1800 SCF	237882.6	269785.64			0.25		1273	20.0	0.94	0.2874		0.07281	0.1408	0.4341	
FLAR3500	LFG Collection System Flare (Less Facility 2700 SCF	237883.2	269808.18			0.36		1273	20.0	1.65	5.6172*		0.05658	0.1006	0.236	

* CO Emission Rate is for 3,500 - scfm Flare running at full capacity

Building Dimensions

Model Source ID	Building	NAD 83, meters Coordinates* Easting	NAD 83, meters Coordinates* Northing	Height (m)	Dimensions Width (m)	Dimensions Diameter (m)	Base Height (m)
Lime Recalcination Facility							
LRECV	Storage Hoppers (top of hopper dimensions)	237949.3	269003.0	8	37		
LFEED	Lime Sludge Storage and Unloading	237933.9	269011.0	8	37		
LTANK1	Sludge Holding Tanks 1	237875.3	269033.7	3	38		
LTANK2	Sludge Holding Tanks 2	237874.5	268997.5	3	38		
CNTRFG	Centrifuge Building	237856.6	269026.3	12	9		
PEIR1	Kiln Pier #1	237803.0	269031.0	9	3		
PEIR2	Kiln Pier #2	237818.2	269030.4	9	3		
PEIR3	Kiln Pier #3	237833.4	269030.0	9	3		
LSILO1	Storage Silo #1	237758.7	269039.8	23		6	
LSILO2	Storage Silo #2	237758.5	269030.2	23		6	
LPROD	Lime Product/Kiln Burner Building	237789.1	269025.2	8	13		
CNTRL	Work Shop Control Building and Maintenance Buil	237770.4	269034.1	3	3		
Biosolids Pelletizing Facility							
SLGLDG	WW Sludge Receiving Area	238017.3	268997.3	8	10		
BPRCSS1	Pelletizing Facility Building #1	238027.8	269011.4	17	36		
BPRCSS2	Pelletizing Facility Building #2	238050.4	269011.1	17	36		
BSILO1N	Storage Silo - Facility 1 North	238078.6	269031.0	23		6	
BSILO1S	Storage Silo - Facility 1 South	238078.3	269021.4	23		6	
BSILO2N	Storage Silo - Facility 2 North	238079.3	269042.2	23		6	
BSILO2S	Storage Silo - Facility 2 South	238077.8	269012.0	23		6	

A screening analysis using CALPUFF was run according to the methodology recommended by the Interagency Workshop on Air Quality Modeling (IWAQM). This methodology states that CALPUFF will be run using the following options:

- five years of ISCST3 meteorological data will be used (hourly values of relative humidity and other meteorological values will be added if deposition and visibility impacts are desired);
- the ISCST3 input files will be converted to CALPUFF input files using the ISC2PUF utility; and
- the use of MESOPUFF II chemistry

6.2.3 Building Downwash and Good Engineering Practice Stack Height

Downwash occurs when structures influence the plume from a nearby stack. The Good Engineering Practice (GEP) stack height is defined as the minimum stack height that ensures that the emissions from the stack do not result in excessive concentrations in the cavity and wake regions near large structures. The EPA has promulgated stack height regulations under 40 CFR Part 51 which help to determine the GEP stack height for any stationary source.

GEP stack height means the greater of:

- 65 meters, measured from the ground-level elevation at the base of the stack.
- (i) For stacks in existence on January 12, 1979, and for which the owner or operator had obtained all applicable permits or approvals required under 40 CFR Parts 51 and 52:

  $H(g) = 2.5H$

  Provided the owner or operator produces evidence that this equation was actually relied on in establishing an emission limitation:

  (ii) For all other stacks:

  $H(g) = H + 1.5L$

  Where:

  $H(g)$ = good engineering practice stack height, measured from the ground-level elevation at the base of the stack.

  H = height of nearby structure(s) measured from the ground-level elevation at the base of the stack.

L = lesser dimension, height or projected width, of nearby structure(s) provided that the EPA, State or local control agency may require the use of a field study or fluid model to verify GEP stack height for the source; or

- The height demonstrated by a fluid model or a field study approved by the EPA, State, or local control agency, which ensures that the emissions from a stack do not result in excessive concentrations of any air pollutant as a result of atmospheric downwash, wakes, or eddy effects created by the source itself, nearby structures or nearby terrain features.

Both the BPF and LRF stacks have been designed to be at GEP stack height.

The most recent version (Version 95086) of the EPA's Building Profile Input Program (BPIP) was used to calculate GEP stack heights, in addition to direction-specific building heights and widths for input into the downwash assessment algorithm of the ISCST3 dispersion model. The maximum height and maximum projected width of the dominant building were used in the SCREEN3 model to determine if any cavity or wake regions would exist near the BPF or LRF stacks. The modeling confirmed that these GEP stacks would cause no cavity or wake regions.

A site layout showing nearby buildings and stack locations is provided in **Figure 6-1**. Buildings anticipated influencing SWA's stacks and their associated tier heights are presented in Table 6-2.

6.2.4 Urban/Rural Analysis

The selection of either rural or urban dispersion coefficients in a specific modeling exercise should follow one of the procedures described in Section 8.2.8 of Appendix W to 40 CFR Part 51. These include a land use classification procedure or a population based procedure to determine whether the character of an area is primarily urban or rural. Both procedures are described below.

- <u>Land Use Procedure</u> - Classify the land use within the total area circumscribed by a 3-kilometer radius circle about the source using the meteorological land use classification scheme (Auer, 1978). If land use types I1, I2, C1, R2, and R3 account for 50 percent or more of this area, urban dispersion coefficients must be used. Otherwise, rural dispersion coefficients must be used. Descriptions of the land use type classifications are shown in **Table 6-3**.

- <u>Population Density Procedure</u> - Compute the average population density per square kilometer in an area as defined above. If the population density is greater than 750 people per square kilometer, urban dispersion coefficients must be used. Otherwise, rural dispersion coefficients must be used.

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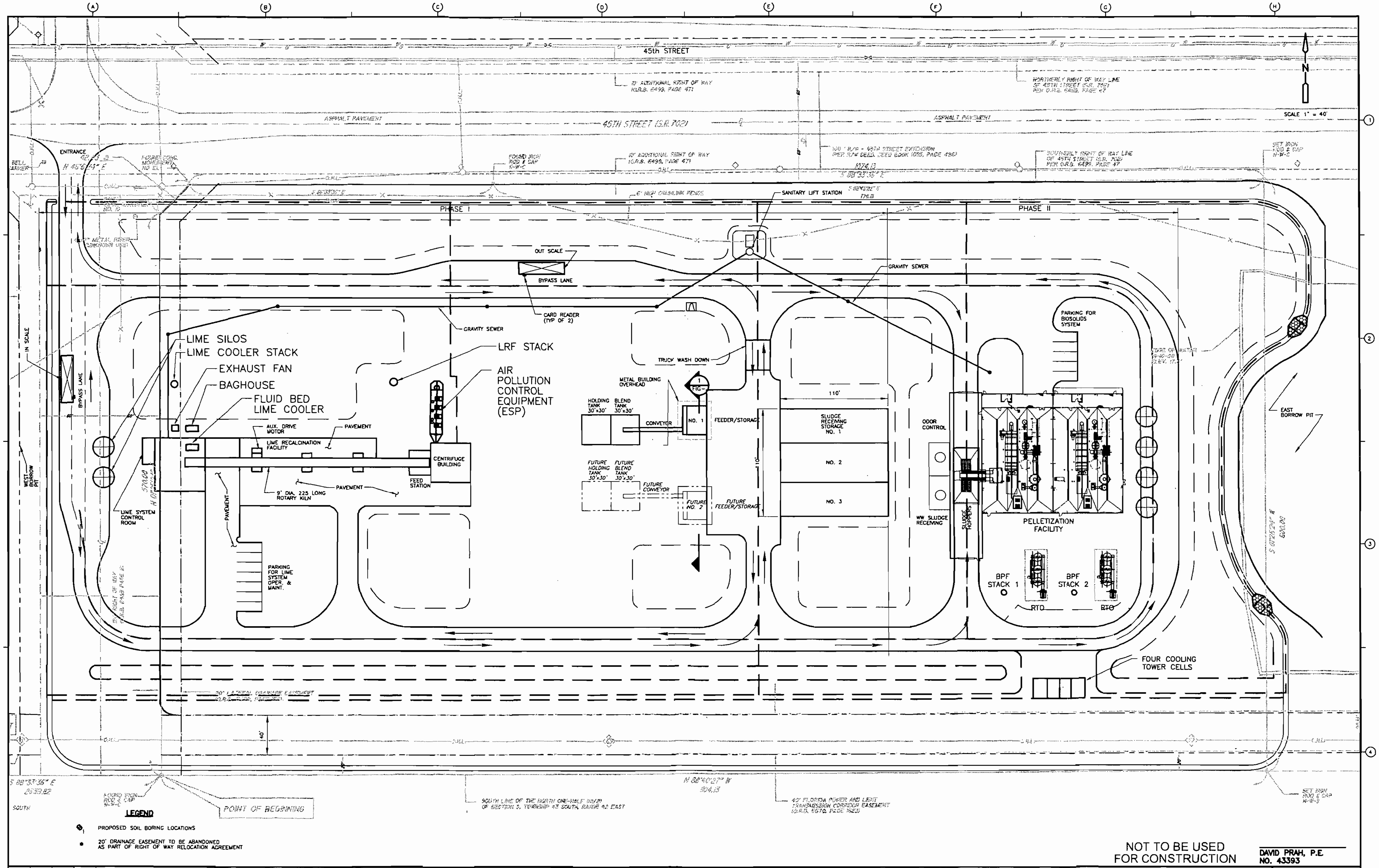

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DAVID PRAH, P.E.
NO. 43393

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: J. HILL
DRAWN BY: D. AUST
SHEET CHK'D BY: D. PRAH
CROSS CHK'D BY: M. LEWIS
APPROVED BY: D. PRAH
DATE: JULY 2003

CDM Camp Dresser & McKee Inc.
2310 Maitland Center Parkway, Suite 300
Maitland, Florida 32751
Tel: 407-660-2552
Cert. of Authorization No. 20

SOLID WASTE AUTHORITY OF PALM BEACH COUNTY
7501 NORTH JOG ROAD

LIME RECALCINATION AND
BIOSOLIDS PELLETIZATION FACILITY

EMISSIONS SOURCE
AND STACK LOCATIONS

PROJECT NO. 2678-39373
FILE NAME: FIGURE13.DWG

SHEET NO.

FIGURE 6-1

L:\2678\39373\FIGURES\ FIGURE1-3 07/31/03 15:48:11 0:37:31 gerhjl

Table 6-3 Auer Land Use Classification Scheme

Type	Description	
	Use and Structures	**Vegetation**
I1	Heavy Industrial Major chemical, steel, and fabrication industries; generally 3-5 story buildings, flat roofs	Grass and tree growth extremely rare; < 5% vegetation
I2	Light-Moderate Industrial Rail yards, truck depots, warehouses, industrial parks, minor fabrications; generally 1-3 story buildings, flat roofs	Very limited grass, trees almost total absent; <5% vegetation
C1	Commercial Office and apartment buildings, hotels; >10 story heights, flat roofs	Limited grass and trees; <15% vegetation
R1	Common Residential Single family dwelling with normal easements; generally one story, pitched roof structures; frequent driveways	Abundant grass lawns and light-moderately wooded; >70% vegetation
R2	Compact Residential Single, some multiple, family dwelling with close spacing; generally < 2 story, pitched roof structures; garages via alley, no driveways	Limited lawn sizes and shade trees; <30% vegetation
R3	Compact Residential Old multi-family dwellings with close (<2 m) lateral separation; generally 2 story, flat roof structures; garages (via alley) and ashpits, no driveways	Limited lawn sizes, old established shade trees; <35% vegetation
R4	Estate Residential Expansive family dwelling on multi-acre tracts	Abundant grass lawns and lightly wooded; >80% vegetation
A1	Metropolitan Natural Major municipal, state, or federal parks, golf courses, cemeteries, campuses; occasional single story structures	Nearly total grass and lightly wooded; >95% vegetation
A2	Agricultural Rural	Local crops (e.g. corn, soybean); >95% vegetation
A3	Undeveloped Uncultivated; wasteland	Mostly wild grasses and weeds, lightly wooded; >90% vegetation
A4	Undeveloped Rural	Heavily wooded; >95% vegetation
A5	Water Surfaces Rivers, lakes	

Of the two methods, the land use procedure is considered more definitive. Population density should be used with caution and should not be applied to highly industrialized areas where the population density may be low and thus a rural classification would be indicated, but the area is sufficiently developed so that the urban land use criteria would be satisfied. In this case, the classification should already be "urban" and urban dispersion parameters should be used. Sources located in an area defined as urban should be modeled using urban dispersion parameters. Sources located in areas defined as rural should be modeled using the rural dispersion parameters. For analyses of entire urban complexes, the entire area should be modeled as an urban region if most of the sources are located in areas classified as urban.

The land use procedure was used to determine whether urban or rural dispersion coefficients should be used. **Figure 6-2** presents the area defined by the circumscribed circle of 3-kilometer radius. Urban land use types I1, I2, C1, R2, and R3 are denoted by hatched areas on the map. These urban land use areas comprise approximately 22 percent of the area. Since these areas comprise less than 50 percent of the total area, rural dispersion coefficients were used in all modeling analyses.

6.2.5 Receptors

Receptors for the screening modeling analysis extend to a distance greater than 10 kilometers from the source and were spaced approximately 500 meters apart to confirm that a 10 km receptor grid for any refined or cumulative source modeling would contain the locations of the maximum expected ground-level concentrations from these facilities. Terrain elevations were not included in the screening modeling analysis.

Receptors in the refined grid and cumulative source modeling analyses consisted of a large Cartesian grid centered on the Solid Waste Authority complex. State planar coordinates (NAD 83) were used for all models. The extent of this grid was based on results obtained in the screening modeling analysis, and extended a maximum of 10 kilometers from the center of the complex. The grid consisted of receptors spaced 100 meters apart.

Receptors were also placed at regular intervals along SWA's property boundary. The spacing of these boundary receptors was no greater than 100 meters. Since the property has no definitive fence line limiting public access, grid receptors that fall on SWA property were included in the analyses.

To further identify the maximum predicted concentrations, a second round of refined modeling was performed using more refined receptor spacing. Secondary Cartesian grids were placed at the locations of the maximum concentrations found in the initial refined modeling. These grids consisted of 100 receptors in a ten-by-ten array, spaced 20 meters apart, and helped to refine the location of the maximum predicted concentration.

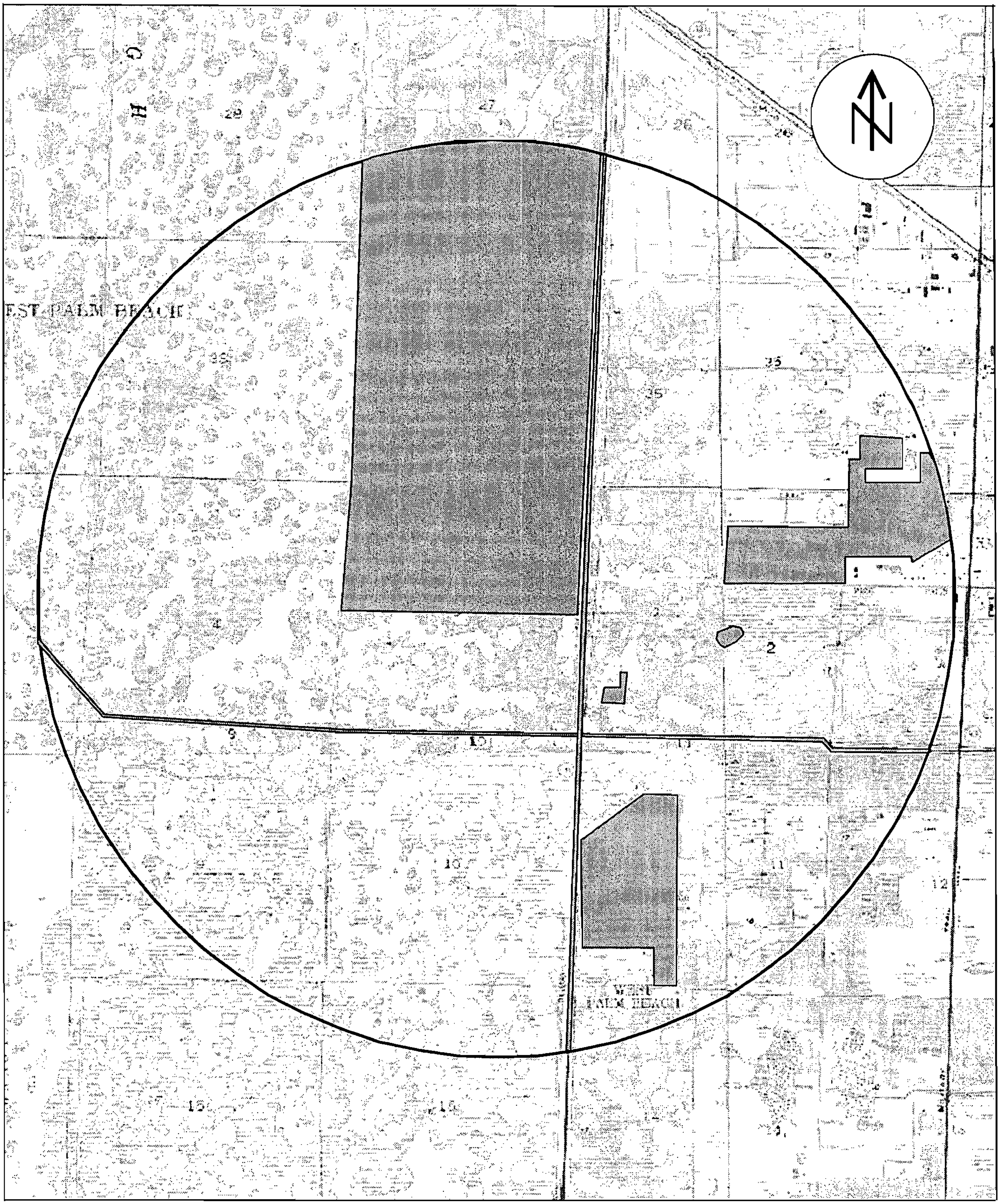

Figure 6-2
Auer Land Classification Analysis - 3km Radius

For a proposed new or modified emissions unit located within 100 kilometers of any Federal Class I area or whose emissions may affect any Federal Class I area (62-210.350(2)(h), Florida Administrative Code (FAC) and EPA, 1990), an air quality analysis of impacts to these areas must be performed. Florida regulations (62-204.360(4)(b), FAC) list four state areas designated as Prevention of Significant Deterioration (PSD) Class I Impact Areas. Of the four, none are within 100 kilometers of SWA's facility. However, FDEP requested (FDEP meeting, Feb. 14, 2002) that impacts at Everglades National Park, which is 128 km (80 miles) south-southwest of SWA's facility, be assessed. Class I areas have the smallest PSD increments, allowing only a small degree of air quality deterioration.

In addition, the National Park Service requested that receptors be placed at Big Cypress National Preserve, located approximately 112 km (70 miles) southwest of SWA's facility. Although this area is technically a Class II area, and **not** a Class I area according to Federal and Florida PSD regulations, concentrations predicted at receptors located at the Big Cypress National Preserve will be compared to Class I impact thresholds. FDEP has provided coordinates for a set of 127 receptors along the nearest edge of the Everglades Park for this analysis. (Cleve Holladay, FDEP, telephone conversation, April, 2002) An additional receptor has been placed at the nearest corner of the Big Cypress Preserve.

All receptors were assumed to lie at ground level. Flagpole receptors were not used.

6.3 Screening Modeling Analysis

A screening-level analysis was conducted just for the LRF and BPF (no flares) with ISCST3 and screening meteorological data for the following:

- to confirm that a receptor grid extending 10 km in each direction from the LRF and BPF will contain the locations of the maximum expected ground-level concentrations from these facilities; and
- to compare upper-bound predicted impacts with de minimis pre-construction monitoring thresholds.

Only those pollutants in exceedence of the PSD emission thresholds require modeling analysis, NO_X in this case. However, the modeling has been performed for all criteria pollutants except ozone, for informational purposes.

The screening meteorological data includes 54 unidirectional combinations of wind speed, stability, and mixing heights determined by EPA to produce the worst-case impacts. These data were reproduced from the SCREEN3 default meteorological data for all 36 directions from 0 to 350 degrees(10-degree increments) to account for spatial orientation of the included sources.

The screening modeling can only predict 1-hour average concentrations. To estimate the 3-, 8-, 24-hour or annual averaging times from the maximum 1-hour average concentration, the 1-hour concentration was scaled as described below, from EPA, 1992, Screening Procedures for Estimating the Air Quality Impacts of Stationary Source, and from the SCREEN3 Users' Guide.

To obtain the estimated maximum concentration for a 3-, 8-, 24-hour or annual averaging time, the 1-hour maximum is multiplied by the indicated factor:

Averaging Time	Multiplying Factor	
3 hours	0.9	(±0.1)
8 hours	0.7	(±0.2)
24 hours	0.4	(±0.2)
Annual	0.08	(±0.02)

A degree of conservatism is incorporated in the factors to provide reasonable assurance that 3-, 8-, 24-hour and annual average maximum concentrations will not be underestimated.

The results of the screening modeling, which are presented in **Table 6-4**, demonstrate that impacts from the facility would be below de minimis monitoring levels as described in Section 5.2, qualifying the proposed modifications for exemption from the preconstruction monitoring requirements listed in 40 CFR 51.166(i)(8) and 62-212.400(5)(f), FAC.

Table 6-4 Comparison to De Minimis Monitoring Levels

Pollutant	Averaging Time	De Minimis Impact Levels ($\mu g/m^3$)		Results
		Federal	Florida	($\mu g/m^3$)
Beryllium	24-hour	0.001		
Carbon Monoxide	8-hour	575	575	7.69
Fluorides	24-hour	0.25	0.25	
Hydrogen Sulfide	1-hour	0.2	0.2	0.13
Lead	Quarterly	0.1	0.1	0.00
Mercury	24-hour	0.25	0.25	
Nitrogen Dioxide	Annual	14	14	2.02
Ozone	-	(1)		
PM_{10}	24-hour	10	10	3.06
Reduced Sulfur Compounds (2)	1-hour	10	0.2	0.13
Sulfur Dioxide	24-hour	13	13	2.35
Total Reduced Sulfur (2)	1-hour	10	0.2	0.13
Vinyl Chloride	24-hour	15		

(1) No de minimis air quality level is provided for ozone. However, any net increase of 100 tons per year or more of volatile organic compounds subject to PSD would be required to perform an ambient impact analysis, including the gathering of ambient air quality data. As VOC emissions are well below the 100-tpy threshold, no additional ozone ambient air quality data is required.

(2) The only known reduced sulfur compound emitted is hydrogen sulfide.

6.4 Refined Modeling Analysis

The refined modeling analysis was conducted to determine the LRF, BPF, and three flares' area of significant impact for each applicable pollutant. The refined modeling analysis is only required for those pollutants that exceed PSD emission thresholds (NO_X) and exceed screening impact levels. However, the modeling has been performed for all criteria pollutants, except ozone, for informational purposes.

The impact area includes all locations where the significant increase in the potential emissions of a criteria pollutant from a new source, or significant net emission increase from a modification, will cause a significant ambient impact. The highest modeled pollutant concentration for each averaging time is used to determine whether the source will have a significant impact for that pollutant. The significant impact levels (SILs) for each pollutant/averaging time are shown in Table 6-1.

The EPA SILs in Table 6-1 apply to Class II areas, such as the project area. If a proposed source is located within 100 kilometers of a Class I, or "pristine", area, an impact for any regulated pollutant of 1 $\mu g/m^3$ on a 24-hour basis is significant. However, the National Park Service recommends SILs that are more stringent than EPA SILs for Class I areas. These NPS SILs are also presented in Table 6-1.
Should a significant impact be predicted for a particular pollutant, the impact area is defined as the circular area with a radius extending from the source to either the most distant point where approved dispersion modeling predicts a significant impact level to occur, or a distance of 50 kilometers, whichever is less. The impact area is determined for each pollutant of review and every applicable averaging time. The impact area is the largest of the areas determined for that pollutant, regardless of averaging time.

The impact area is then used a) to define the area of the cumulative impact analysis; b) to guide the identification of other sources to be included in the cumulative impact analysis; and c) to set boundaries for ambient monitoring, if necessary.

6.4.1 Compliance with Ambient Air Quality Standards and Prevention of Significant Deterioration Increments

As described in Section 2.4, Ambient Air Quality Standards (AAQS) and PSD increment compliance demonstrations are only required for NO_X emissions from the proposed projects. However, the modeling has been performed for all criteria pollutants for informational purposes. Should no significant impacts be predicted for a particular pollutant, no further National Ambient Air Quality Standards (NAAQS) or PSD analysis is required for that pollutant. However, background concentrations have been added to the modeled results and compared with the Federal and Florida AAQS and PSD increments, as described below. Although not required this has also been done for informational purposes.

6.4.1.1 Compliance with Ambient Air Quality Standards

For NAAQS and Florida Ambient Air Quality Standards (FAAQS) compliance, applicable (pollutant and averaging-time specific) background ambient concentrations (as presented in Table 5-5) have been added to the predicted concentrations to produce total concentrations. The highest predicted concentrations have been used for annual averaging times. The highest of the second-highest concentrations have been used for all short-term (1-hour to 24-hour) averaging times. To determine compliance with State and National AAQS, these total concentrations have been compared with the AAQS.

6.4.1.2 Prevention of Significant Deterioration Increment Compliance

For PSD compliance, the highest predicted concentrations have been used for annual averaging times. The highest of the second-highest concentrations have been used for all short-term (1-hour to 24-hour) averaging times. To determine compliance with Prevention of Significant Deterioration increment values (presented in Table 5-1), the predicted net concentrations were compared with the PSD increments.

6.4.2 Refined Modeling Results - Industrial Source Complex, Short Term, Version 3 Modeling

Results from the refined modeling analysis are shown in **Table 6-5**. **Appendix D** contains sample printouts the output (*.lst) files from select model runs. All of the model runs for each year of meteorological data and pollutant have been submitted to FDEP separately on the CDs. All the pollutants modeled have a maximum predicted impact for the proposed emissions increases below the ambient air quality significance impact levels for all locations and averaging times. Therefore, a cumulative impact analysis including other sources in the project area is not required. However, total predicted project impacts were added to the background concentrations listed in Table 5-5 and compared with AAQS for informational purposes. As **Table 6-6** shows, all pollutant concentrations were predicted to be well below the air quality standards, demonstrating compliance with the FAAQS, NAAQS, and PSD increment. The highest predicted NO_X impacts are one percent of the AAQS, and less than four percent of the Class II PSD increment.

6.4.3 Refined Modeling Results - CALPUFF Modeling

The results of the refined modeling analysis using the CALPUFF model to determine impacts at the Everglades National Park and Big Cypress National Preserve were compared to the National Park Service (NPS) SILs and PSD increments, as shown in **Table 6-7**. No pollutants were found to be in exceedence and, therefore, no additional analysis was required.

Table 6-5 Comparison of BPF, LRF, and Three Flares Predicted Air Pollutant Concentrations with Class II Area Significant Impact Levels

Pollutant	Averaging Time	EPA SILs	Class II PSD Increments	Modeling Results ($\mu g/m^3$)
		($\mu g/m^3$)		
SO_2	3-hour	25	512	3.05
	24-hour	5	91	1.36
	Annual	1	20	0.18
NO_2	Annual	1	25	0.94
CO	1-hour	2000		16.26
	8-hour	500		8.47
PM_{10}	24-hour	5	30	0.98
	Annual	1	17	0.13
Pb	Quarter	0.1		1.30 E-4

Table 6-6 Comparison of BPF, LRF, and Three Flares Predicted Air Pollutant Concentrations with AAQS and PSD Increments

Pollutant	Avg. Time	Florida Standard	National Primary Standard	National Secondary Standard	Model Results ($\mu g/m^3$)
NO_2 ($\mu g/m^3$)	Annual	100	100	100	1.0
SO_2 ($\mu g/m^3$)	3-Hr	1300	-	1300	39.6
	24-Hr	260	365	-	35.2
	Annual	60	80	-	2.8
CO ($\mu g/m^3$)	1-Hr	40000	40000	-	20.3
	8-Hr	10000	10000	-	11.3
Pb ($\mu g/m^3$)	Qtr	1.5	1.5	1.5	1.1 E-03
O_3 (ppm)	1-Hr	0.12	0.12	0.12	
PM_{10} ($\mu g/m^3$)	24-Hr	150	150	150	43.0
	Annual	50	50	50	25.9

Notes:
Background concentrations have been added to the modeled impacts.
All short-term (1-hour, 3-hour, and 24-hour) standards except ozone are not to be exceeded more than once per 12 month period.
Annual standards are 12-month arithmetic means, never to be exceeded. Quarterly standards are also never to be exceeded.
The 1-hour ozone standard should not be exceeded more than an average of one day per year over three years.
Note that the National NO_2 standard is promulgated at 0.053 ppm.
1 ppm NO_2 = 1887 $\mu g/m^3$ NO_2
1 ppm CO = 1140 $\mu g/m^3$ CO
1 ppm O_3 = 1961 $\mu g/m^3$ O_3

Table 6-7 Comparison of BPF, LRF, and Three Flares Predicted Air Pollutant Concentrations with Class I Significant Impact Levels (SILs) for Sensitive Areas

Pollutant	Averaging Time	NPS Class I SILs	Class I PSD Increments	Modeling Results	
				Everglades	Big Cypress
		($\mu g/m^3$)		($\mu g/m^3$)	($\mu g/m^3$)
SO_2	3-hour	0.48	25	1.63 E-02	2.54 E-02
	24-hour	0.07	5	4.28 E-03	7.81 E-03
	Annual	0.03	2	1.11 E-04	4.48 E-04
NO_2	Annual	0.03	2.5	1.83 E-04	9.24 E-04
PM_{10}	24-hour	0.27	8	4.30 E-03	6.02 E-03
	Annual	0.08	4	1.23 E-04	3.59 E-04

As **Table 6-8** shows, all pollutants are below thresholds, demonstrating compliance with the FAAQS, NAAQS, and PSD increment.

Table 6-8 Comparison of BPF, LRF, and Three Flares Predicted Air Pollutant Concentrations National and Florida Ambient Air Quality Standards, Sensitive Areas

		Florida Standard	National Primary Standard	National Secondary Standard	Modeling Results Everglades	Big Cypress
Pollutant	Avg. Time	($\mu g/m^3$)			($\mu g/m^3$)	
NO_2 ($\mu g/m^3$)	Annual	100	100	100	2.02 E-02	2.09 E-02
SO_2 ($\mu g/m^3$)	3-Hr	1300	-	1300	36.4	36.4
	24-Hr	260	365	-	33.8	33.8
	Annual	60	80	-	2.6	2.6
CO ($\mu g/m^3$)	1-Hr	40000	40000	-	4.4	4.4
	8-Hr	10000	10000	-	2.9	3.0
Pb ($\mu g/m^3$)	Qtr	1.5	1.5	1.5	1.00 E-03	1.00 E-03
O_3 (ppm)	1-Hr	0.12	0.12	0.12		
PM_{10} ($\mu g/m^3$)	24-Hr	150	150	150	42.0	42.0
	Annual	50	50	50	25.8	25.8

Notes:

Background concentrations have been added to the modeled impacts.
All short-term (1-hour, 3-hour, and 24-hour) standards except ozone are not to be exceeded more than once per 12 month period.
Annual standards are 12-month arithmetic means, never to be exceeded. Quarterly standards are also never to be exceeded.
The 1-hour ozone standard should not be exceeded more than an average of one day per year over three years.
Note that the National NO_2 standard is promulgated at 0.053 ppm.
1 ppm NO_2 = 1887 $\mu g/m^3$ NO_2
1 ppm CO = 1140 $\mu g/m^3$ CO
1 ppm O_3 = 1961 $\mu g/m^3$ O_3

6.5 Cumulative Impact Analysis

Because all pollutant concentrations modeled were predicted to be below significant impact levels, no cumulative impact analysis is required, and none was performed.

Section 7
Additional Impact Analysis

This section describes the analysis performed to assess the impact of the Solid Waste Authority of Palm Beach County (SWA) modification, addition of the Lime Recalcination Facility (LRF), Biosolids Pelletization Facility (BPF), and the three flares at the Class I Landfill on air quality related values as required under the Prevention of Significant Deterioration (PSD) regulations. The values assessed are:

- Visibility in Class I areas within 100 km of SWA's site or as advised by Florida Department of Environmental Protection (FDEP);
- Impacts from growth indirectly related to the LRF and BPF; and
- The potential for impacts to soil and vegetation.

Air quality impacts from criteria pollutants in the Big Cypress National Preserve are also presented. As the closest Class I Area, the Everglades National Park, is located over 100 km away, no additional Class I impact analysis was required. However, the additional Class I impact analyses were performed as requested by FDEP. Other issues addressed in this section include an assessment of secondary sources from SWA.

Because the sensitive areas are over 50 kilometers from the source, U.S. Environmental Protection Agency (EPA) guidance recommends the use of the CALPUFF model to analyze concentrations, visibility and deposition impacts (40 Code of Federal Regulations (CFR) 51, Appendix W, Guideline on Air Quality Models; Cleve Holladay, FDEP, email and phone conversations April 2002). Modeling parameters as listed in Section 6.2.2 were used for the analyses. The CALPUFF post-processor, CALPOST, was used to calculate haze/visibility parameters as well as convert deposition flux to kg/(hectare*year).

7.1 Visibility Impacts

Visibility impairment can be quantified by determining the spectral light intensity at a given location in the atmosphere with known aerosol and pollutant concentrations. Visibility impairment includes such things as the reduction of visual range, the perceptibility of plume shapes and haze layers, atmospheric discoloration, and plume-modified visual contrast of distant objects. These effects are caused by changes in light intensity as a result of the scattering and absorption of light (radiation) by particles and/or atmospheric aerosols. When the physical and chemical properties of the plume are known, the impact on visibility can be estimated (Latimer and Ireason, 1980).

Calculation of impacts to visibility are only required at Class I areas. At the request of the National Park Service (NPS), the CALPUFF model was used to assess visibility impacts at the Everglades National Park and the Big Cypress National Preserve using methods outlined by IWAQM (EPA 1998). CALPUFF was used to produce concentrations of sulfates and nitrates. Resulting concentrations of $SO_4^{=}$, NO_3^{-}, and HNO_3 were used to calculate 24-hour averaged extinction coefficients and compute the percent change in extinction. The light extinction coefficient includes both scattering and absorption components, and is a measure of light attenuation over a unit distance.

CALPUFF was set to create concentration data files that were used as input files for the CALPOST post-processor. Parameters used in the CALPOST post-processor are listed below:

- Modeled Species: Sulfates, Nitrates
- Computation Method: (CALPOST, Method 6) Compute extinction from speciated PM measurements and user-specified Relative Humidity (RH) factors.
- Extinction Efficiency:
  - Ammonium Sulfate: 3 Mm^{-1} per $\mu g/m^3$
  - Ammonium Nitrate: 3 Mm^{-1} per $\mu g/m^3$
- Monthly RH Factors:
  - Winter (Jan, Feb, Dec): 3.6
  - Spring (Mar, Apr, May): 3.7
  - Summer (Jun, Jul, Aug): 3.8
  - Fall (Sep, Oct, Nov): 4.0
- Background concentration for computing background extinction coefficients
  - Ammonium Sulfate: 0.3 μg/m3
  - Ammonium Nitrate: 0.3 μg/m3
  - Soil: 8.5 μg/m3
- Extinction due to Rayleigh Scattering: 10 Mm^{-1}
- Averaging time: 24-hour
- Visibility units: Mm^{-1}

Natural background estimates for the visibility reference level at the Everglades National Park were obtained from information in the Federal Land Managers' Air Quality Related Values Workgroup (FLAG), guidance, December 2000. These data are assumed representative of the Big Cypress National Preserve as well.

In accordance with guidance, as the change in light extinction was predicted to be 5 percent or less when compared to natural conditions, no further visibility analysis is required. Results are shown in **Table 7-1** for each year of meteorological data. A sample of the modeling output can be found in Appendix D.

Table 7-1 Visibility Modeling Results

Class 1 - Everglades Nation Park, 24-hr Average						
	1986	**1987**	**1988**	**1989**	**1990**	**Threshold**
Largest Change in Extinction, Db_{ext}	0.12%	0.15%	0.18%	0.14%	0.11%	5%
Largest Delta-Deciview, DDV	0.012	0.015	0.018	0.014	0.011	
Maximum Extinction, (Mm^{-1})	25.721	25.728	25.726	25.728	25.723	
Big Cypress National Preserve, NE Corner, 24-hr Average						
	1986	**1987**	**1988**	**1989**	**1990**	**Threshold**
Largest Change in Extinction, Db_{ext}	0.18%	0.09%	0.22%	0.15%	0.21%	5%
Largest Delta-Deciview, DDV	0.018	0.009	0.022	0.015	0.021	
Maximum Extinction, (Mm^{-1})	25.724	25.72	25.72	25.727	25.755	

CALPOST was used to calculate visibility parameters using S and N concentrations calculated using the CALPUFF dispersion model.

7.2 Growth Analysis

The LRF, once operational, will employ approximately ten people. The BPF, once operational, will employ approximately sixteen people. The proposed flares can be managed by SWA's current staff. It is anticipated that the majority of these personnel requirements will be filled from within the local labor force. Significant in-migration to the area is therefore not anticipated. As a result, no increase in population in the area attributable to SWA's modifications is expected to occur.

The projects do not require the destruction, relocation or alteration of any residential property in the area. In addition, since no net migration to the area is anticipated, there will be no change in demand for housing units in the area.

The construction and operation of the LRF, BPF, and flares will have a minor positive net effect on industrial and commercial development. It is not anticipated that this effect will be significant when considered on a regional basis.

The growth analysis indicates that no net significant change in employment, populations, housing, or commercial/industrial development will be associated with the project. As a result, there will not be any significant increases in pollutant emissions indirectly associated with the LRF, BPF, or flares.

7.3 Soils and Vegetation

Federal and Florida regulations require that an assessment be undertaken of the potential impacts of emissions from a proposed facility on soils and vegetation of commercial or recreational value (40 CFR 51.166(o)(1) and 62-212.400(5)(e)1.a Florida Administrative Code [FAC]). Pollutant emissions from the LRF, BPF, and flares were used to compute potential impacts on soils and vegetation. Vegetative impacts from airborne pollutants may result from deposition on leaf surfaces as particulate matter (dry deposition), from solutions in rainfall (wet deposition), or by gaseous exchange. Airborne components may also enter vegetation through roots following deposition to soils. Accumulation of airborne pollutants in soil can also lead to changes in soil characteristics.

At NPS's request, total nitrogen and total sulfur deposition modeling was done using the CALPUFF model, to assess any potential impacts at the Everglades National Park and Big Cypress National Preserve. The parameters for running CALPUFF in screening mode, as listed in Section 6.2.2, were used for the analysis. (Cleve Holladay, FDEP, phone conversation, April 2002.)

Deposition estimates, in units of g/(m2*s), needed to be adjusted to compare modeling results with the limit of 0.1 kg/(ha*yr) of elemental sulfur (S) and nitrogen (N), as requested by NPS. The CALPUFF results for each pollutant were individually converted to kg/ha using the CALPOST post-processor. Molecular weight differences between S or N and a specific pollutant were corrected using the multipliers presented in Tables 7-2 and 7-3.

7.3.1 Total Sulfur Deposition

Sulfuric acid (H_2SO_4) is formed when gaseous SO_3 produced by a source reacts with water droplets. The acidified water vapor can result in acidic precipitation (acid rain). Plant sensitivity to sulfur dioxide (SO_2) appears to vary not only with the climate of an area, but also with the duration of exposure.

Wet and dry deposition fluxes of SO_2 and $SO_4^=$ were calculated for the proposed modifications to SWA. Deposition results were converted to kg/(ha*yr) and normalized for S deposition using the multipliers listed in **Table 7-2**. The maximum annual average from all receptors modeled was used for the comparison. As Table 7-2 shows, total S deposition resulting from SWA's modifications do not exceed NPS's 0.1 kg/(ha*yr) threshold.

7.3.2 Total Nitrogen Deposition

Nitrogen dioxide (NO_2) can be beneficial to vegetation in small amounts. Uptake of NO_2 varies with a number of factors such as nutrient supply in the soil, fertilization, and rainfall. NO_2 can also be converted to nitric acid (HNO_3) and contribute to acid precipitation.

The dry deposition fluxes of nitrogen oxides (NO_X), HNO_3, and NO_3^-, as well as the wet deposition flux of HNO_3 were calculated for the proposed LRF, BPF, and flares. Deposition results were converted to kg/(ha*yr) and normalized for N deposition using the multipliers listed in **Table 7-3**. The maximum annual average from all receptors modeled was used for the comparison. As Table 7-3 shows, total N deposition resulting from SWA's modifications do not exceed NPS's 0.1 kg/(ha*yr) threshold.

Table 7-2 Total Nitrogen and Sulfur Deposition Results

Class I - Everglades Nation Park, Annual Average S Deposition (kg/ha*yr)

	Multiplier*	**1986**	**1987**	**1988**	**1989**	**1990**
SO_2, Dry Deposition	157680000	6.16E-05	5.92E-05	5.75E-05	4.81E-05	5.63E-05
SO_2, Wet Deposition	157680000	7.31E-05	2.89E-05	2.62E-05	2.14E-05	2.69E-05
SO_4^{2-}, Dry Deposition	105118949	2.62E-07	2.56E-07	2.82E-07	2.03E-07	2.59E-07
SO_4^{2-}, Wet Deposition	105118949	1.06E-05	4.63E-06	4.84E-06	3.06E-06	5.26E-06
Total S Deposition:		1.45E-04	9.31E-05	8.87E-05	7.27E-05	8.86E-05

Big Cypress National Preserve, NE Corner, Annual Average S Deposition (kg/ha*yr)

	Multiplier*	**1986**	**1987**	**1988**	**1989**	**1990**
SO_2, Dry Deposition	157680000	2.00E-04	1.58E-04	2.38E-04	1.60E-04	2.44E-04
SO_2, Wet Deposition	157680000	7.78E-05	8.88E-05	6.49E-05	2.69E-05	7.96E-05
SO_4^{2-}, Dry Deposition	105118949	5.35E-07	4.18E-07	6.18E-07	4.27E-07	5.88E-07
SO_4^{2-}, Wet Deposition	105118949	1.64E-05	8.97E-06	8.41E-06	4.04E-06	1.09E-05
Total S Deposition:		2.95E-04	2.56E-04	3.11E-04	1.92E-04	3.35E-04

* Multipler is applied using CALPOST to convert from the pollutant specific (g/m^2*s) values in the wet and dry deposition CALPUFF output files, to sulfur deposition values (in kg/ha*yr) for comparison with the NPS limit of 0.1 (kg/ha*yr)

Deposition of	Ratio of MW of Pollutant to S	g to kg	m2 to ha	sec to hr	hr to year	Multipler
S from SO2	0.5	0.001	10000	3600	8760	157680000
S from SO4	0.33333	0.001	10000	3600	8760	105118949

pg. 40 of IWAQM Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts, EPA-454/R-98-019, December, 1998.

Table 7-3 Class I - Everglades National Park, Annual Average N Deposition (kg/ha*yr)

	Multiplier*	1986	1987	1988	1989	1990
NO_X, Dry Deposition	95979816	3.44E-05	4.75E-05	3.48E-05	2.35E-05	2.81E-05
HNO_3, Dry Deposition	70079299	5.02E-05	4.81E-05	4.95E-05	3.85E-05	4.96E-05
HNO_3, Wet Deposition	70079299	2.32E-05	7.58E-06	8.26E-06	6.87E-06	1.31E-05
NO_3^{1-}, Dry Deposition	71211442	9.09E-07	8.00E-07	9.06E-07	6.67E-07	7.50E-07
NO_3^{1-}, Wet Deposition	71211442	7.49E-05	2.46E-05	2.32E-05	1.54E-05	2.60E-05
Total N Deposition:		1.84E-04	1.29E-04	1.17E-04	8.50E-05	1.18E-04

Big Cypress National Preserve, NE Corner, Annual Average N Deposition (kg/ha*yr)

	Multiplier*	1986	1987	1988	1989	1990
NO_X, Dry Deposition	95979816	1.73E-04	1.63E-04	2.13E-04	1.38E-04	2.27E-04
HNO_3, Dry Deposition	70079299	1.52E-04	1.07E-04	1.71E-04	1.21E-04	1.72E-04
HNO_3, Wet Deposition	70079299	4.80E-05	2.01E-05	2.60E-05	1.05E-05	4.13E-05
NO_3^{1-}, Dry Deposition	71211442	1.55E-06	1.66E-06	2.31E-06	1.28E-06	2.27E-06
NO_3^{1-}, Wet Deposition	71211442	4.92E-05	5.95E-05	3.94E-05	2.44E-05	5.73E-05
Total N Deposition:		4.24E-04	3.52E-04	4.51E-04	2.96E-04	4.99E-04

* Multipler is applied using CALPOST to convert from the pollutant specific (g/m^2*s) values in the wet and dry deposition CALPUFF output files, to nitrogen deposition values (in kg/ha*yr) for comparison with the NPS limit of 0.1 (kg/ha*yr)

Deposition of	Ratio of MW of Pollutant to N	g to kg	m2 to ha	sec to hr	hr to year	Multipler
N from NO_X	0.30435	0.001	10000	3600	8760	95979816
N from HNO_3	0.22222	0.001	10000	3600	8760	70079299.2
N from NO_3^-	0.22581	0.001	10000	3600	8760	71211441.6

pg. 40 of IWAQM Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts, EPA-454/R-98-019, December, 1998.

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Appendix A
Emission Calculation Workbook

APPENDIX A
SWA Lime Recalcination Facility and Sludge Pelletization Facility
Emission Calculation Tables

The tables in this Appendix include the emission inventory for the SWA Lime Recalcination and Biosolids Pelletizing Facility PSD permit modification, along with calculation and information support documentation for the inventory.

Table Number	Table Name	Description
A-1	Estimated Maximum Potential Emission Rates	Summary of emission factors and emission rates for PSD pollutants emitted from the LRF, BPF, and flares
A-2	Estimated Emission Rates for the Lime Kiln	Calculation of the lime kiln emissions based on Vendor (FFE Minerals, Dave Gunkle) Information
A-3	Estimated PM Emission Rates for Baghouses, Lime Silos, Sludge Pelletizing Silos	Calculation of PM/PM10 emissions from the proposed baghouses, based on vendor information (Lime: FFE Minerals, Dave Gunkle; BPF: Andritz, Peter Commerford)
A-4	Cooling Tower Air Emissions - PM	Calculation of PM emissions from the cooling tower based on known design parameters and AP-42 estimates.
A-5	Methane Emission Rates	Calculation of Methane and NMOC emission rates for the lime kiln.
A-6	HAP Emission Rates	Calculation of HAP emission rates for the lime kiln, based on default HAP concentrations in landfill gas as listed in AP-42
A-7	Methane Emission Rates	Calculation of Methane and NMOC emission rates for the biosolids pelletizing dryer.
A-8	HAP Emission Rates	Calculation of HAP emission rates for the biosolids pelletizing dryer, based on default HAP concentrations in landfill gas as listed in AP-42
	Existing Flare Emission Calculations	
A-9	Methane Emission Rates	Calculation of Methane and NMOC emission rates for the existing flare.
A-10	HAP Emission Rates	Calculation of HAP emission rates for the existing flare, based on default HAP concentrations in landfill gas as listed in AP-42

A-11	Estimated Emissions for the Existing Flare	Calculation of CO, NO_X, PM, SO2 and HCl based on AP-42 emission factors.
Proposed 1000 SCFM Flare Emission Calculations		
A-12	Exit Gas Flow Rate Calculations	Calculation of exit flow and velocity from the flare
A-13	Methane Emission Rates	Calculation of Methane and NMOC emission rates for the proposed flare.
A-14	HAP Emission Rates	Calculation of HAP emission rates for the proposed flare, based on default HAP concentrations in landfill gas as listed in AP-42
A-15	Secondary Pollutant Emission Rates from Flare	Calculation of CO and NO_X emissions based on vendor information. Calculation of SO_2 and HCl based on AP-42 calculations and flare data.
Proposed 2000 SCFM Flare Emission Calculations		
A-16	Exit Gas Flow Rate Calculations	Calculation of exit flow and velocity from the flare
A-17	Methane Emission Rates	Calculation of Methane and NMOC emission rates for the proposed flare.
A-18	HAP Emission Rates	Calculation of HAP emission rates for the proposed flare, based on default HAP concentrations in landfill gas as listed in AP-42
A-19	Secondary Pollutant Emission Rates from Flare	Calculation of CO and NO_X emissions based on vendor information. Calculation of SO_2 and HCl based on AP-42 calculations and flare data.
Proposed 3500 SCFM Flare Emission Calculations (operating at capacity)		
A-20	Exit Gas Flow Rate Calculations	Calculation of exit flow and velocity from the flare
A-21	Methane Emission Rates	Calculation of Methane and NMOC emission rates for the proposed flare.
A-22	HAP Emission Rates	Calculation of HAP emission rates for the proposed flare, based on default HAP concentrations in landfill gas as listed in AP-42
A-23	Secondary Pollutant Emission Rates from Flare	Calculation of CO and NO_X emissions based on vendor information. Calculation of SO_2 and HCl based on AP-42 calculations and flare data.
Proposed 3500 SCFM Flare Emission Calculations (operating 800 SCFM to account for LRF and BPF demand of 2700 SCFM)		
A-24	Exit Gas Flow Rate Calculations	Calculation of exit flow and velocity from the flare
A-25	Methane Emission Rates	Calculation of Methane and NMOC emission rates for the proposed flare.

A-26	HAP Emission Rates	Calculation of HAP emission rates for the proposed flare, based on default HAP concentrations in landfill gas as listed in AP-42
A-27	Secondary Pollutant Emission Rates from Flare	Calculation of CO and NO_X emissions based on vendor information. Calculation of SO_2 and HCl based on AP-42 calculations and flare data.

Table A-1
SWA Lime Recalcination Facility and Biosolids Pelletization Facility
Estimated Maximum Potential Emission Rates

Source	Emissions, by Air Pollutant																									
	Particulate Matter				Sulfur Dioxide				Nitrogen Oxides				Carbon Monoxide				Lead				Volatile Organic Compounds				Total HAP	
	Emission Factor	Units	lb/hr	ton/year	Emission Factor	Units	lb/hr	ton/year	Emission Factor	Units	lb/hr	ton/year	Emission Factor	Units	lb/hr	ton/year	Emission Factor	Units	lb/hr	ton/year	Emission Factor	Units	lb/hr	ton/year	lb/hr	ton/year
Lime Recalcination Facility																										
Rotary Kiln (Landfill Gas)[4]	0.005	gr/dscf @ 10% O2	0.58	2.5	9.99E-04	lb/hr/scfm[1]	1.40	6.1	0.440	lbs/MMBtu	14.52	63.6	150.00	ppmv @ 10% O2	8.87	38.9	—	—	—	—	20	ppmv @ 3% O	2.22	9.7	—	0.13
Cross-bar lime cooler	0.005	gr/dscf @ 10% O2	0.08	0.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Storage Silo (2 Silos)	1.50E-02	gr/dscf actual	4.76E-04	2.1E-03	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Facility Subtotal	—	—	—	2.9	—	—	—	6.1	—	—	—	63.6	—	—	—	38.9	—	—	—	—	—	—	—	9.7	0.03	0.13
Biosolids Pelletizing Facility																										
200-wtpd Train (Andritz) Odor Control Unit	0.78	lb/hour[3, 4]	0.78	3.4	0.93	lb/hour[2]	0.93	4.1	2.24	lb/hour[2]	2.24	9.8	0.39	lb/hour[2]	0.39	1.7	8.3E-05	lb/hour[2]	8.3E-05	3.6E-04	0.3	lb/hour[2]	0.3	1.3	—	0.09
Storage Silos (2 Silos)	0.015	gr/dscf actual	1.51E-04	6.61E-04	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cooling Towers (2)	0.019	lbs/10^3 gal drift	3.42E-04	1.50E-03	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Recycle Bin w/ Baghouse	0.015	gr/dscf actual	3.38E-01	1.5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
200-wtpd Train (Andritz) Odor Control Unit	0.78	lb/hour[3, 4]	0.78	3.4	0.93	lb/hour[2]	0.93	4.1	2.24	lb/hour[2]	2.24	9.8	0.39	lb/hour[2]	0.39	1.7	8.3E-05	lb/hour[2]	8.3E-05	3.6E-04	0.3	lb/hour[2]	0.3	1.3	—	0.00
Storage Silos (2 Silos)	0.015	gr/dscf actual	1.51E-04	6.61E-04	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cooling Towers (2)	0.019	lbs/10^3 gal drift	3.42E-04	1.50E-03	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Recycle Bin w/ Baghouse	0.015	gr/dscf actual	3.38E-01	1.5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Facility Subtotal	—	—	—	9.8	—	—	—	8.1	—	—	—	19.6	—	—	—	3.4	—	—	—	0.0	—	—	—	2.6	0.02	0.1
1600 SCFM Flare																										
Existing Flare[5]	17	lbs/10^6 dscf CH_4	0.53	2.3	9.99E-04	lb/hr/scfm[1]	1.03	4.5	40	lbs/10^6 dscf CH_4	1.24	5.4	750	lbs/10^6 dscf CH_4	23.19	101.6	—	—	—	—	—	—	0.15	0.7	0.03	0.14
1000 SCFM Flare																										
Proposed Flare[7]	17	lbs/10^6 dscf CH_4	0.56	2.5	9.99E-04	lb/hr/scfm[1]	1.00	4.4	0.068	lb/MMBtu	2.34	10.3	0.37	lb/MMBtu	12.74	55.8	—	—	—	—	—	—	0.15	0.6	0.03	0.13
2000 SCFM Flare Netted with Existing 1600 SCFM Flare																										
Proposed Flare[7]	17	lbs/10^6 dscf CH_4	0.60	2.61	9.99E-04	lb/hr/scfm[1]	0.96	4.22	0.068	lb/MMBtu	3.44	16.09	0.37	lb/MMBtu	2.28	9.99	—	—	—	—	—	—	0.14	0.6	0.03	0.13
3500 SCFM Flare - Operating at Capacity																										
Proposed Flare[7]	17	lbs/10^6 dscf CH_4	1.98	8.8	9.99E-04	lb/hr/scfm[1]	3.49	15.3	0.068	lb/MMBtu	8.19	35.9	0.37	lb/MMBtu	44.58	195.3	—	—	—	—	—	—	0.51	2.3	0.11	0.48
3500 SCFM Flare - Operating at 900 SCFM[8]																										
Proposed Flare[7]	17	lbs/10^6 dscf CH_4	0.46	2.0	9.99E-04	lb/hr/scfm[1]	0.80	3.5	0.068	lb/MMBtu	1.87	8.2	0.37	lb/MMBtu	10.19	44.6	—	—	—	—	—	—	0.12	0.5	0.02	0.11
Totals																										
Total (No Flares)	—	—	—	12.7	—	—	—	14.3	—	—	—	**83.2**	—	—	—	42.3	—	—	—	0.0	—	—	—	12.3	—	0.2
Total (Flares Included)	—	—	—	19.7	—	—	—	28.4	—	—	—	**118.9**	—	—	—	**291.6**	—	—	—	0.0	—	—	—	14.1	—	0.6
Emission Thresholds																										
PSD Significant Increase (Major Modification)				25 (15 PM_{10})				40				40				100				0.6				40		25

Bold Text denotes an exceedance of the PSD threshold

Notes:

[1] Assumes a 100 ppmv sulfur dioxide concentration in the landfill gas which is a conservative estimate for the Class I landfill (based on a 68.9 ppm concentration previously sampled at the Class I flare inlet)
Lime kiln combusts about 1,000 scfm of landfill gas. 200-wtpd sludge dryer combusts about 900 scfm of landfill gas.

[2] Emissions based on vendor information (Andritz), dated May 2, 2002, attached. BACT emission rate for low-NOx burner from North American Burner.

[3] Emissions are from the dryer stack only. Particulate matter emissions from screens, recycle bin, and storage silos not included.

[4] Emissions based on Vendor Information (FFE Minerals USA Inc.) estimates of flue gas concentrations at ESP exit: 150 ppmv CO @ 10% O2; 0.005 gr/dscf PM. NO_X Emissions based on BACT for low-NOx burner (Coen): 0.44 lbs/MMBtu

[5] Emissions factors calculated based on estimated baghouse emission rate of 0.015 gr/dscf.

[6] Emission factors for the Existing Flare are from U.S. EPA AP-42 Section 2.4, consistent with AOR reporting.

[7] NOx and CO emission factors are based on vendor guarantees and U.S. EPA AP-42 Section 13.5 (See Table A-15)

[8] 2700 SCFM is subtracted from flare capacity to account for demands of the Lime Recalcination Facility and the Biosolids Pellitization Facility.

Table A-2
SWA Lime Recalcination Facility and Sludge Pelletization Facility
Estimated Emission Rates for the Lime Kiln

PM Concentration	0.005	gr/dscf of PM	10%	O_2 conc.
Flue gas flow at stack exit	13563.9	dscfm, with	10%	O_2 conc.
NO_X Concentration	0.44	lbs NO_X/MMBtu	33	MMBtu/hr
CO Concentration	150	ppmv, corrected	10%	O_2 conc.
VOC Concentration	20	ppmv, corrected	3%	O_2 conc.

Flow 11850.3 ncfm @ 32 °F

3.36% O_2 conc.

33.72% H_2O, by vol.

Temperature Correction: 12717.4

Moisture Correction: 8429.09

Oxygen Correction: 13563.9 dscfm

PM Emissions

Calculate PM emission rate per unit:

$$\frac{0.005\ \text{grains}}{1\ \text{dscf}} * \frac{13563.87428\ \text{dscf}}{1\ \text{min}} * \frac{1\ \text{g}}{15.43\ \text{grain}} * \frac{1\ \text{min}}{60\ \text{second}} = \frac{0.07\ \text{g}}{\text{second}}$$

Calculate PM emission rate for facility

$$\frac{0.07\ \text{g}}{\text{sec/unit}} \quad 1\ \text{units} = \frac{0.07\ \text{g}}{\text{sec}}$$

$$\frac{0.07\ \text{g}}{\text{second}} * \frac{1\ \text{ton}}{907200\ \text{g}} * \frac{60\ \text{sec}}{1\ \text{min}} * \frac{60\ \text{min}}{1\ \text{hour}} * \frac{24\ \text{hour}}{1\ \text{day}} * \frac{365\ \text{days}}{1\ \text{year}} = \frac{2.55\ \text{ton}}{\text{year}}$$

Nitrogen Dioxide Emissions

Adjusted NO_X emissions

$$\frac{0.44\ \text{lbs}\ NO_X}{\text{MMBtu}} * \frac{33\ \text{MMBtu}}{1\ \text{hr}} * \frac{24\ \text{hour}}{1\ \text{day}} * \frac{365\ \text{days}}{1\ \text{year}} * \frac{1\ \text{ton}}{2000\ \text{lbs}} = \frac{63.60\ \text{ton}}{\text{year}}$$

* 0.25 lbs/MMBtu, emission rate from FFE.

Carbon Monoxide Emissions

Adjusted CO emissions

$$\frac{150\ \text{ppmv}}{@\ 10\%\ O_2\ \text{conc.}} * \frac{(20.9\% - 10\%)\ O_2\ \text{conc.}}{(20.9\% - 10\%)\ O_2\ \text{conc.}} = \frac{150.0\ \text{ppmv}}{@\ 10\%\ O_2}$$

Dry volumetric flow rate for unit

$$\frac{13564\ \text{dscfm}}{@\ 10\%\ O_2} * \frac{1\ \text{dscm}}{35.31\ \text{dscf}} * \frac{1\ \text{min}}{60\ \text{second}} = \frac{6.40\ \text{dscm}}{1\ \text{sec}}$$

CO emission rate for unit

$$\frac{150.00\ \text{mol CO}}{1.E{+}06\ \text{moles}} * \frac{41.57\ \text{moles}}{1\ \text{dscm}} * \frac{28.01\ \text{g}}{1\ \text{mole}} = \frac{0.175\ \text{g}}{\text{dscm}}$$

$$\frac{0.175\ \text{g}}{\text{dscm}} * \frac{6.40\ \text{dscm}}{1\ \text{sec}} = \frac{1.12\ \text{g}}{\text{sec}}$$

Calculate CO emissions for the facility

$$\frac{1.12\ \text{g}}{\text{sec/unit}} * 1\ \text{units} = \frac{1.12\ \text{g}}{\text{sec}}$$

$$\frac{1.12\ \text{g}}{\text{sec}} * \frac{1\ \text{ton}}{907200\ \text{g}} * \frac{60\ \text{sec}}{1\ \text{min}} * \frac{60\ \text{min}}{1\ \text{hour}} * \frac{24\ \text{hour}}{1\ \text{day}} * \frac{365\ \text{days}}{1\ \text{year}} = \frac{38.87\ \text{ton}}{\text{year}}$$

Volatile Organic Compound Emissions (MSW Landfill NSPS Limit)

Adjusted VOC emissions

$$\frac{20\ \text{ppmv}}{@\ 3\%\ O_2\ \text{conc.}} * \frac{(20.9\% - 10\%)\ O_2\ \text{conc.}}{(20.9\% - 3\%)\ O_2\ \text{conc.}} = \frac{12.18\ \text{ppmv}}{@\ 10\%\ O_2}$$

Dry volumetric flow rate for unit

$$\frac{13564\ \text{dscfm}}{@\ 10\%\ O_2} * \frac{1\ \text{dscm}}{35.31\ \text{dscf}} * \frac{1\ \text{min}}{60\ \text{second}} = \frac{6.40\ \text{dscm}}{1\ \text{sec}}$$

VOC emission rate for unit

$$\frac{12.18\ \text{mol CO}}{1.E{+}06\ \text{moles}} * \frac{41.57\ \text{moles}}{1\ \text{dscm}} * \frac{86.18\ \text{g}}{1\ \text{mole}} = \frac{0.044\ \text{g}}{\text{dscm}}$$

$$\frac{0.044\ \text{g}}{\text{dscm}} * \frac{6.40\ \text{dscm}}{1\ \text{sec}} = \frac{0.28\ \text{g}}{\text{sec}}$$

Calculate VOC emissions for the facility

$$\frac{0.28\ \text{g}}{\text{sec/unit}} * 1\ \text{units} = \frac{0.28\ \text{g}}{\text{sec}}$$

$$\frac{0.28\ \text{g}}{\text{sec}} * \frac{1\ \text{ton}}{907200\ \text{g}} * \frac{60\ \text{sec}}{1\ \text{min}} * \frac{60\ \text{min}}{1\ \text{hour}} * \frac{24\ \text{hour}}{1\ \text{day}} * \frac{365\ \text{days}}{1\ \text{year}} = \frac{9.71\ \text{ton}}{\text{year}}$$

Table A-3
SWA Lime Recalcination Facility and Sludge Pelletization Facility
Estimated PM Emission Rates for Baghouses, Lime Silos, Sludge Pelletizing Silos

Cross-Bar Lime Product Cooler with Baghouse

baghouse airflow	1785.1	dscfm	
PM Concentration	0.005	gr/dscf	10% O_2 conc.

Calculate PM emission rate per unit:

$$\frac{0.005 \text{ grains}}{1 \text{ dscf}} * \frac{1785.1 \text{ dscf}}{1 \text{ min}} * \frac{1 \text{ g}}{15.43 \text{ grain}} * \frac{1 \text{ min}}{60 \text{ second}} = \frac{0.01 \text{ g}}{\text{second}}$$

Calculate PM emission rate for facility

$$\frac{0.01 \text{ g}}{\text{sec/unit}} \quad 1 \text{ units} = \frac{0.01 \text{ g}}{\text{sec}}$$

$$\frac{0.01 \text{ g}}{\text{second}} * \frac{1 \text{ ton}}{907200 \text{ g}} * \frac{60 \text{ sec}}{1 \text{ min}} * \frac{60 \text{ min}}{1 \text{ hour}} * \frac{24 \text{ hour}}{1 \text{ day}} * \frac{365 \text{ days}}{1 \text{ year}} = \frac{0.34 \text{ ton}}{\text{year}}$$

Biosolid Pellet, Recycle Bin Baghouse

baghouse airflow	2625	dscfm
PM Concentration	0.015	gr/dscf of PM

Calculate PM emission rate per unit:

$$\frac{0.015 \text{ grains}}{1 \text{ dscf}} * \frac{2625 \text{ dscf}}{1 \text{ min}} * \frac{1 \text{ g}}{15.43 \text{ grain}} * \frac{1 \text{ min}}{60 \text{ second}} = \frac{0.04 \text{ g}}{\text{second}}$$

Calculate PM emission rate for facility

$$\frac{0.04 \text{ g}}{\text{sec/unit}} \quad 1 \text{ units} = \frac{0.04 \text{ g}}{\text{sec}}$$

$$\frac{0.04 \text{ g}}{\text{second}} * \frac{1 \text{ ton}}{907200 \text{ g}} * \frac{60 \text{ sec}}{1 \text{ min}} * \frac{60 \text{ min}}{1 \text{ hour}} * \frac{24 \text{ hour}}{1 \text{ day}} * \frac{365 \text{ days}}{1 \text{ year}} = \frac{1.48 \text{ ton}}{\text{year}}$$

Lime Storage Silos

PM Concentration	0.015	gr/dscf of PM	
Volume of each Silo	25977.04	dscf	
Max mass of lime in silo	500	tons of lime	
ρ of Lime produced	75	lbs/cf	
Throughput	100	tons/day	
Amount of air displaced	2666.667	dscf/day	1.85185 dscfm

Calculate PM emission rate per unit:

$$\frac{0.015 \text{ grains}}{1 \text{ dscf}} * \frac{2666.7 \text{ dscf}}{1 \text{ day}} * \frac{1 \text{ g}}{15.43 \text{ grain}} * \frac{1 \text{ day}}{24 \text{ hour}} * \frac{1 \text{ hour}}{60 \text{ min}} * \frac{1 \text{ min}}{60 \text{ second}} = \frac{3.0\text{E-}05 \text{ g}}{\text{second}}$$

Calculate PM emission rate for facility

$$\frac{3.00\text{E-}05 \text{ g}}{\text{sec/unit}} \quad 2 \text{ units} = \frac{6.00\text{E-}05 \text{ g}}{\text{sec}}$$

$$\frac{6.00\text{E-}05 \text{ g}}{\text{second}} * \frac{1 \text{ ton}}{907200 \text{ g}} * \frac{60 \text{ sec}}{1 \text{ min}} * \frac{60 \text{ min}}{1 \text{ hour}} * \frac{24 \text{ hour}}{1 \text{ day}} * \frac{365 \text{ days}}{1 \text{ year}} = \frac{2.09\text{E-}03 \text{ ton}}{\text{year}}$$

Biosolids Pelletizing Silo (accounts for 1 train in 2 silos)

PM Concentration	0.015	gr/dscf of PM	
Annual Biosolid Production	12509.28	dry tons/year	
ρ of Biosolid produced	40.58	lbs/cf	
Amount of air displaced	1689.11	dscf/day	1.17299 dscfm

Calculate PM emission rate per unit:

$$\frac{0.015 \text{ grains}}{1 \text{ dscf}} * \frac{1689.1 \text{ dscf}}{1 \text{ day}} * \frac{1 \text{ g}}{15.43 \text{ grain}} * \frac{1 \text{ day}}{24 \text{ hour}} * \frac{1 \text{ hour}}{60 \text{ min}} * \frac{1 \text{ min}}{60 \text{ second}} = \frac{1.9\text{E-}05 \text{ g}}{\text{second}}$$

Calculate PM emission rate for facility

$$\frac{1.90\text{E-}05 \text{ g}}{\text{sec/unit}} \quad 1 \text{ units} = \frac{1.90\text{E-}05 \text{ g}}{\text{sec}}$$

$$\frac{1.90\text{E-}05 \text{ g}}{\text{second}} * \frac{1 \text{ ton}}{907200 \text{ g}} * \frac{60 \text{ sec}}{1 \text{ min}} * \frac{60 \text{ min}}{1 \text{ hour}} * \frac{24 \text{ hour}}{1 \text{ day}} * \frac{365 \text{ days}}{1 \text{ year}} = \frac{6.61\text{E-}04 \text{ ton}}{\text{year}}$$

Table A-4

Solid Waste Authority of Palm Beach County
Biosolids Pelletizing Facility
Cooling Tower Air Emissions - Particulate Matter

A. Flow Rate Across ALL Cooling Towers (2 operating)	1500	gal/min	
B. Amount of Dissolved Particulate Matter (PM)	45	mg/L	
C. Amount of Dissloved PM (AP-42)	1.900E-05	lbs/gal	AP-42, Table 13.4-1
D. Drift as a Percentage of Recirculating Rate	0.020%	AP-42, Table 13.4-1, 1/95	
E. Total Drift of all towers (A*D*60)	18	Gal/hour	
F. Total PM10 Emissions within Drift (C*E)	3.42E-04	lbs/hour	
G. Hours of Operations	8760	hours/year	
H. Annual PM10 Emissions for tower (F*G/2000)	1.50E-03	TPY	
I. Annual PM_{10} Emissions for one tower (H/3)	7.49E-04	TPY	
Emission Rate (g/s) - per tower	2.15E-05		
	1.71E-04	lbs/hr	

Table A-5

SWA Lime Recalcination Facility and Sludge Pelletization Facility

Methane Emission Rates - Landfill Gas to Lime Kiln

Kiln Burner Gas Flow Design Capacity:	1000.0	scfm	14883336.36	m^3/year
Methane Content of Landfill Gas:	58.5%	(percent by volume)		
Total Methane Flow to Kiln Burner:	585.5	scfm	8713869.89	m^3/year
MW of Methane	16			

Methane Emission Rate

Pollutant	Methane Flow Rate (m^3/year)	Methane Flow Rate (m^3/minute)	Methane (Mg/yr)*
Class I Landfill			
Methane	8713870	16.6	5,796

*41.57 Conversion from std. m^3/yr to g/yr.

0.276315002

NMOC Emission Rate

Pollutant	Concentration of NMOC (ppmv)	MW of NMOC (g/mol)	Concentration of NMOC (μg/m³)	NMOC, Uncontrolled (Mg/yr)	NMOC, Uncontrolled (tpy)	NMOC, Controlled* (tpy)	NMOC, Controlled* (lbs/hr)
Class I Landfill							
NMOC	595	86.2	2,131,589	32	32	1	0.147

* 98% Control of NMOC assumed for calculation

Table A-6

SWA, Lime Kiln HAP Emissions

Input Information:

NMOC concentration in landfill gas:	595	ppmdv expressed as hexane with MW of:		86.17
Equivalent mass/volume conc. is:	2131341.7	ug/m3	[ug/m3 = (ppm)41.57(MW)]	
NMOC em. rate:	32	Mg/yr	1.005998122 g/s	

HAP	Molecular Weight	Default Conc. (ppmv)	Mass Conc. (ug/m3)	Emissions (Mg/yr)	Emissions (tons/yr)
1,1,1-Trichlorethane (methyl chloroform)	133.42	0.480	2617.38	3.90E-02	3.95E-02
1,1,2,2-Tetrachloroethane	167.85	1.11	7614.63	1.13E-01	1.15E-01
1,1,2-Trichloroethane	133.42	0.100	545.29	8.12E-03	8.22E-03
1,1-Dichloroethane (ethylidene dichloride)	98.95	2.35	9503.60	1.41E-01	1.43E-01
1,1-Dichloroethene (vinylidene chloride)	96.94	0.201	796.35	1.19E-02	1.20E-02
1,2-Dichloroethane (ethylene dichloride)	98.96	0.407	1646.11	2.45E-02	2.48E-02
1,2-Dichloropropane (propylene dichloride)	112.98	0.18	831.15	1.24E-02	1.25E-02
Acrylonitrile	53.06	6.33	13727.00	2.04E-01	2.07E-01
Benzene	78.11	1.91	6097.40	9.08E-02	9.20E-02
Carbon disulfide	76.13	0.583	1813.97	2.70E-02	2.74E-02
Carbon tetrachloride	153.84	0.004	25.15	3.74E-04	3.79E-04
Carbonyl sulfide	60.07	0.490	1202.98	1.79E-02	1.81E-02
Chlorobenzene	112.56	0.254	1168.48	1.74E-02	1.76E-02
Chloroethane	64.52	1.25	3296.17	4.91E-02	4.97E-02
Chlorform	119.39	0.03	146.38	2.18E-03	2.21E-03
Chloromethane (methyl chloride)	50.49	1.21	2496.87	3.72E-02	3.77E-02
Dichlorobenzene	147.00	0.213	1279.68	1.90E-02	1.93E-02
Dichloromethane (methylene chloride)	84.94	14.3	49642.42	7.39E-01	7.49E-01
Ethylbenzene	106.16	4.61	20001.68	2.98E-01	3.02E-01
Hexane	86.17	6.57	23138.02	3.44E-01	3.49E-01
Mercury	200.61	0.000292	2.39	3.56E-05	3.61E-05
Methyl ethyl ketone (2-butanone)	72.10	7.09	20892.29	3.11E-01	3.15E-01
Methyl isobutyl ketone (hexone)	100.16	1.87	7654.92	1.14E-01	1.15E-01
Perchloroethylene (tetrachloroethylene)	165.83	3.73	25279.97	3.76E-01	3.81E-01
Toluene	92.13	39.3	147978.38	2.20E+00	2.23E+00
Trichloroethylene	131.40	2.82	15144.30	2.25E-01	2.28E-01
Vinyl chloride	62.50	7.34	18749.11	2.79E-01	2.83E-01
Xylenes	106.16	12.1	52498.99	7.81E-01	7.92E-01
Total Uncontrolled VOC HAPs (before burner)					6.57E+00
Total Mercury					3.61E-05
Total Controlled VOC HAPs					1.31E-01
Total HAPs					**0.13**

Table A-7
SWA Lime Recalcination Facility and Sludge Pelletization Facility
Methane Emission Rates - Landfill Gas to Biosolids Pelletizing Facility

Flare Gas Flow Design Capacity:	670.0	scfm	9971835.36 m^3/year
Methane Content of Landfill Gas:	58.5%	(percent by volume)	
Total Methane Flow to Flare:	392.3	scfm	5838292.82 m^3/year
MW of Methane	16		

Methane Emission Rate

Pollutant	Methane Flow Rate to Flare (m^3/year)	Methane Flow Rate to Flare (m^3/minute)	Methane (Mg/yr)*
Class I Landfill			
Methane	5838293	11.1	3,883

*41.57 Conversion from std. m^3/yr to g/yr.

0.185131051

NMOC Emission Rate

Pollutant	Concentration of NMOC (ppmv)	MW of NMOC (g/mol)	Concentration of NMOC ($\mu g/m^3$)	NMOC, Uncontrolled (Mg/yr)	NMOC, Uncontrolled (tpy)	NMOC, Controlled* (tpy)	NMOC, Controlled* (lbs/hr)
Class I Landfill							
NMOC	595	86.2	2,131,589	21	22	0	0.098

* 98% Control of NMOC assumed for calculation

Table A-8

SWA, Biosolids Pelletizing Dryer HAP Emissions

Input Information:

NMOC concentration in landfill gas:	595	ppmdv expressed as hexane with MW of:			86.17
Equivalent mass/volume conc. is:	2131341.71	ug/m3	[ug/m3 = (ppm)41.57(MW)]		
LANDFILL 1995 NMOC em. rate:	21	Mg/yr	0.67401874	g/s	

HAP	**Molecular Weight**	**Default Conc. (ppmv)**	**Mass Conc. (ug/m3)**	**Emissions (Mg/yr)**	**Emissions (tons/yr)**
1,1,1-Trichlorethane (methyl chloroform)	133.42	0.480	2617.38	2.61E-02	2.64E-02
1,1,2,2-Tetrachloroethane	167.85	1.11	7614.63	7.59E-02	7.69E-02
1,1,2-Trichloroethane	133.42	0.100	545.29	5.44E-03	5.51E-03
1,1-Dichloroethane (ethylidene dichloride)	98.95	2.35	9503.60	9.48E-02	9.60E-02
1,1-Dichloroethene (vinylidene chloride)	96.94	0.201	796.35	7.94E-03	8.05E-03
1,2-Dichloroethane (ethylene dichloride)	98.96	0.407	1646.11	1.64E-02	1.66E-02
1,2-Dichloropropane (propylene dichloride)	112.98	0.18	831.15	8.29E-03	8.40E-03
Acrylonitrile	53.06	6.33	13727.00	1.37E-01	1.39E-01
Benzene	78.11	1.91	6097.40	6.08E-02	6.16E-02
Carbon disulfide	76.13	0.583	1813.97	1.81E-02	1.83E-02
Carbon tetrachloride	153.84	0.004	25.15	2.51E-04	2.54E-04
Carbonyl sulfide	60.07	0.490	1202.98	1.20E-02	1.22E-02
Chlorbenzene	112.56	0.254	1168.48	1.17E-02	1.18E-02
Chloroethane	64.52	1.25	3296.17	3.29E-02	3.33E-02
Chlorform	119.39	0.03	146.38	1.46E-03	1.48E-03
Chloromethane (methyl chloride)	50.49	1.21	2496.87	2.49E-02	2.52E-02
Dichlorbenzene	147.00	0.213	1279.68	1.28E-02	1.29E-02
Dichlormethane (methylene chloride)	84.94	14.3	49642.42	4.95E-01	5.02E-01
Ethylbenzene	106.16	4.61	20001.68	1.99E-01	2.02E-01
Hexane	86.17	6.57	23138.02	2.31E-01	2.34E-01
Mercury	200.61	0.000292	2.39	2.39E-05	2.42E-05
Methyl ethyl ketone (2-butanone)	72.10	7.09	20892.29	2.08E-01	2.11E-01
Methyl isobutyl ketone (hexone)	100.16	1.87	7654.92	7.63E-02	7.74E-02
Perchloroethylene (tetrachloroethylene)	165.83	3.73	25279.97	2.52E-01	2.55E-01
Toluene	92.13	39.3	147978.38	1.48E+00	1.50E+00
Trichloroethylene	131.40	2.82	15144.30	1.51E-01	1.53E-01
Vinyl chloride	62.50	7.34	18749.11	1.87E-01	1.89E-01
Xylenes	106.16	12.1	52498.99	5.24E-01	5.30E-01
Total Uncontrolled VOC HAPs (before burner)					4.40E+00
Total Mercury					2.42E-05
Total Controlled VOC HAPs					8.81E-02
Arsenic (from biosolids drying)					1.44E-05
Cadmium (from biosolids drying)					3.65E-05
Chromium (from biosolids drying)					1.37E-04
Mercury (from biosolids drying)					9.48E-06
Nickel (from biosolids drying)					1.25E-04
Total HAPs					0.09

Table A-9
SWA Lime Recalcination Facility and Sludge Pelletization Facility
Methane Emission Rates - Existing Flare

Flare Actual Flow Rate:	1033.7	scfm	15384840.09	m^3/year
Methane Content of Landfill Gas:	58.5%	(percent by volume)		
Total Methane Flow to Flare:	605.2	scfm	9007489.42	m^3/year
MW of Methane	16			

Methane Emission Rate

Pollutant	Methane Flow Rate to Flare (m^3/year)	Methane Flow Rate to Flare (m^3/minute)	Methane (Mg/yr)*
Class I Landfill			
Methane	9007489	17.1	5,991

*41.57 Conversion from std. m^3/yr to g/yr.

0.285625616

NMOC Emission Rate

Pollutant	Concentration of NMOC (ppmv)	MW of NMOC (g/mol)	Concentration of NMOC (µg/m³)	NMOC, Uncontrolled (Mg/yr)	NMOC, Uncontrolled (tpy)	NMOC, Controlled* (tpy)	NMOC, Controlled* (lbs/hr)
Class I Landfill							
NMOC	595	86.2	2,131,589	33	33	0.7	0.152

* 98% Control of NMOC assumed for calculation

Table A-10

SWA, Existing Flare HAP Emissions

Input Information:

NMOC concentration in landfill gas:	595	ppmdv expressed as hexane with MW of:		86.17
Equivalent mass/volume conc. is:	2131341.71	ug/m3	[ug/m3 = (ppm)41.57(MW)]	
Uncontrolled NMOC Emission Rate	33	Mg/yr	1.03989588	g/s

HAP	Molecular Weight	Default Conc. (ppmv)	Mass Conc. (ug/m3)	Emissions (Mg/yr)	Emissions (tons/yr)
1,1,1-Trichlorethane (methyl chloroform)	133.42	0.480	2617.38	4.03E-02	4.08E-02
1,1,2,2-Tetrachloroethane	167.85	1.11	7614.63	1.17E-01	1.19E-01
1,1,2-Trichloroethane	133.42	0.100	545.29	8.39E-03	8.50E-03
1,1-Dichloroethane (ethylidene dichloride)	98.95	2.35	9503.60	1.46E-01	1.48E-01
1,1-Dichloroethene (vinylidene chloride)	96.94	0.201	796.35	1.23E-02	1.24E-02
1,2-Dichloroethane (ethylene dichloride)	98.96	0.407	1646.11	2.53E-02	2.57E-02
1,2-Dichloropropane (propylene dichloride)	112.98	0.18	831.15	1.28E-02	1.30E-02
Acrylonitrile	53.06	6.33	13727.00	2.11E-01	2.14E-01
Benzene	78.11	1.91	6097.40	9.38E-02	9.51E-02
Carbon disulfide	76.13	0.583	1813.97	2.79E-02	2.83E-02
Carbon tetrachloride	153.84	0.004	25.15	3.87E-04	3.92E-04
Carbonyl sulfide	60.07	0.490	1202.98	1.85E-02	1.88E-02
Chlorbenzene	112.56	0.254	1168.48	1.80E-02	1.82E-02
Chloroethane	64.52	1.25	3296.17	5.07E-02	5.14E-02
Chlorform	119.39	0.03	146.38	2.25E-03	2.28E-03
Chloromethane (methyl chloride)	50.49	1.21	2496.87	3.84E-02	3.89E-02
Dichlorbenzene	147.00	0.213	1279.68	1.97E-02	1.99E-02
Dichlormethane (methylene chloride)	84.94	14.3	49642.42	7.64E-01	7.74E-01
Ethylbenzene	106.16	4.61	20001.68	3.08E-01	3.12E-01
Hexane	86.17	6.57	23138.02	3.56E-01	3.61E-01
Mercury	200.61	0.000292	2.39	3.68E-05	3.73E-05
Methyl ethyl ketone (2-butanone)	72.10	7.09	20892.29	3.21E-01	3.26E-01
Methyl isobutyl ketone (hexone)	100.16	1.87	7654.92	1.18E-01	1.19E-01
Perchloroethylene (tetrachloroethylene)	165.83	3.73	25279.97	3.89E-01	3.94E-01
Toluene	92.13	39.3	147978.38	2.28E+00	2.31E+00
Trichloroethylene	131.40	2.82	15144.30	2.33E-01	2.36E-01
Vinyl chloride	62.50	7.34	18749.11	2.88E-01	2.92E-01
Xylenes	106.16	12.1	52498.99	8.08E-01	8.18E-01
Total Uncontrolled VOC HAPs (before flare)					6.79E+00
Total Mercury					3.73E-05
Total Controlled VOC HAPs					1.36E-01
Total HAPs					**0.14**

Table A-11
SWA Lime Recalcination Facility and Sludge Pelletization Facility
Estimated Emission Rates for the Existing Flare

AP-42 Emission Factors

NO_x	40 lbs/10^6 dscf Methane
CO	750 lbs/10^6 dscf Methane
PM	17 lbs/10^6 dscf Methane

Class 1

Flare Flow Rate (current)	880 dscfm
% Methane	58.5%

* Flow Rate is the two-year average taken from the SWA Flare Log Sheets for 2000 and 2001. Unclear whether cfm is acfm, scfm, or dscfm. Methane is also the two year average from SWA Flare Log Sheets for 2000 and 2001. Sulfur data taken from November 2000 Flare Inlet gas testing

PM Emissions

Calculate Total Methane emissions from the flares (current)

$$\text{Class 1 Flare}\ \frac{880\ \text{dscf}}{\text{min}} \cdot 58.5\%\ \text{methane} = \frac{515.4\ \text{dscf}}{\text{min}}\ \text{methane}$$

Calculate Total PM_{10} emissions from the flares

$$\text{Class 1}\ \frac{515.43\ \text{dscf}}{\text{min}} \cdot \frac{17\ \text{lbs}}{1\ 10^6\ \text{dscf}} \cdot \frac{1\ 10^6\ \text{dsc}}{1E{+}06\ \text{dscf}} \cdot \frac{60\ \text{min}}{1\ \text{hour}} \cdot \frac{8760\ \text{hour}}{1\ \text{year}} \cdot \frac{1\ \text{ton}}{2000\ \text{lbs}} = \frac{2.30\ \text{ton}}{\text{year}}$$

CO Emissions

Calculate Total Methane emissions from the flares (current)

$$\text{Class 1 Flare}\ \frac{880\ \text{dscf}}{\text{min}} \cdot 58.5\%\ \text{methane} = \frac{515.4\ \text{dscf}}{\text{min}}\ \text{methane}$$

Calculate Total CO emissions from the flares

$$\text{Class 1}\ \frac{515.43\ \text{dscf}}{\text{min}} \cdot \frac{750\ \text{lbs}}{1\ 10^6\ \text{dscf}} \cdot \frac{1\ 10^6\ \text{dsc}}{1E{+}06\ \text{dscf}} \cdot \frac{60\ \text{min}}{1\ \text{hour}} \cdot \frac{8760\ \text{hour}}{1\ \text{year}} \cdot \frac{1\ \text{ton}}{2000\ \text{lbs}} = \frac{101.59\ \text{ton}}{\text{year}}$$

NOX Emissions

Calculate Total Methane emissions from the flares (current)

$$\text{Class 1 Flare}\ \frac{880\ \text{dscf}}{\text{min}} \cdot 58.5\%\ \text{methane} = \frac{515.4\ \text{dscf}}{\text{min}}\ \text{methane}$$

Calculate Total NOX emissions from the flares

$$\text{Class 1}\ \frac{515.43\ \text{dscf}}{\text{min}} \cdot \frac{40\ \text{lbs}}{1\ 10^6\ \text{dscf}} \cdot \frac{1\ 10^6\ \text{dsc}}{1E{+}06\ \text{dscf}} \cdot \frac{60\ \text{min}}{1\ \text{hour}} \cdot \frac{8760\ \text{hour}}{1\ \text{year}} \cdot \frac{1\ \text{ton}}{2000\ \text{lbs}} = \frac{5.42\ \text{ton}}{\text{year}}$$

Table A-11 (Cont.)
SWA Lime Recalcination Facility and Sludge Pelletization Facility
Estimated Emission Rates for the Existing Flare

	Current			
Class 1 flow rate	15384840.09	m^3/year		
Energy content of methane:	980	Btu/cf	34603.8	Btu/m3

SO2 and HCl Emission Rates Based on Mass Balance

Pollutant	Total Landfill Gas Flow Rate to Flare (Std. m^3/yr)	Concentration of S or Cl in Landfill Gas (ppmV)	Emission rate of S or Cl (m^3/yr)	Molecular Weight of S or Cl (g/gmol)	Temperature at Standard Conditions (°C)	Uncontrolled Mass Emissions of S or Cl (kg/yr)	Control Efficiency (%)	Ratio of Molecular Weights SO_2/S or HCl/Cl	Controlled Mass Emissions of Pollutant (kg/yr)	Controlled Mass Emissions of Pollutant (lb/hr)	Controlled Mass Emissions of Pollutant (ton/yr)
				Current							
Class I Landfill											
Sulfur - Sulfur Dioxide	15384840	100	1538.48	32.06	20	2050.65	0	2.00	4097.58	1.031	4.52E+00
Class I Landfill											
Chlorine - Hydrogen Chloride	15384840	42	646.16	35.45	20	952.22	91	1.05	88.3	0.02	9.73E-02

The calculation of SO2 and HCl is from: U.S. EPA, *Compilation of Air Pollutant Emission Factors*, Report No. AP-42, Fifth Edition, Supplement C, Section 2.4, updated November, 1997.

Table A-12
SWA Lime Recalcination Facility and Sludge Pelletization Facility
Exit Gas Flow Rate Calculations - Proposed 1000 SCFM Flare

Maximum Potential Gas Flow Rate

Flare Gas Flow Design Capacity:	1000	scfm
cf of air needed to combust 1 cf of LFG:	15.7	(ratio)
Exit Gas Flow Rate:	15700	scfm

Gas going to LRF (33 MMBtu/hr):	958.6	scfm
Gas going to BPF (23 MMBtu/hr):	668.1	scfm

	Actual	Standard
Moisture Content of Gas (%):	6.0%	0%
Temperature of Gas (°F):	1400	68

Conversion from scfm to dscfm:

$$\frac{15700 \quad \text{ft}^3}{\text{minute}} * (1 - 0.06) = \frac{14{,}758 \quad \text{dscf}}{\text{minute}}$$

Converstion from scfm to acfm:

$$\frac{15700 \quad \text{ft}^3}{\text{minute}} * \frac{(459.67°\text{R} + 1400°\text{F})}{(459.67°\text{R} + 68°\text{F})} = \frac{55{,}332 \quad \text{acf}}{\text{minute}}$$

Table A-13

SWA Lime Recalcination Facility and Sludge Pelletization Facility
Methane Emission Rates - Proposed 1000 SCFM Flare

Flare Gas Flow Design Capacity:	1000	scfm	14883336.36	m^3/year
Methane Content of Landfill Gas:	58.5%	(percent by volume)		
Total Methane Flow to Flare:	585.5	scfm	8713869.89	m^3/year
MW of Methane	16			

Methane Emission Rate

Pollutant	Methane Flow Rate to Flare (m^3/year)	Methane Flow Rate to Flare (m^3/minute)	Methane (Mg/yr)*
Class I Landfill			
Methane	8713870	16.6	5,796

*41.57 Conversion from std. m^3/yr to g/yr.

Table A-14

SWA, Proposed 1000 SCFM Flare HAP Emissions

Input Information:

NMOC concentration in landfill gas: 595 ppmdv expressed as hexane with MW of: 86.17
Equivalent mass/volume conc. is: 2131341.71 ug/m3 [ug/m3 = (ppm)41.57(MW)]
NMOC Emission Rate 32 Mg/yr 1.00599812 g/s

HAP	Molecular Weight	Default Conc. (ppmv)	Mass Conc. (ug/m3)	Emissions (Mg/yr)	Emissions (tons/yr)
1,1,1-Trichlorethane (methyl chloroform)	133.42	0.480	2617.38	3.90E-02	3.95E-02
1,1,2,2-Tetrachloroethane	167.85	1.11	7614.63	1.13E-01	1.15E-01
1,1,2-Trichloroethane	133.42	0.100	545.29	8.12E-03	8.22E-03
1,1-Dichloroethane (ethylidene dichloride)	98.95	2.35	9503.60	1.41E-01	1.43E-01
1,1-Dichloroethene (vinylidene chloride)	96.94	0.201	796.35	1.19E-02	1.20E-02
1,2-Dichloroethane (ethylene dichloride)	98.96	0.407	1646.11	2.45E-02	2.48E-02
1,2-Dichloropropane (propylene dichloride)	112.98	0.18	831.15	1.24E-02	1.25E-02
Acrylonitrile	53.06	6.33	13727.00	2.04E-01	2.07E-01
Benzene	78.11	1.91	6097.40	9.08E-02	9.20E-02
Carbon disulfide	76.13	0.583	1813.97	2.70E-02	2.74E-02
Carbon tetrachloride	153.84	0.004	25.15	3.74E-04	3.79E-04
Carbonyl sulfide	60.07	0.490	1202.98	1.79E-02	1.81E-02
Chlorbenzene	112.56	0.254	1168.48	1.74E-02	1.76E-02
Chloroethane	64.52	1.25	3296.17	4.91E-02	4.97E-02
Chlorform	119.39	0.03	146.38	2.18E-03	2.21E-03
Chloromethane (methyl chloride)	50.49	1.21	2496.87	3.72E-02	3.77E-02
Dichlorbenzene	147.00	0.213	1279.68	1.90E-02	1.93E-02
Dichlormethane (methylene chloride)	84.94	14.3	49642.42	7.39E-01	7.49E-01
Ethylbenzene	106.16	4.61	20001.68	2.98E-01	3.02E-01
Hexane	86.17	6.57	23138.02	3.44E-01	3.49E-01
Mercury	200.61	0.000292	2.39	3.56E-05	3.61E-05
Methyl ethyl ketone (2-butanone)	72.10	7.09	20892.29	3.11E-01	3.15E-01
Methyl isobutyl ketone (hexone)	100.16	1.87	7654.92	1.14E-01	1.15E-01
Perchloroethylene (tetrachloroethylene)	165.83	3.73	25279.97	3.76E-01	3.81E-01
Toluene	92.13	39.3	147978.38	2.20E+00	2.23E+00
Trichloroethylene	131.40	2.82	15144.30	2.25E-01	2.28E-01
Vinyl chloride	62.50	7.34	18749.11	2.79E-01	2.83E-01
Xylenes	106.16	12.1	52498.99	7.81E-01	7.92E-01
Total Uncontrolled VOC HAPs (before flare)					6.57E+00
Total Mercury					3.61E-05
Total Controlled VOC HAPs					1.31E-01
Total HAPs					**0.13**

Table A-15
SWA Lime Recalcination Facility and Sludge Pelletization Facility
Secondary Pollutant Emission Rates - Proposed 1000 SCFM Flare

Flare Gas Flow Design Capacity:	1000	scfm	14883336.36	m^3/year	0.4719475
Methane Content of Landfill Gas:	58.5%	(percent by volume)			
Total Methane Flow to Flare:	585.5				
Energy content of methane:	980	Btu/ft^3	34603.8	Btu/m^3	

CO and NOx Emission Rates Based on Vendor Emission Factors

Pollutant	Methane Flow Rate to Flare (scfm)	Energy input to flare (MMBtu/yr)	Emission Factor (lb/MMBtu)	Emissions from Flare (lb/yr)	Emissions from Flare (ton/yr)
Class I Landfill					
Carbon Monoxide	585	301572.8	0.37	111581.9	55.79
Nitrogen Oxides	585	301572.8	0.068	20507.0	10.25

SO2 and HCl Emission Rates Based on Mass Balance

Pollutant	Total Landfill Gas Flow Rate to Flare (Std. m^3/yr)	Concentration of S or Cl in Landfill Gas (ppmV)	Emission rate of S or Cl (m^3/yr)	Molecular Weight of S or Cl (g/gmol)	Temperature at Standard Conditions (°C)	Uncontrolled Mass Emissions of S or Cl (kg/yr)	Control Efficiency (%)	Ratio of Molecular Weights SO_2/S or HCl/Cl	Controlled Mass Emissions of Pollutant (kg/yr)	Controlled Mass Emissions of Pollutant (lb/hr)	Controlled Mass Emissions of Pollutant (ton/yr)
Class I Landfill											
Sulfur - Sulfur Dioxide	14883336	100	1488.33	32.06	20	1983.80	0	2.00	3964.01	1.0E+00	4.4
Chlorine - Hydrogen Chloride	14883336	42.0	625.10	35.45	20	921.18	91	1.03	85.29	2.1E-02	0.09

The emission rates for CO and NO_X are from U.S. EPA, *Compilation of Air Pollutant Emision Factors*, Report No. AP-42, Section 13.5, Industrial Flares, September 1991. The calculation of SO_2 and HCl is from: U.S. EPA, *Compilation of Air Pollutant Emission Factors*, Report No. AP-42, Section 2.4, updated November, 1997.

Table A-16
SWA Lime Recalcination Facility and Sludge Pelletization Facility
Exit Gas Flow Rate Calculations - Proposed 2000 SCFM Flare

Maximum Potential Gas Flow Rate

Flare Gas Flow Design Capacity:	2000	scfm
cf of air needed to combust 1 cf of LFG:	15.7	(ratio)
Exit Gas Flow Rate:	31400	scfm

Gas going to LRF (33 MMBtu/hr):	958.6	scfm
Gas going to BPF (23 MMBtu/hr):	668.1	scfm

	Actual	Standard
Moisture Content of Gas (%):	6.0%	0%
Temperature of Gas (°F):	1400	68

Conversion from scfm to dscfm:

$$\frac{31400 \quad \text{ft}^3}{\text{minute}} * (1 - 0.06) = \frac{29{,}516 \quad \text{dscf}}{\text{minute}}$$

Converstion from scfm to acfm:

$$\frac{31400 \quad \text{ft}^3}{\text{minute}} * \frac{(459.67°\text{R} + 1400°\text{F})}{(459.67°\text{R} + 68°\text{F})} = \frac{110{,}663 \quad \text{acf}}{\text{minute}}$$

Table A-17

SWA Lime Recalcination Facility and Sludge Pelletization Facility
Methane Emission Rates - Proposed 2000 SCFM Flare

Flare Gas Flow Design Capacity:	2000	scfm	29766672.72	m^3/year
Methane Content of Landfill Gas:	58.5%	(percent by volume)		
Total Methane Flow to Flare:	1171.0	scfm	17427739.78	m^3/year
MW of Methane	16			

Methane Emission Rate

Pollutant	Methane Flow Rate to Flare (m^3/year)	Methane Flow Rate to Flare (m^3/minute)	Methane (Mg/yr)*
Class I Landfill			
Methane	17427740	33.2	11,592

*41.57 Conversion from std. m^3/yr to g/yr.

Table A-18

SWA, Proposed 2000 SCFM Flare HAPs Emissions

Input Information:

NMOC concentration in landfill gas: 595 ppmdv expressed as hexane with MW of: 86.17
Equivalent mass/volume conc. is: 2131341.71 ug/m3 [ug/m3 = (ppm)41.57(MW)]
NMOC Emission Rate 63 Mg/yr 2.01199624 g/s

HAP	Molecular Weight	Default Conc. (ppmv)	Mass Conc. (ug/m3)	Emissions (Mg/yr)	Emissions (tons/yr)
1,1,1-Trichlorethane (methyl chloroform)	133.42	0.480	2617.38	7.79E-02	7.89E-02
1,1,2,2-Tetrachloroethane	167.85	1.11	7614.63	2.27E-01	2.30E-01
1,1,2-Trichloroethane	133.42	0.100	545.29	1.62E-02	1.64E-02
1,1-Dichloroethane (ethylidene dichloride)	98.95	2.35	9503.60	2.83E-01	2.87E-01
1,1-Dichloroethene (vinylidene chloride)	96.94	0.201	796.35	2.37E-02	2.40E-02
1,2-Dichloroethane (ethylene dichloride)	98.96	0.407	1646.11	4.90E-02	4.97E-02
1,2-Dichloropropane (propylene dichloride)	112.98	0.18	831.15	2.47E-02	2.51E-02
Acrylonitrile	53.06	6.33	13727.00	4.09E-01	4.14E-01
Benzene	78.11	1.91	6097.40	1.82E-01	1.84E-01
Carbon disulfide	76.13	0.583	1813.97	5.40E-02	5.47E-02
Carbon tetrachloride	153.84	0.004	25.15	7.49E-04	7.59E-04
Carbonyl sulfide	60.07	0.490	1202.98	3.58E-02	3.63E-02
Chlorbenzene	112.56	0.254	1168.48	3.48E-02	3.52E-02
Chloroethane	64.52	1.25	3296.17	9.81E-02	9.94E-02
Chlorform	119.39	0.03	146.38	4.36E-03	4.42E-03
Chloromethane (methyl chloride)	50.49	1.21	2496.87	7.43E-02	7.53E-02
Dichlorbenzene	147.00	0.213	1279.68	3.81E-02	3.86E-02
Dichlormethane (methylene chloride)	84.94	14.3	49642.42	1.48E+00	1.50E+00
Ethylbenzene	106.16	4.61	20001.68	5.95E-01	6.03E-01
Hexane	86.17	6.57	23138.02	6.89E-01	6.98E-01
Mercury	200.61	0.000292	2.39	7.13E-05	7.22E-05
Methyl ethyl ketone (2-butanone)	72.10	7.09	20892.29	6.22E-01	6.30E-01
Methyl isobutyl ketone (hexone)	100.16	1.87	7654.92	2.28E-01	2.31E-01
Perchloroethylene (tetrachloroethylene)	165.83	3.73	25279.97	7.53E-01	7.63E-01
Toluene	92.13	39.3	147978.38	4.41E+00	4.46E+00
Trichloroethylene	131.40	2.82	15144.30	4.51E-01	4.57E-01
Vinyl chloride	62.50	7.34	18749.11	5.58E-01	5.66E-01
Xylenes	106.16	12.1	52498.99	1.56E+00	1.58E+00
Total Uncontrolled VOC HAPs (before flare)					1.31E+01
Total Mercury					7.22E-05
Total Controlled VOC HAPs					2.63E-01
Total HAPs					**0.26**

Table A-19
SWA Lime Recalcination Facility and Sludge Pelletization Facility
Secondary Pollutant Emission Rates - Proposed 2000 SCFM Flare

Flare Gas Flow Design Capacity:	2000	scfm	29766672.72	m^3/year	0.943895
Methane Content of Landfill Gas:	58.5%	(percent by volume)			
Total Methane Flow to Flare:	1171.0				
Energy content of methane:	980	Btu/ft^3	34603.8	Btu/m^3	

CO and NOx Emission Rates Based on Vendor Emission Factors

Pollutant	Methane Flow Rate to Flare (scfm)	Energy input to flare (MMBtu/yr)	Emission Factor (lb/MMBtu)	Emissions from Flare (lb/yr)	Emissions from Flare (ton/yr)
Class I Landfill					
Carbon Monoxide	1171	603145.7	0.37	223163.9	111.58
Nitrogen Oxides	1171	603145.7	0.068	41013.9	20.51

SO2 and HCl Emission Rates Based on Mass Balance

Pollutant	Total Landfill Gas Flow Rate to Flare (Std. m^3/yr)	Concentration of S or Cl in Landfill Gas (ppmV)	Emission rate of S or Cl (m^3/yr)	Molecular Weight of S or Cl (g/gmol)	Temperature at Standard Conditions (°C)	Uncontrolled Mass Emissions of S or Cl (kg/yr)	Control Efficiency (%)	Ratio of Molecular Weights SO_2/S or HCl/Cl	Controlled Mass Emissions of Pollutant (kg/yr)	Controlled Mass Emissions of Pollutant (lb/hr)	Controlled Mass Emissions of Pollutant (ton/yr)
Class I Landfill											
Sulfur - Sulfur Dioxide	29766673	100	2976.67	32.06	20	3967.60	0	2.00	7928.03	2.0E+00	8.7
Chlorine - Hydrogen Chloride	29766673	42.0	1250.20	35.45	20	1842.37	91	1.03	170.58	4.3E-02	0.19

The emission rates for CO and NOX are from U.S. EPA, *Compilation of Air Pollutant Emision Factors*, Report No. AP-42, Section 13.5, Industrial Flares, September 1991. The calculation of SO2 and HCl is from: U.S. EPA, *Compilation of Air Pollutant Emission Factors*, Report No. AP-42, Section 2.4, updated November, 1997.

Table A-20
SWA Lime Recalcination Facility and Sludge Pelletization Facility
Exit Gas Flow Rate Calculations - Proposed 3500 SCFM Flare

Maximum Potential Gas Flow Rate

Flare Gas Flow Design Capacity:	3500	scfm
cf of air needed to combust 1 cf of LFG:	15.7	(ratio)
Exit Gas Flow Rate:	54950	scfm

Gas going to LRF (33 MMBtu/hr):	958.6	scfm
Gas going to BPF (23 MMBtu/hr):	668.1	scfm

	Actual	Standard
Moisture Content of Gas (%):	6.0%	0%
Temperature of Gas (°F):	1400	68

Conversion from scfm to dscfm:

$$\frac{54950 \quad \text{ft}^3}{\text{minute}} * (1 - 0.06) = \frac{51{,}653 \quad \text{dscf}}{\text{minute}}$$

Converstion from scfm to acfm:

$$\frac{54950 \quad \text{ft}^3}{\text{minute}} * \frac{(459.67^\circ\text{R} + 1400^\circ\text{F})}{(459.67^\circ\text{R} + 68^\circ\text{F})} = \frac{193{,}661 \quad \text{acf}}{\text{minute}}$$

Table A-21

SWA Lime Recalcination Facility and Sludge Pelletization Facility
Methane Emission Rates - Proposed 3500 SCFM Flare

Flare Gas Flow Design Capacity:	3500	scfm	52091677.26 m^3/year
Methane Content of Landfill Gas:	58.5%	(percent by volume)	
Total Methane Flow to Flare:	2049.2	scfm	30498544.61 m^3/year
MW of Methane	16		

Methane Emission Rate

Pollutant	Methane Flow Rate to Flare (m^3/year)	Methane Flow Rate to Flare (m^3/minute)	Methane (Mg/yr)*
Class I Landfill			
Methane	30498545	58.0	20,285

*41.57 Conversion from std. m^3/yr to g/yr.

Table A-22

SWA, Proposed 3500 SCFM Flare HAP Emissions

Input Information:

NMOC concentration in landfill gas: 595 ppmdv expressed as hexane with MW of: 86.17
Equivalent mass/volume conc. is: 2131341.71 ug/m3 [ug/m3 = (ppm)41.57(MW)]
NMOC Emission Rate 111 Mg/yr 3.52099343 g/s

HAP	**Molecular Weight**	**Default Conc. (ppmv)**	**Mass Conc. (ug/m3)**	**Emissions (Mg/yr)**	**Emissions (tons/yr)**
1,1,1-Trichlorethane (methyl chloroform)	133.42	0.480	2617.38	1.36E-01	1.38E-01
1,1,2,2-Tetrachloroethane	167.85	1.11	7614.63	3.97E-01	4.02E-01
1,1,2-Trichloroethane	133.42	0.100	545.29	2.84E-02	2.88E-02
1,1-Dichloroethane (ethylidene dichloride)	98.95	2.35	9503.60	4.95E-01	5.02E-01
1,1-Dichloroethene (vinylidene chloride)	96.94	0.201	796.35	4.15E-02	4.20E-02
1,2-Dichloroethane (ethylene dichloride)	98.96	0.407	1646.11	8.58E-02	8.69E-02
1,2-Dichloropropane (propylene dichloride)	112.98	0.18	831.15	4.33E-02	4.39E-02
Acrylonitrile	53.06	6.33	13727.00	7.15E-01	7.25E-01
Benzene	78.11	1.91	6097.40	3.18E-01	3.22E-01
Carbon disulfide	76.13	0.583	1813.97	9.45E-02	9.58E-02
Carbon tetrachloride	153.84	0.004	25.15	1.31E-03	1.33E-03
Carbonyl sulfide	60.07	0.490	1202.98	6.27E-02	6.35E-02
Chlorbenzene	112.56	0.254	1168.48	6.09E-02	6.17E-02
Chloroethane	64.52	1.25	3296.17	1.72E-01	1.74E-01
Chlorform	119.39	0.03	146.38	7.63E-03	7.73E-03
Chloromethane (methyl chloride)	50.49	1.21	2496.87	1.30E-01	1.32E-01
Dichlorbenzene	147.00	0.213	1279.68	6.67E-02	6.75E-02
Dichlormethane (methylene chloride)	84.94	14.3	49642.42	2.59E+00	2.62E+00
Ethylbenzene	106.16	4.61	20001.68	1.04E+00	1.06E+00
Hexane	86.17	6.57	23138.02	1.21E+00	1.22E+00
Mercury	200.61	0.000292	2.39	1.25E-04	1.26E-04
Methyl ethyl ketone (2-butanone)	72.10	7.09	20892.29	1.09E+00	1.10E+00
Methyl isobutyl ketone (hexone)	100.16	1.87	7654.92	3.99E-01	4.04E-01
Perchloroethylene (tetrachloroethylene)	165.83	3.73	25279.97	1.32E+00	1.33E+00
Toluene	92.13	39.3	147978.38	7.71E+00	7.81E+00
Trichloroethylene	131.40	2.82	15144.30	7.89E-01	7.99E-01
Vinyl chloride	62.50	7.34	18749.11	9.77E-01	9.90E-01
Xylenes	106.16	12.1	52498.99	2.74E+00	2.77E+00
Total Uncontrolled VOC HAPs (before flare)					2.30E+01
Total Mercury					1.26E-04
Total Controlled VOC HAPs					4.60E-01
Total HAPs					**0.46**

Table A-23

SWA Lime Recalcination Facility and Sludge Pelletization Facility

Secondary Pollutant Emission Rates - Proposed 3500 SCFM Flare

Flare Gas Flow Design Capacity:	3500	scfm	52091677.26	m^3/year	1.65181625
Methane Content of Landfill Gas:	58.5%	(percent by volume)			
Total Methane Flow to Flare:	2049.2				
Energy content of methane:	980	Btu/ft^3	34603.8	Btu/m^3	

CO and NOx Emission Rates Based on Vendor Emission Factors

Pollutant	Methane Flow Rate to Flare (scfm)	Energy input to flare (MMBtu/yr)	Emission Factor (lb/MMBtu)	Emissions from Flare (lb/yr)	Emissions from Flare (ton/yr)
Class I Landfill					
Carbon Monoxide	2049	1055504.9	0.37	390536.8	195.27
Nitrogen Oxides	2049	1055504.9	0.068	71774.3	35.89

SO2 and HCl Emission Rates Based on Mass Balance

Pollutant	Total Landfill Gas Flow Rate to Flare (Std. m^3/yr)	Concentration of S or Cl in Landfill Gas (ppmV)	Emission rate of S or Cl (m^3/yr)	Molecular Weight of S or Cl (g/gmol)	Temperature at Standard Conditions (°C)	Uncontrolled Mass Emissions of S or Cl (kg/yr)	Control Efficiency (%)	Ratio of Molecular Weights SO_2/S or HCl/Cl	Controlled Mass Emissions of Pollutant (kg/yr)	Controlled Mass Emissions of Pollutant (lb/hr)	Controlled Mass Emissions of Pollutant (ton/yr)
Class I Landfill											
Sulfur - Sulfur Dioxide	52091677	100	5209.17	32.06	20	6943.30	0	2.00	13874.04	3.5E+00	15.3
Chlorine - Hydrogen Chloride	52091677	42.0	2187.85	35.45	20	3224.14	91	1.03	298.52	7.5E-02	0.33

The emission rates for CO and NO_X are from U.S. EPA, *Compilation of Air Pollutant Emision Factors*, Report No. AP-42, Section 13.5, Industrial Flares, September 1991. The calculation of SO2 and HCl is from: U.S. EPA, *Compilation of Air Pollutant Emission Factors*, Report No. AP-42, Section 2.4, updated November, 1997.

Table A-24

SWA Lime Recalcination Facility and Sludge Pelletization Facility
Exit Gas Flow Rate Calculations - Proposed 3500 SCFM Flare

(Operating at 800 SCFM to account for LRF/BPF demand of 2700 SCFM)

Maximum Potential Gas Flow Rate

Flare Gas Flow Design Capacity:	800	scfm
cf of air needed to combust 1 cf of LFG:	15.7	(ratio)
Exit Gas Flow Rate:	12560	scfm

Gas going to LRF (33 MMBtu/hr):	958.6	scfm
Gas going to BPF (23 MMBtu/hr):	668.1	scfm

	Actual	Standard
Moisture Content of Gas (%):	6.0%	0%
Temperature of Gas (°F):	1400	68

Conversion from scfm to dscfm:

$$\frac{12560 \ \text{ft}^3}{\text{minute}} * (1 - 0.06) = \frac{11{,}806 \ \text{dscf}}{\text{minute}}$$

Converstion from scfm to acfm:

$$\frac{12560 \ \text{ft}^3}{\text{minute}} * \frac{(459.67°\text{R} + 1400°\text{F})}{(459.67°\text{R} + 68°\text{F})} = \frac{44{,}265 \ \text{acf}}{\text{minute}}$$

Table A-25

SWA Lime Recalcination Facility and Sludge Pelletization Facility
Methane Emission Rates - Proposed 3500 SCFM Flare
(Operating at 800 SCFM to account for LRF/BPF demand of 2700 SCFM)

Flare Gas Flow Design Capacity:	800	scfm	11906669.09	m^3/year
Methane Content of Landfill Gas:	58.5%	(percent by volume)		
Total Methane Flow to Flare:	468.4	scfm	6971095.91	m^3/year
MW of Methane	16			

Methane Emission Rate

Pollutant	Methane Flow Rate to Flare (m^3/year)	Methane Flow Rate to Flare (m^3/minute)	Methane (Mg/yr)*
Class I Landfill			
Methane	6971096	13.3	4,637

*41.57 Conversion from std. m^3/yr to g/yr.

Table A-26

SWA, Proposed 3500 SCFM Flare HAP Emissions

(Operating at 800 SCFM to account for LRF/BPF demand of 2700 SCFM)

Input Information:

NMOC concentration in landfill gas:	595	ppmdv expressed as hexane with MW of:		86.17
Equivalent mass/volume conc. is:	2131341.71	ug/m3	[ug/m3 = (ppm)41.57(MW)]	
NMOC Emission Rate	25	Mg/yr	0.8047985	g/s

HAP	Molecular Weight	Default Conc. (ppmv)	Mass Conc. (ug/m3)	Emissions (Mg/yr)	Emissions (tons/yr)
1,1,1-Trichlorethane (methyl chloroform)	133.42	0.480	2617.38	3.12E-02	3.16E-02
1,1,2,2-Tetrachloroethane	167.85	1.11	7614.63	9.07E-02	9.19E-02
1,1,2-Trichloroethane	133.42	0.100	545.29	6.49E-03	6.58E-03
1,1-Dichloroethane (ethylidene dichloride)	98.95	2.35	9503.60	1.13E-01	1.15E-01
1,1-Dichloroethene (vinylidene chloride)	96.94	0.201	796.35	9.48E-03	9.61E-03
1,2-Dichloroethane (ethylene dichloride)	98.96	0.407	1646.11	1.96E-02	1.99E-02
1,2-Dichloropropane (propylene dichloride)	112.98	0.18	831.15	9.90E-03	1.00E-02
Acrylonitrile	53.06	6.33	13727.00	1.63E-01	1.66E-01
Benzene	78.11	1.91	6097.40	7.26E-02	7.36E-02
Carbon disulfide	76.13	0.583	1813.97	2.16E-02	2.19E-02
Carbon tetrachloride	153.84	0.004	25.15	2.99E-04	3.03E-04
Carbonyl sulfide	60.07	0.490	1202.98	1.43E-02	1.45E-02
Chlorbenzene	112.56	0.254	1168.48	1.39E-02	1.41E-02
Chloroethane	64.52	1.25	3296.17	3.93E-02	3.98E-02
Chlorform	119.39	0.03	146.38	1.74E-03	1.77E-03
Chloromethane (methyl chloride)	50.49	1.21	2496.87	2.97E-02	3.01E-02
Dichlorbenzene	147.00	0.213	1279.68	1.52E-02	1.54E-02
Dichlormethane (methylene chloride)	84.94	14.3	49642.42	5.91E-01	5.99E-01
Ethylbenzene	106.16	4.61	20001.68	2.38E-01	2.41E-01
Hexane	86.17	6.57	23138.02	2.76E-01	2.79E-01
Mercury	200.61	0.000292	2.39	2.85E-05	2.89E-05
Methyl ethyl ketone (2-butanone)	72.10	7.09	20892.29	2.49E-01	2.52E-01
Methyl isobutyl ketone (hexone)	100.16	1.87	7654.92	9.12E-02	9.24E-02
Perchloroethylene (tetrachloroethylene)	165.83	3.73	25279.97	3.01E-01	3.05E-01
Toluene	92.13	39.3	147978.38	1.76E+00	1.79E+00
Trichloroethylene	131.40	2.82	15144.30	1.80E-01	1.83E-01
Vinyl chloride	62.50	7.34	18749.11	2.23E-01	2.26E-01
Xylenes	106.16	12.1	52498.99	6.25E-01	6.33E-01
Total Uncontrolled VOC HAPs (before flare)					5.26E+00
Total Mercury					2.89E-05
Total Controlled VOC HAPs					1.05E-01
Total HAPs					**0.11**

Table A-27
SWA Lime Recalcination Facility and Sludge Pelletization Facility
Secondary Pollutant Emission Rates - Proposed 3500 SCFM Flare

(Operating at 800 SCFM to account for LRF/BPF demand of 2700 SCFM)

Flare Gas Flow Design Capacity:	800	scfm	11906669.09	m^3/year	0.377558
Methane Content of Landfill Gas:	58.5%	(percent by volume)			
Total Methane Flow to Flare:	468.4				
Energy content of methane:	980	Btu/ft^3	34603.8	Btu/m^3	

CO and NOx Emission Rates Based on Vendor Emission Factors

Pollutant	Methane Flow Rate to Flare (scfm)	Energy input to flare (MMBtu/yr)	Emission Factor (lb/MMBtu)	Emissions from Flare (lb/yr)	Emissions from Flare (ton/yr)
Class I Landfill					
Carbon Monoxide	468	241258.3	0.37	89265.6	44.63
Nitrogen Oxides	468	241258.3	0.068	16405.6	8.20

SO2 and HCl Emission Rates Based on Mass Balance

Pollutant	Total Landfill Gas Flow Rate to Flare (Std. m^3/yr)	Concentration of S or Cl in Landfill Gas (ppmV)	Emission rate of S or Cl (m^3/yr)	Molecular Weight of S or Cl (g/gmol)	Temperature at Standard Conditions (°C)	Uncontrolled Mass Emissions of S or Cl (kg/yr)	Control Efficiency (%)	Ratio of Molecular Weights SO_2/S or HCl/Cl	Controlled Mass Emissions of Pollutant (kg/yr)	Controlled Mass Emissions of Pollutant (lb/hr)	Controlled Mass Emissions of Pollutant (ton/yr)
Class I Landfill											
Sulfur - Sulfur Dioxide	11906669	100	1190.67	32.06	20	1587.04	0	2.00	3171.21	8.0E-01	3.5
Chlorine - Hydrogen Chloride	11906669	42.0	500.08	35.45	20	736.95	91	1.03	68.23	1.7E-02	0.08

The emission rates for CO and NO_X are from U.S. EPA, *Compilation of Air Pollutant Emision Factors*, Report No. AP-42, Section 13.5, Industrial Flares, September 1991. The calculation of SO2 and HCl is from: U.S. EPA, *Compilation of Air Pollutant Emission Factors*, Report No. AP-42, Section 2.4, updated November, 1997.

Vendor Emissions Data

FAX

ENVIRONMENT AND PROCESS TECHNOLOGIES

ANDRITZ

Send to: CDM

Attention: Ms. Teresa Raine

Fax No.: 617-452-8371

Copies to: Peter Commerford

Issued by: Dr. R. Venkatesan

Our ref. Ds-434

Total no. of pages: 2

Arlington e-mail:

Date: 5/2/02

SUBJECT:

Attached please find the emission estimates (revised) for the West Palm Beach, Florida dryer project. Please call me if you have questions.

Thanks

RVenkatesan

817-419-1737 (Ph)

ANDRITZ-RUTHNER, INC.
1010 Commercial Blvd. S.
Arlington, TX USA 76001
Tel: 817/465-5611
Fax: 817/472-8589
E-mail: andritz@andirtz-arl.com

ANDRITZ

Project: Ds-434
Client: West Palm Beach, Florida

Estimates of Maximum Hourly and Annual Criteria and Non-criteria Pollutant Emissions:

Dryer Model	DDS70
Sludge type	
Wet cake throughput (dry basis), DTPD	33.75
No. dryer trains	1
No.dryer trains operating	1
Evaporation rate per dryer train, lbs./hr	15,790

Stack gas data:

		gas composition	volume%	
stack gas temperature, °F	207	component	(wet basis)	(dry basis)
stack pressure, inches Hg	29.8	H_2O	6.50%	
stack gas flow rate, acfm	11,120	CO_2	5.85%	6.25%
gas flow rate, scfm	8,836	N_2	76.54%	81.86%
gas flow rate, dscfm	8,261	O_2	11.11%	11.88%
		SO_2	0.00%	0.00%
			100.00%	100.00%

Safety factor	10%
Total hours of operation per year	8760

Pollutant		Control device	Control efficiency	stimated emissions (see Note		Comments
				lbs./hr	tons/yr	
PM_{10}		venturi scrubber	95%	0.78	3.41	see Note 2.
THC		RTO	98%	0.30	1.30	see Note 3.
NH_3		RTO	50%	0.20	0.88	see Note 4.
NO_x as NO_2		none	0%	2.24	9.79	see Note 5.
SO_x as SO_2		none	0%	0.93	4.09	see Note 6.
CO		RTO	90%	0.39	1.73	see Note 7.
H_2S		RTO	95%	2.62E-02	0.11	
Metals:	Concentration					
Arsenic (As)	4.21	none	0%	3.28E-06	1.44E-05	see Note 8.
Cadmium (Cd)	10.7	none	0%	8.33E-06	3.65E-05	see Note 8.
Chromium (Cr)	40.1	none	0%	3.12E-05	1.37E-04	see Note 8.
Copper (Cu)	0	none	0%	0.00E+00	0.00E+00	see Note 8.
Lead (Pb)	106	none	0%	8.26E-05	3.62E-04	see Note 8.
Mercury (Hg)	2.78	none	0%	2.17E-06	9.48E-06	see Note 8.
Molybdenum (Mo)	0	none	0%	0.00E+00	0.00E+00	see Note 8.
Nickel (Ni)	36.7	none	0%	2.86E-05	1.25E-04	see Note 8.
Selenium (Se)	0	none	0%	0.00E+00	0.00E+00	see Note 8.
Zinc (Zn)	0	none	0%	0.00E+00	0.00E+00	see Note 8.

Note 1. - ESTIMATES at stack conditions

Note 2. - Vendor guarantees less than 0.01 gr./dscf ex-venturi scrubber

Note 3. - Based on OCUA stack emissions.

Note 4. - Assumed no absorption in water in the tray sub-cooler.

Note 5. - With fuel burner type same as OCUA.

Note 6. - Assumed no oxidation of sulfur in sludge and no chemical usage in tray condenser.

Note 7. - Vendor guarantees CO concentration of 10 ppmv ex-RTO.

Note 8. - For typical sludge composition. Assumed no vaporization or destruction metals take place during drying.

Appendix B
RACT/BACT/LAER Clearinghouse

U.S. Environmental Protection Agency

Technology Transfer Network
Clean Air Technology Center
RACT/BACT/LAER Clearinghouse

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EPA Home > Air & Radiation > TTNWeb - Technology Transfer Network > Clean Air Technology Center > RACT/BACT/LAER Clearinghouse > RBLC Database Query > RBLC Standard Query > RBLC Query Results

RBLC Query Results Help

Your query has found **39** facilities and **322** processes that match your search criteria. You can view details for one or more facilities by clicking on the highlighted RBLC identifier in the list shown at the bottom of this page. To create a report file, select one of the standard output formats from the list of reports at the bottom of this page. You can choose from both summary and detailed output formats.

Summary output contains selected information for all facilities in the table below. Detailed output contains all available information, but just for selected facilities. Only facilities that are checked in the table below will be included in your report. Click on the check box next to any facility to switch between checked and unchecked. Click the reset button to set all facilities to checked.

Matching Facilities for Search Criteria:

Permit Date Between 01/01/1992 And 10/10/2002
And p.proctype='90.019'

Check Un-Check **ALL Facilities** New Query

[illegible]E: Draft determinations are marked with a " * " beside the RBLC ID.

RBLC ID Sort By	COMPANY NAME & PLANT NAME Sort By	CODE	PROCESS DESCRIPTION	PERMIT NUMBER PERMIT DATE Sort By
☑ *PR-0007	AES PUERTO RICO COGENERATION PLANT (A ES-PRCP) AES-PRCP	90.019	LIMESTONE DRYER	14 10/29/2001
		11.002	2 COAL-FIRED CIRCULATING FLUIDIZED BED BOILERS	
		99.009	COOLING TOWER	
		49.999	STORAGE TANKS- FUEL START-UP TANK	
		49.999	STORAGE TANKS- DIESEL FUEL	
		15.002	FIRE PUMP- DIESEL	
		15.002	DIESEL GENERATOR, EMERGENCY EQUIP	
		15.002	EMERGENCY BOILER FEED PUMP- DIESEL ENGINE	
☑ *LA-0122	INTERNATIONAL PAPER - MANSFIELD MILL INTERNATIONAL PAPER - MANSFIELD MILL	30.002	ASH HANDLING OPERATIONS	PSD-LA-93 (M-6) 08/14/2001
		30.002	BARK/WOODWASTE/SLUDGE HANDLING	
		30.002	PAPER MACHINE NO.1	
		30.002	PM1 - SAVE ALL VENT 1	
		30.002	PAPER MACHINE NO.2	
		30.002	PM2 - SAVE ALL VENT 1	
		30.002	PAPER MACHINE NO.3	
		30.002	PM3 - SAVE ALL VENT	

15.002	AUXILIARY DIESEL GENERATORS NO.1 & NO.2
30.002	UNLEADED GASOLINE BULK TANK
30.002	LIME KILN GASOLINE TANK
30.002	NO.2 FUEL OIL TANK
30.002	DETROIT DIESEL FIRE-WATER PUMP 2 & 3
15.002	CLARIFIER DIESEL ENGINE
30.002	WASTE CLARIFIER DIESEL ENGINE
15.002	ADMINISTRATION BUILDING DIESEL GENERATOR
15.002	EFFLUENT LIFT PIT DIESEL ENGINE
30.002	WOODYARD
30.002	WASTEWATER TREATMENT
30.002	LANDFILL
30.002	HAUL ROADS
30.002	PRIMARY WEAK BLACK LIQUOR, TANK EAST AND WEST
30.002	CAUSTICIZER NO.1 THRU NO.4
30.002	WEAK WASH TANK NO.1 & NO.2
30.002	WHITE LIQUOR CLARIFIER 1 & 2
30.002	WHITE LIQUOR TANK 1 THRU 3
30.002	LIME MUD MIX TANK
30.002	LIME MUD WASHER 1 & 2
30.002	LIME MUD STORAGE TANK
30.002	SECONDARY WEAK BLACK LIQUOR TANK
30.002	LIME MUD PRECOAT FILTER
30.002	WASTE CLARIFIER
30.002	SECONDARY BLACK LIQUOR FILTER
30.002	PRIMARY BLACK LIQUOR FILTER
30.002	PRIMARY HIGH DENSITY TANKS A, B & C
30.002	SECONDARY HIGH DENSITY TANK
30.002	SEMICHEMICAL HIGH DENSITY TANK
30.002	DIGESTER DUMP TANKS, 3
30.002	CATIONIC STARCH SILO
30.002	OXIDIZED STARCH SILO
30.002	TALC SILO
30.002	LIME KILN AUXILIARY ENGINE
30.002	CATERPILLAR BACK-UP DIESEL AIR COMPRESSORS, 2
30.002	MUD STORAGE DIESEL GENERATOR
30.002	BOILER FEEDWATER/STEAM CONDENSATE TREATMENT
30.002	PAINT YARD
30.002	REPULPER NO.4
11.110	POWER BOILER #1 & #2, COAL
11.220	POWER BOILER #1 & #2, OIL
11.900	POWER BOILER #1 & #2, COMBINED FUEL
90.019	LIME KILN
30.002	RECOVERY BOILER NO.1 AND NO.2
30.002	SEMICHEMICAL WEAK BLACK LIQUOR TANK
30.002	SWING WEAK BLACK LIQUOR TANK
30.002	INTERMEDIATE BLACK LIQUOR TANK 1 & 2
30.002	HEAVY BLACK LIQUOR TANK
30.002	SOAP SKIMMER AND COLLECTION TANKS, 4
30.002	SOAP STORAGE TANK
30.002	BOILOUT TANK
30.002	SPILL TANK NO.1 & NO.2
30.002	RB1 & RB2 BLACK LIQUOR DUMP TANK
30.002	GREEN LIQUOR CLARIFIER 1 & 2

		30.002 GREEN LIQUOR TANK 1 & 2	
		30.002 DREGS FILTERS	
		30.002 SMELT DISSOLVING TANK NO.1 AND NO.2	
		30.002 LIME SLAKER	
		30.002 NCG INCINERATOR	
		15.004 GAS TURBINE/HRSG	
		15.004 GAS TURBINE	
		15.004 DUCT BURNER	
		30.002 REPULPER NO.1	
		30.002 REPULPER NO.2 AND NO.3	
		30.002 COAL STORAGE AND HANDLING	
☑ AR-0034	ARKANSAS LIME COMPANY ARKANSAS LIME COMPANY	→ 90.019 LIME MANUFACTURING - ROTARY LIME KILN, NO. 2	45-AOP-R2 05/18/2000
☑ AR-0028	ARKANSAS LIME COMPANY ARKANSAS LIME COMPANY	→ 90.019 KILN, LIME	45-AOP-R1 09/14/1999
☑ *IL-0060	ARCHER DANIELS MIDLAND COMPANY ARCHER DANIELS MIDLAND COMPANY	11.110 BOILER (9&10), FLUIDIZED BED	97070097 12/24/1998
		11.310 BOILER (11), GAS FIRED	
		90.019 STORAGE & HANDLING SYSTEM, LIMESTONE	
☑ UT-0053	DESERET GENERATION AND TRANSMISSION COMPANY DESERET GENERATION AND TRANSMISSION COMPANY	90.011 CONVEYOR COAL	DAQE-186-98 03/16/1998
		90.019 MATL HANDLING, LIMESTONE	
		11.110 COAL FIRED BOILER	
☑ WY-0039	TWO ELK GENERATION PARTNERS, LIMITED PARTNERSHIP TWO ELK GENERATION PARTNERS, LIMITED PARTNERSHIP	11.110 BOILER, STEAM ELECTRIC POWER GENERATING	CT-1352 02/27/1998
		90.999 HANDLING BUILDING, FLY ASH	
		15.004 TURBINE, STATIONARY	
		90.011 DUMP POCKET, COAL	
		90.011 SILO, COAL	
		90.011 CRUSHER, CONE, SECONDARY COAL	
		90.999 MATERIAL HANDLING, DESULFURIZATION BYPRODUCTS	
		90.011 MATERIAL HANDLING, DUMPING COAL AT DUMP POCKET	
		90.011 SILO, BOILER, PLANT COAL	
		90.019 SILO, LIME	
		90.999 SILO, FLY ASH	
☑ SC-0053	PALMETTO LIME, LLC PALMETTO LIME, LLC	→ 90.019 VERTICAL SHAFT KILNS (LIME MANUFACTURING)	0560-0262 12/12/1997
☑ MT-0012	CONTINENTAL LIME INC. CONTINENTAL LIME INC.	90.019 SCREENING/CONVEYING PROJECT	1554-10 11/19/1997
		→ 90.019 KILN-LIME, TWO	
		90.019 HANDLING/BLENDING - COKE, SYSTEM	
☑ WY-0047	ENCOAL CORPORATION-ENCOAL NORTH ROCHELLE FACILITY ENCOAL CORPORATION-ENCOAL NORTH ROCHELLE FACILITY	90.011 MATERIAL HANDLING, FLY ASH AND GAS DESULFURIZATION	CT-1324 10/10/1997
		90.010 COOLER, PROCESS DERIVED FUEL	
		90.010 EXHAUST, PLANT VAPOR FROM LIQUIDS FROM COAL PROCES	
		90.010 EXHAUST, PROCESS WATER VAPOR, 3 EACH	

		90.010	SILO, COAL STORAGE	
		90.019	SILO, LIME STORAGE	
		90.010	SCRUBBER, FINISHING, 3 EACH	
		90.011	STORAGE, PROCESS DERIVED FUEL	
		90.999	BIN, ASH STORAGE	
		90.010	LIQUIDS FROM COAL PLANT (3 MODULES PER PLANT)	
		11.110	BOILER, PULVERIZED COAL FIRED POWER GENERATION UNI	
		11.110	BOILER, COAL FIRED, MAIN STACK	
		90.010	DRYER SURGE BIN	
☑ AL-0102	DRAVO LIME COMPANY-LONGVIEW DIVISION DRAVO LIME COMPANY-LONGVIEW DIVISION →	90.019	CHEMICAL LIME MANUFACTURING	411-0002-X016 THRU X023 09/15/1997
☑ MT-0008	CONTINENTAL LIME INC. CONTINENTAL LIME INC. →	90.019	KILNS, LIME 2	1554-09 06/20/1997
☑ *IA-0057	CARGILL, INC CARGILL, INC	70.007	GLUTEN LOADOUT CONVEYING I	83-A-090-S2, ET AL 02/24/1997
		70.007	GLUTEN LOADOUT CONVEYING II	
		70.007	FEED STORAGE & LOADOUT/RAIL	
		70.007	FEEDHOUSE CONVEYOR ASPIRATION	
		70.007	FIBER HAMMERMILL ASPIRATION I	
		70.007	FEED LOADOUT, TRUCK	
		70.007	COLD GERM TRANSFER RECEIVER	
		70.015	EXPELLER ASPIRATION II	
		90.019	LIME / PRECOAT WEIGH HOPPER DUST COLLECTER	
		90.019	LIME PRECOAT STORAGE	
		70.007	DRY CRYSTAL HANDLING ASPIRATION	
		70.007	DRY CRYSTAL COOLER	
		70.007	FEED LOADOUT III	
		70.007	DRY CRYSTAL HANDLING II	
		70.007	CONDITIONING DRYER I	
		90.011	COAL BUNKER I	
		70.999	CHEMICAL TANK ASPIRATION (3 TANKS)	
		90.011	COAL DUMPING SHED	
		12.310	BOILER #4	
		12.310	BOILER #5	
		12.310	BOILER #6	
		70.007	CORN RECEIVING I- MISCELLANEOUS CONVEYORS AND BIN	
		70.007	CORN RECEIVING II	
		70.007	BARR-ROSIN FIBER FLASH DRYER SYSTEM	
		70.007	GLUTEN FLASH DRYER CONVEYING	
		70.007	GLUTEN FLASH DRYER CONVEYING II	
		70.007	FIBER HAMMERMILL ASPIRATION II	
		70.007	FIBER HAMMERMILL ASPIRATION III	
		70.007	FEED HOUSE CONVEYOR ASPIRATION II	
		70.007	GERM DRYER / COOLER	
		70.007	GERM DRYER/COOLER II	
		70.007	MEAL DRYER/COOLER	
		70.007	FRUCTOSE PRECOAT UNLOADING	
		70.007	FLAKER CONDITIONER	
		70.015	EXPELLER ASPIRATION I	
		70.007	PELLET COOLING I	
		70.007	PELLET COOLING II	
		70.007	PELLET COOLING III	
		70.007	PELLET COOLING IV	

		90.011	COAL BUNKER II-CUSTOM FABRICATED	
		90.011	COAL BUNKER III-CUSTOM FABRICATED	
		90.011	COAL CONVEYING ASPIRATION	
		70.007	MEAL TRANSFER RECEIVING /PNEUMATIC CONVEYING	
		70.007	CORN GERM MEAL SILO VENT	
☑ WI-0090	WESTERN LIME CORPORATION WESTERN LIME CORPORATION	90.019	LIME KILN #2, P38, S18	95POY118 07/23/1996
		90.019	P07, S07, LOADOUT PROCESS	
☑ AL-0082	CHEMICAL LIME COMPANY OF ALABAMA, INC. - O'NEAL QU CHEMICAL LIME COMPANY OF ALABAMA, INC. - O'NEAL QU	90.019	2 SIZING SCREENS & 500 TON HI-CAL LIME TANK (NO.1)	411-0039-X005 THROUGH X018 04/29/1996
		90.019	250 TON KILN DUST BIN (NO.7)	
		90.019	500 TON RETURN LIME BIN (NO.4)	
		90.019	LIME SCREENING, BUCKET DISCHARGE, AND LIME STORAGE	
		90.019	LIME TRUCK LOADOUT	
		90.019	LIME RAIL LOADOUT	
		90.019	BELT CONVEYORS 353, 356, & 358	
		90.019	RETURN LIME HOPPER	
		90.019	TRUCK LOADING	
		90.019	LIME MANUFACTURING	
		90.019	100 TON CHAT (FINES) BIN	
		90.019	1000 TON STONE FEED BIN	
		90.019	COAL/COKE DUMP HOPPER	
		90.019	COAL/COKE ROLL CRUSHER	
		90.019	1000 TON COAL TANK & 1000 TON COKE TANK	
		90.019	350 TON KILN DUST BIN	
		90.019	5000 TON HI-CAL LIME TANK & 500 TON REJECT BIN	
		90.019	500 TON REJECT BIN LOADOUT	
		90.019	BELT CONVEYOR 310 TRANSFER TO BUCKET ELEVATOR 312	
		90.019	LIME REJECT TRANSFER POINT (WT FDR 328 TO BC 321)	
		90.019	LIME ROLL CRUSHER & BELT CONVEYOR TRANSFER	
☑ *NE-0016	CARGILL, INC. CARGILL, INC.	99.999	HAUL TRAFFIC ROAD	57902 04/25/1996
		70.007	GERM EXTRACTION PLANT, MEAL DRYER AND COOLER	
		70.007	GERM EXTRACTION PLANT, EXPELLED GERM CONVEYOR	
		12.310	BOILERS, (3)	
		70.016	FERMENTATION PROCESS	
		70.016	RECTIFIER COLUMN	
		70.016	STILLAGE EVAPORATOR	
		42.009	ETHANOL STORAGE TANK FARM	
		70.015	CORN GERM OIL EXTRACTION	
		70.007	CORN TRUCK UNLOADING SYSTEM	
		70.007	CORN RAIL UNLOADING PROCESS	
		70.007	STEEP HOUSE	
		70.007	FEEDHOUSE CRACKED CORN	
		70.007	FEED LOADOUT, RAIL	
		70.007	FEED LOADOUT, TRUCK	
		90.019	LIME ADDITION ASPIRATION	
		90.019	LIME UNLOAD AND STORAGE	
		70.007	SWEET BRAN BATCH MIXER	
		90.019	FEED LIME UNLOADING AND STORAGE	

		70.007 GERM EXTRACTOR PLANT, GERM RECEIVING	
		70.007 GERM EXTRACTOR PLANT HOT GERM CONVEYING SYSTEM	
		70.007 GERM EXTRACTION PLANT GERM MEAL CONVEYING	
		70.007 CORN SYRUP PLANT, UNLOADING, TRANSFER & STORAGE	
		70.007 CORN SYRUP PLANT, CONVEYING SYSTEM -	
		70.010 CORN SYRUP PLANT MANUAL ADDITION OF PRECOAT -	
		70.007 GLUTEN FLASH DRYER	
		70.007 GERM DRYER	
		70.007 FIBER PREDRYER	
		70.007 GLUTEN BIN FILTER RECEIVER	
		70.007 GERM BIN FILTER RECEIVER	
		70.007 FIBER BIN FILTER RECEIVER	
		13.310 SYRUP REFINERY CARBON REGENERATOR	
		70.007 PROCESS ASPIRATION	
☑ MT-0006	CONTINENTAL LIME-INDIAN CREEK OP'N CONTINENTAL LIME-INDIAN CREEK OP'N	90.019 LIME KILNS ←	1554-06 03/20/1996
☑ *IA-0036	IPSCO STEEL INC IPSCO STEEL INC	81.006 TUNDISH DUMP	95-314 03/14/1996
		90.019 LIME/DOLOMITE STORAGE	
		81.006 CARBON STORAGE	
		81.006 CASTER TORCH	
T-0054	CONTINENTAL LIME INC. - CRICKET MTN. LIME PLANT CONTINENTAL LIME INC. - CRICKET MTN. LIME PLANT	→ 90.019 KILN, #4	DAQ-021-96 01/10/1996
☑ VA-0236	CASELIN SYSTEMS, INC. CASELIN SYSTEMS, INC.	29.004 MEDICAL WASTE INCINERATOR (2 UNITS)	11106 12/21/1995
		90.019 LIME SILO	
☑ UT-0060	DESERET GENERATION AND TRANSMISSION CO. DESERET GENERATION AND TRANSMISSION CO.	11.110 BOILER, GENERATING UNIT	DAQE-523-95 06/14/1995
		90.011 MATERIAL HANDLING - COAL	
		90.019 MATERIAL HANDLING - LIMESTONE	
		29.999 MATERIAL HANDLING - ASH	
		90.019 LIMESTONE STORAGE	
		90.011 COAL STORAGE PILE	
		99.999 ROADS (PAVED)	
		99.999 ROADS (UNPAVED)	
☑ *IA-0055	IPSCO STEEL, INC IPSCO STEEL, INC	81.006 MATERIAL HANDLING, LIME TRANSFER TO SCRAP BUCKETS	70-08-002 01/03/1995
		81.006 COILING FURNACES, (2)	
		90.019 STORAGE SILOS, LIME AND DOLOMITE, EP #3	
		81.006 CASTER SLAB HAND SCARFING	
		99.999 ROADWAYS, PLANT	
		81.006 STEEL SCRAP CUTTING OPERATION	
		99.999 ROADWAY, SLAG HAUL, EP #8	
		81.006 TUNDISH DUMP	
		81.006 CONTINUOUS SLAB CASTER TORCH OPERATION	
		81.006 CARBON STORAGE SILO, EP#4	

		81.007	CASTER MOLD, EP #2	
		81.006	TRANSFER, ALLOY BINS, EP#1	
		81.006	ELECTRIC ARC FURNACE MELTSHOP EP # 1	
		81.006	LADLE DRYER STATION	
		81.006	TUNDISH DRYER	
		81.006	ELECTRIC ARC FURNACE ROOF VENT	
		81.006	TUNDISH PREHEATERS	
		81.006	LADLE PREHEATER STATIONS, (3)	
		81.006	REHEAT FURNACE, WALKING BLAM	
☑ PA-0131	J.E. BAKER COMPANY J.E. BAKER COMPANY	90.019	KILN #1, COAL/COKE DIRECT-FIRED FULLER ROTARY	67-2001 12/22/1994
		90.019	KILN #2, COAL/COKE DIRECT-FIRED KFS ROTARY	
☑ MO-0038	CHEMICAL LIME CO CHEMICAL LIME CO	90.019	BUILD & OPERATE A 2700(TPD) LIME MANUFACTURE PLANT	1294-004 12/07/1994
☑ *TN-0097	TENN LUTTRELL COMPANY TENN LUTTRELL COMPANY	90.019	VERTICAL SHAFT LIME KILN	938511P 09/23/1994
☑ *TN-0098	TENN LUTTRELL COMPANY TENN LUTTRELL COMPANY	90.019	MATERIAL HANDLING OPERATIONS	938513P 09/23/1994
☑ WI-0082	CLM CORP. CLM CORP.	90.019	KILN, LIME (4)	93-DBY-074 06/01/1994
☑ WY-0028	FMC WY CORPORATION-GREEN RIVER SODA ASH PLANT FMC WY CORPORATION-GREEN RIVER SODA ASH PLANT	90.019	LIME STORAGE SILO	CT-1045 09/07/1993
		90.019	SLAKER VENT, LIME	
		90.017	FLUID BED SODA ASH	
		90.017	MATL. HANDLING, CONVEOR & TRANSFER	
		12.310	BOILER, NATURAL GAS FIRED	
KY-0062	NEW RIVER LIME, INC. NEW RIVER LIME, INC.	90.019	KILN, ROTARY LIME (4)	C-93-053 08/26/1993
		90.019	MATERIAL HANDLING, LIME	
☑ *KY-0065	DRAVO LIME COMPANY - KY ROUTE 8 DRAVO LIME COMPANY - KY ROUTE 8	90.019	KILN, ROTARY LIME (3)	C-93-032 08/12/1993
		90.019	MATERIAL HANDLING, LIME	
☑ VA-0210	W. S. FREY COMPANY, INC. W. S. FREY COMPANY, INC.	90.019	KILN, LIME	20504 05/14/1993
☑ *IL-0052	MISSISSIPPI LIME COMPANY MISSISSIPPI LIME COMPANY	90.019	KILN, ROTARY, LIME	92060070 04/30/1993
		90.019	KILN, PREHEATER, LIME	
☑ WY-0046	BLACK HILLS POWER AND LIGHT COMPANY-NEIL SIMPSON U BLACK HILLS POWER AND LIGHT COMPANY-NEIL SIMPSON U	90.011	SILO, COAL STORAGE, TOP	CT-1028 04/14/1993
		90.011	SILO, COAL STORAGE, BOTTOM	
		90.011	BOILER BUILDING	
		90.999	FLY ASH TRANSFER/HANDLING BUILDING	
		90.019	SILO, LIME STORAGE	
		90.999	MATERIAL HANDLING, FLY ASH AND FGD BYPRODUCT	
		11.110	BOILER, PULVERIZED COAL FIRED STEAM ELECTRIC POWER	
		13.220	BOILER, AUXILIARY, DISTILLATE OIL	
AK-0024	GOLDEN VALLEY ELECTRIC ASSOCIATION - HEALY GOLDEN VALLEY ELECTRIC ASSOCIATION - HEALY	90.019	LIMESTONE PRIMARY CRUSHER & STORAGE SILO	9231-AA007 03/10/1993
		99.999	HAUL ROADS	

		29.999 FLYASH STORAGE SILO	
		90.011 COAL STORAGE PILE	
		90.011 COAL, PRIMARY CRUSHER & HANDLING SYSTEM	
		12.110 BOILER, PULVERIZED COAL (CLEAN COAL TECHNOLOGY)	
☑ *KY-0064	DRAVO LIME COMPANY - KY ROUTE 10 DRAVO LIME COMPANY - KY ROUTE 10	90.019 KILN, ROTARY LIME (2)	C-93-024 03/09/1993
		90.019 MATERIAL HANDLING, LIME	
☑ VA-0196	TEXASGULF, INC. TEXASGULF, INC.	90.011 COAL UNLOADING	10813 02/23/1993
		90.026 BULK PRODUCT LOADING	
		90.024 RAW MATERIAL BELT TRANSFER	
		90.019 LIME UNLOADING	
		90.026 KILN FEED MIX PRODUCTION	
		90.026 #3 KILN DEFLUORINATION	
		90.026 CLINKER CONVEYING	
		90.026 PRODUCT SIZING AND DEDUSTING	
		90.026 PRODUCT STORAGE	
		90.026 PRODUCT STORAGE - #3 SILO	
		90.026 PHOSPHATE ROCK UNLOADING	
		90.024 MATERIAL TRANSFER/HANDLING, SODA ASH & SAND	
☑ VA-0190	BEAR ISLAND PAPER COMPANY, L.P. BEAR ISLAND PAPER COMPANY, L.P.	12.310 BURNER, DUCT	50840 10/30/1992
		15.007 TURBINE, COMBUSTION GAS (TOTAL)	
		30.004 MATERIAL TRANSFER/HANDLING, BARK	
		30.004 MATERIAL TRANSFER/HANDLING, CHIP	
		90.011 MATERIAL TRANSFER/HANDLING, COAL	
		90.019 MATERIAL STORAGE, LIME SILOS	
		90.999 MATERIAL TRANSFER/HANDLING, ASH	
		15.007 TURBINE, COMBUSTION GAS	
		15.007 TURBINE, COMBUSTION GAS	
		12.310 BURNER, DUCT	
		11.220 BOILER, PACKAGE, NO. 2 FUEL OIL	
		14.200 BOILER, PACKAGE (TOTAL)	
		12.310 BURNER, DUCT (TOTAL)	
		15.999 TURBINE, COMBUSTION GAS & DUCT BURNER (TOTAL)	
		11.310 BOILER, CIRCULATING FLUIDIZED COMBUSTION	
		11.310 BOILER, PACKAGE, NATURAL GAS FUEL	
		11.220 BOILER, B & W	
		30.004 DEBARKING FACILITY	
		30.004 THERMO MECHANICAL LINES (4) - EXISTING	
		30.004 THERMO MECHANICAL LINES (2) - NEW	
☑ WI-0062	WESTERN LIME AND CEMENT CO. WESTERN LIME AND CEMENT CO.	90.019 KILN, LIME, P38,S18	90-MWH-060 04/30/1992
☑ UT-0055	CONTINENTAL LIME INC. - CRICKET MTN. LIME PLANT CONTINENTAL LIME INC. - CRICKET MTN. LIME PLANT	90.019 KILN, #3	DAQE-021-92 01/07/1992

Select a Report Format

[illegible]atting your report may take a while, especially if your facility has a large number of processes and pollutants. The detail reports take the longest amount of time because they include the most information. Please be patient after you select "Create report".

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Process Index Report(Ordered by Company Name) ▾ [Create report] [Help]

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For information about the pollutants related to this process, click on the Pollutant Information button above.

Process Information - Details Help

DRAFT

ID/Company: LA-0122 / INTERNATIONAL PAPER - MANSFIELD MILL
Plant Name:
Process: LIME KILN

Primary Fuel:
Throughput: 142 MMBTU/H
Process Code: 90.019
SCC Code: 30700106
Compliance Verified? No
Verification Method

Stack Testing: No
Inspections: No
Calculation: No
Other Method: No
Description:

Process Notes: EMISSION POINT 03-78

Pollutant Information - List of Pollutants Help

Pollutant	Primary Emission Limit	Basis
PM10	39.2 LB/H	BACT-PSD
SO2	8.4 LB/H	BACT-PSD
NOX	103.7 LB/H	BACT-PSD
CO	2 LB/H	BACT-PSD
VOC	8.3 LB/H	BACT-PSD
TRS	6.5 PPM	BACT-PSD

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Process / Pollutant Information

Click on the Pollutant Information button to return to the list of pollutants for this process or click on the Process Information button to return to the list of processes.

Pollutant Information

Help

ID/Company: LA-0122 / INTERNATIONAL PAPER - MANSFIELD MILL
Plant Name:
Process: LIME KILN

Pollutant: NOX ←
CAS Number: 10102
Pollution Prevention/Add-on Control Equipment/Both/No Controls Feasible: P
P2/Add-on Description: GOOD PROCESS CONTROLS, WATER CONTENT OF LIME

P indicates Pollution Prevention

Ranking Information: not provided

EMISSION LIMITS:
Basis: BACT-PSD
Emission Limit 1: 103.7000 LB/H
Emission Limit 2: 437.4000 T/Y
Standardized:
Percent Efficiency:
Emission Type: P

COST DATA: Verified by Agency? No
Year Used in Cost Estimates:
Capital Cost of Control Equip: $ 0
Annualized Cost: $ 0
Cost Effectiveness: 0 $/ton

Pollutant Notes:

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For information about the pollutants related to this process, click on the Pollutant Information button above.

Process Information - Details

Help

FINAL

ID/Company:AR-0034 / ARKANSAS LIME COMPANY
Plant Name:
Process: LIME MANUFACTURING - ROTARY LIME KILN, NO. 2

Primary Fuel: NATURAL GAS
Throughput: 600 T/D
Process Code: 90.019
SCC Code: 30501604
Compliance Verified? No
Verification Method

Stack Testing: No
Inspections: No
Calculation: No
Other Method: No
Description:

Pollutant Information - List of Pollutants

Help

Pollutant	Primary Emission Limit	Basis
PM	83.9 T/YR	BACT-PSD
SO2	227 T/YR	BACT-PSD
VOC	14.2 T/YR	OTHER
CO	342 T/YR	OTHER
→ NOX	399.3 T/YR	BACT-PSD

Process Notes: ONLY NATURAL GAS IS AUTHORIZED FOR KILN 2, COKE/COAL ARE LIMITED

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Process / Pollutant Information

Click on the Pollutant Information button to return to the list of pollutants for this process or click on the Process Information button to return to the list of processes.

Pollutant Information Help

ID/Company: AR-0034 / ARKANSAS LIME COMPANY
Plant Name:
Process: LIME MANUFACTURING - ROTARY LIME KILN, NO. 2

Pollutant: NOX ← **CAS Number:** 10102

Pollution Prevention/Add-on Control Equipment/Both/No Controls Feasible: N

N indicates No Controls Feasible

P2/Add-on Description:

Ranking Info: Number Considered: 6
Rank Selected: 6

EMISSION LIMITS:

Basis:	BACT-PSD
Emission Limit 1:	399.3000 T/YR
Emission Limit 2:	3.6500 LB/T
Standardized:	
Percent Efficiency:	
Emission Type:	P

COST DATA: Verified by Agency? Yes
Year Used in Cost Estimates:
Capital Cost of Control Equip: $ 0
Annualized Cost: $ 0
Cost Effectiveness: 0 $/ton

Pollutant Notes:

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For information about the pollutants related to this process, click on the Pollutant Information button above.

Process Information - Details Help

FINAL

ID/Company: AR-0028 / ARKANSAS LIME COMPANY
Plant Name: ARKANSAS LIME COMPANY
Process: KILN, LIME

Primary Fuel:	COAL/COKE
Throughput:	625 T/D LIME
Process Code:	90.019
SCC Code:	3-05-016-04
Compliance Verified?	No
Verification Method	
Stack Testing:	Yes
Inspections:	Yes
Calculation:	No
Other Method:	Yes
Description:	OXYGEN MONITOR

Pollutant Information - List of Pollutants Help

Pollutant	Primary Emission Limit	Basis
SO2	65.2 LB/H	BACT-PSD
NOX	91.2 LB/H	BACT-PSD

Process Notes: NEW COAL/COKE FIRED ROTARY LIME KILN. NATURAL GAS MAY ALSO BE USED TO FIRE THE KILN.

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Process/Pollutant Information

Click on the Pollutant Information button to return to the list of pollutants for this process or click on the Process Information button to return to the list of processes.

Pollutant Information Help

FINAL

ID/Company: AR-0028 / ARKANSAS LIME COMPANY
Plant Name: ARKANSAS LIME COMPANY
Process: KILN, LIME

Pollutant: NOX ←   CAS Number: 10102

Pollution Prevention/Add-on Control Equipment/Both/No Controls Feasible: P

P2/Add-on Description: PROPER DESIGN AND OPERATION OF LIME KILN

nking Info: Number Considered: 5
Rank Selected:

EMISSION LIMITS:
Basis: BACT-PSD
Emission Limit 1: 91.2000 LB/H
Emission Limit 2: 3.5000 LB/T OF LIME
Standardized:
Percent Efficiency:
Emission Type: P

COST DATA: Verified by Agency? No
Year Used in Cost Estimates:
Capital Cost of Control Equip: $ 0
Annualized Cost: $ 0
Cost Effectiveness: 0 $/ton

Pollutant Notes:

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For information about the pollutants related to this process, click on the Pollutant Information button above.

Process Information - Details Help

FINAL

ID/Company: SC-0053 / PALMETTO LIME, LLC
Plant Name:
Process: VERTICAL SHAFT KILNS (LIME MANUFACTURING)

Primary Fuel:
Throughput: 1200 T/D
Process Code: 90.019
SCC Code: 30501603
Compliance Verified? No
Verification Method

Stack Testing: No
Inspections: No
Calculation: No
Other Method: No
Description:

Pollutant Information - List of Pollutants Help

Pollutant	Primary Emission Limit	Basis
PM10	.12 LB/T	BACT-PSD
→ NOX	2.2 LB/T	BACT-PSD
SO2	.71 LB/T	BACT-PSD

Process Notes: PSD DETERMINATION FOR PM10, NOX AND SO2 ONLY.

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Process/ Pollutant Information

Click on the Pollutant Information button to return to the list of pollutants for this process or click on the Process Information button to return to the list of processes.

Pollutant Information Help

FINAL

ID/Company: SC-0053 / PALMETTO LIME, LLC
Plant Name:
Process: VERTICAL SHAFT KILNS (LIME MANUFACTURING)

Pollutant: NOX ← CAS Number: 10102

Pollution Prevention/Add-on Control Equipment/Both/No Controls Feasible: N

P2/Add-on Description:

[illegible]king Information: not provided

[illegible]SSION LIMITS:

[illegible]sis: BACT-PSD

Emission Limit 1: 2.2000 LB/T

Emission Limit 2:

Standardized:

Percent Efficiency:

Emission Type: P

COST DATA: Verified by Agency? No

Year Used in Cost Estimates:

Capital Cost of Control Equip: $ 0

Annualized Cost: $ 0

Cost Effectiveness: 0 $/ton

Pollutant Notes:

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Process / Pollutant Information

For information about the pollutants related to this process, click on the Pollutant Information button above.

Process Information - Details Help

FINAL

ID/Company: MT-0012 / CONTINENTAL LIME INC.
Plant Name:
Process: KILN-LIME, TWO

Primary Fuel:
Throughput: 0
Process Code: 90.019
SCC Code: 30501605
Compliance Verified? No
Verification Method

Stack Testing: No
Inspections: No
Calculation: No
Other Method: No
Description:

Pollutant Information - List of Pollutants Help

Pollutant	Primary Emission Limit	Basis
PM	.05 LB/T OF LIMESTONE	BACT-PSD
SO2	63.5 LB/H EACH	BACT-PSD
NOX	77.5 LB/H EACH	BACT-PSD
CO	131 LB/H EACH KILN	BACT-PSD
VOC	1.25 LB/H EACH KILN	BACT-PSD

Process Notes: TWO CYCLONES, 62000 ACFM AT 580F AT THE END OF EACH KILN (TOTAL OF FOUR CYCLONES). THE DISCHARGE PASSES TO THE BAGHOUSES.

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Click on the Pollutant Information button to return to the list of pollutants for this process or click on the Process Information button to return to the list of processes.

Pollutant Information

Help

FINAL

ID/Company: MT-0012 / CONTINENTAL LIME INC.
Plant Name:
Process: KILN-LIME, TWO

Pollutant: NOX ←
CAS Number: 10102

Pollution Prevention/Add-on Control Equipment/Both/No Controls Feasible: A

P2/Add-on Description: BAGHOUSES, 75000 ACFM AT 470F WITH APPROX. 17000 SQ.FT AND AN AIR-TO-CLOTH RATIO OF 4:4:1.

[illegible]king Info: Number Considered: 0
Rank Selected: 0

EMISSION LIMITS:
Basis: BACT-PSD
Emission Limit 1: 77.5000 LB/H EACH
Emission Limit 2: 0.0000
Standardized: 0.0000
Percent Efficiency: 0
Emission Type: P

COST DATA: Verified by Agency? No
Year Used in Cost Estimates:
Capital Cost of Control Equip: $ 0
Annualized Cost: $ 0
Cost Effectiveness: 0 $/ton

Pollutant Notes:

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For information about the pollutants related to this process, click on the Pollutant Information button above.

Process Information - Details Help

FINAL

ID/Company: AL-0102 / DRAVO LIME COMPANY-LONGVIEW DIVISION
Plant Name:
Process: CHEMICAL LIME MANUFACTURING

Primary Fuel:	
Throughput:	113 T/H
Process Code:	90.019
SCC Code:	3-05-016-04
Compliance Verified?	No
Verification Method	
Stack Testing:	No
Inspections:	No
Calculation:	No
Other Method:	No
Description:	

Pollutant Information - List of Pollutants Help

Pollutant	Primary Emission Limit	Basis
PM	.015 GR/DSCF	BACT-PSD
NO2	3.1 LB/T	BACT-PSD
SO2	64.2 LB/H	BACT-PSD
CO	1.5 LB/T	BACT-PSD

Process Notes: COMPLIANCE VERIFICATION FOLLOWING START-UP.

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Process / Pollutant Information

Click on the Pollutant Information button to return to the list of pollutants for this process or click on the Process Information button to return to the list of processes.

Pollutant Information

Help

ID/Company: AL-0102 / DRAVO LIME COMPANY-LONGVIEW DIVISION
Plant Name:
Process: CHEMICAL LIME MANUFACTURING

Pollutant: NO2 ←
CAS Number: 10102-44-0

Pollution Prevention/Add-on Control Equipment/Both/No Controls Feasible: B

P2/Add-on Description: PROPER KILN DESIGN AND OPERATION PLUS BAGHOUSE

Ranking Info: Number Considered: 6
Rank Selected: 6

EMISSION LIMITS:

Basis:	BACT-PSD
Emission Limit 1:	3.1000 LB/T
Emission Limit 2:	167.9000 LB/H
Standardized:	0.0000
Percent Efficiency:	0
Emission Type:	P

COST DATA: Verified by Agency? No
Year Used in Cost Estimates:
Capital Cost of Control Equip: $ 0
Annualized Cost: $ 0
Cost Effectiveness: 0 $/ton

Pollutant Notes:

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Process/ Pollutant Information

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Process Information - Details

Help

FINAL

ID/Company: MT-0008 / CONTINENTAL LIME INC.
Plant Name:
Process: KILNS, LIME 2

Primary Fuel:
Throughput: 106 MMBTU/H EACH
Process Code: 90.019
SCC Code: 3-05-016-04
Compliance Verified? No
Verification Method

Stack Testing: No
Inspections: No
Calculation: No
Other Method: No
Description:

Pollutant Information - List of Pollutants

Help

Pollutant	Primary Emission Limit	Basis
SO2	63.5 LB/H EACH KILN	BACT-PSD

Process Notes: THERE ARE TWO KILNS OF THE SAME SIZE.

No limit on NOx

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For information about the pollutants related to this process, click on the Pollutant Information button above.

Process Information - Details

Help

FINAL

ID/Company: WI-0090 / WESTERN LIME CORPORATION
Plant Name:
Process: LIME KILN #2, P38, S18

Primary Fuel: COAL
Throughput: 123.3 MMBTU/H
Process Code: 90.019
SCC Code: 30501620
Compliance Verified? No
Verification Method

Stack Testing: No
Inspections: No
Calculation: No
Other Method: No
Description:

Pollutant Information - List of Pollutants

Help

Pollutant	Primary Emission Limit	Basis
PM	.006 GR/DSCF	BACT-PSD

Process Notes: THE LIME KILN (P38) IS A ROTARY KILN WITH A HEAT INPUT OF 123.3 MMBTU PER HOUR. THE MAXIMUM THROUGHPUT OF THE KILN AFTER MODIFICATION WILL BE 500 TONS PER DAY (20.8 TONS PER HOUR). LOW SULFUR BITUMINOUS COAL IS USED AS FUEL TO SUPPLY ENERGY THAT IS NECESSARY FOR THE CALCINATION OF THE LIMESTONE TO PRODUCE LIME.

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Process Information - Details

Help

FINAL

ID/Company: AL-0082 / CHEMICAL LIME COMPANY OF ALABAMA, INC. - O'NEAL QU
Plant Name:
Process: LIME MANUFACTURING

Primary Fuel: COAL/COKE BLEND
Throughput: 113 T/H STONE FEED
Process Code: 90.019
SCC Code: 3-05-016-04
Compliance Verified? No
Verification Method

Stack Testing: No
Inspections: No
Calculation: No
Other Method: No
Description:

Pollutant Information - List of Pollutants

Help

Pollutant	Primary Emission Limit	Basis
PM	.015 GR/DSCF	BACT-PSD
SO2	115.4 LB/H	BACT-PSD
NO2	3.5 LB/T LIME PRODUCED	BACT-PSD
CO	1.5 LB/T LIME PRODUCED	BACT-PSD
VE	15 % OPACITY	NSPS

Process Notes: COMPLIANCE VERIFICATION UPON START-UP

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Pollutant Information Help

ID/Company: AL-0082 / CHEMICAL LIME COMPANY OF ALABAMA, INC. - O'NEAL QU
Plant Name:
Process: LIME MANUFACTURING

Pollutant: NO2 CAS Number: 10102-44-0

Pollution Prevention/Add-on Control Equipment/Both/No Controls Feasible: P

P2/Add-on Description: PROPER KILN DESIGN AND OPERATION

Ranking Info: Number Considered: 6
Rank Selected: 6

EMISSION LIMITS:

Basis:	BACT-PSD
Emission Limit 1:	3.5000 LB/T LIME PRODUCED
Emission Limit 2:	196.9000 LB/H
Standardized:	0.0000
Percent Efficiency:	0
Emission Type:	P

COST DATA: Verified by Agency? No
Year Used in Cost Estimates:
Capital Cost of Control Equip: $ 0
Annualized Cost: $ 0
Cost Effectiveness: 0 $/ton

Pollutant Notes:

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Process/ Pollutant Information

For information about the pollutants related to this process, click on the Pollutant Information button above.

Process Information - Details

Help

FINAL

ID/Company: MT-0006 / CONTINENTAL LIME-INDIAN CREEK OP'N
Plant Name:
Process: LIME KILNS

Primary Fuel:
Throughput: 500 TPD CAO EACH
Process Code: 90.019
SCC Code: 3-05-016-03
Compliance Verified? No
Verification Method

Stack Testing: No
Inspections: No
Calculation: No
Other Method: No
Description:

Process Notes:

Pollutant Information - List of Pollutants

Help

Pollutant	Primary Emission Limit	Basis
SO2	31.8 LBS/HR	BACT-PSD
NOX	77.5 LBS/HR	BACT-PSD
CO	131 LBS/HR	BACT-PSD

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Process / Pollutant Information

Click on the Pollutant Information button to return to the list of pollutants for this process or click on the Process Information button to return to the list of processes.

Pollutant Information

Help

ID/Company: MT-0006 / CONTINENTAL LIME-INDIAN CREEK OP'N
Plant Name:
Process: LIME KILNS

Pollutant: NOX ←
CAS Number: 10102

Pollution Prevention/Add-on Control Equipment/Both/No Controls Feasible: N

P2/Add-on Description:

Ranking Info: Number Considered: 4
Rank Selected: 4

EMISSION LIMITS:

Basis:	BACT-PSD
Emission Limit 1:	77.5000 LBS/HR
Emission Limit 2:	0.0000
Standardized:	0.0000
Percent Efficiency:	0
Emission Type:	P

COST DATA: Verified by Agency? No
Year Used in Cost Estimates:
Capital Cost of Control Equip: $ 0
Annualized Cost: $ 0
Cost Effectiveness: 0 $/ton

Pollutant Notes:

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Process / Pollutant Information

For information about the pollutants related to this process, click on the Pollutant Information button above.

Process Information - Details Help

FINAL

ID/Company: UT-0054 / CONTINENTAL LIME INC. - CRICKET MTN. LIME PLANT
Plant Name:
Process: KILN, #4

Primary Fuel:	NATURAL GAS
Throughput:	1200 T/D, LIME
Process Code:	90.019
SCC Code:	30501604
Compliance Verified?	No
Verification Method	

Stack Testing:	No
Inspections:	No
Calculation:	No
Other Method:	No
Description:	

Pollutant Information - List of Pollutants Help

Pollutant	Primary Emission Limit	Basis
PM10	13.4 LB/H	BACT-PSD
SO2	38.4 LB/H	BACT-PSD
→ NO2	200 LB/H	BACT-PSD

Process Notes: EMISSIONS CONTROLLED BY A BAGHOUSE

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Process/Pollutant Information

Click on the Pollutant Information button to return to the list of pollutants for this process or click on the Process Information button to return to the list of processes.

Pollutant Information

Help

ID/Company: UT-0054 / CONTINENTAL LIME INC. - CRICKET MTN. LIME PLANT
Plant Name:
Process: KILN, #4

Pollutant: NO2 ←
CAS Number: 10102-44-0

Pollution Prevention/Add-on Control Equipment/Both/No Controls Feasible: N

P2/Add-on Description:

Ranking Info: Number Considered: 0
Rank Selected: 0

EMISSION LIMITS:

Basis:	BACT-PSD
Emission Limit 1:	200.0000 LB/H
Emission Limit 2:	0.0000
Standardized:	4.0000 LB/T
Percent Efficiency:	0
Emission Type:	P

COST DATA: Verified by Agency? No
Year Used in Cost Estimates:
Capital Cost of Control Equip: $ 0
Annualized Cost: $ 0
Cost Effectiveness: 0 $/ton

Pollutant Notes:

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For information about the pollutants related to this process, click on the Pollutant Information button above.

Process Information - Details Help

FINAL

ID/Company: PA-0131 / J.E. BAKER COMPANY
Plant Name:
Process: KILN #1, COAL/COKE DIRECT-FIRED FULLER ROTARY

Primary Fuel: COAL/COKE
Throughput: 336 TPD PRODUCT
Process Code: 90.019
SCC Code: 3-90-002-03
Compliance Verified? No
Verification Method

Stack Testing: No
Inspections: No
Calculation: No
Other Method: No
Description:

Pollutant Information - List of Pollutants Help

Pollutant	Primary Emission Limit	Basis
→ NOX	34 LB/TON PRODUCT	RACT

Process Notes: EMISSION LIMITS BASED ON STACK TEST RESULTS

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Pollutant Information Help

ID/Company: PA-0131 / J.E. BAKER COMPANY
Plant Name:
Process: KILN #1, COAL/COKE DIRECT-FIRED FULLER ROTARY

Pollutant: NOX ← CAS Number: 10102

Pollution Prevention/Add-on Control Equipment/Both/No Controls Feasible: N

P2/Add-on Description: ANNUAL TESTING REQUIRED

Ranking Info: Number Considered: 4
Rank Selected: 0

EMISSION LIMITS:
Basis: RACT
Emission Limit 1: 34.0000 LB/TON PRODUCT
Emission Limit 2: 0.0000
Standardized: 0.0000
Percent Efficiency: 0
Emission Type: P

COST DATA: Verified by Agency? No
Year Used in Cost Estimates:
Capital Cost of Control Equip: $ 0
Annualized Cost: $ 0
Cost Effectiveness: 0 $/ton

Pollutant Notes:

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For information about the pollutants related to this process, click on the Pollutant Information button above.

Process Information - Details Help

FINAL

ID/Company: PA-0131 / J.E. BAKER COMPANY
Plant Name:
Process: KILN #2, COAL/COKE DIRECT-FIRED KFS ROTARY

Primary Fuel:	COAL/COKE
Throughput:	540 TPD PRODUCT
Process Code:	90.019
SCC Code:	3-90-002-03
Compliance Verified?	No
Verification Method	
Stack Testing:	No
Inspections:	No
Calculation:	No
Other Method:	No
Description:	

Pollutant Information - List of Pollutants Help

Pollutant	Primary Emission Limit	Basis
→ NOX	38 LB NOX/TON PRODUCT	RACT

Process Notes: EMISSION LIMITS BASED ON STACK TEST RESULTS

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Pollutant Information Help

ID/Company: PA-0131 / J.E. BAKER COMPANY
Plant Name:
Process: KILN #2, COAL/COKE DIRECT-FIRED KFS ROTARY

Pollutant: NOX ← CAS Number: 10102
Pollution Prevention/Add-on Control Equipment/Both/No Controls Feasible: N
P2/Add-on Description: ANNUAL TESTING REQUIRED

Ranking Info: Number Considered: 4
Rank Selected: 0

EMISSION LIMITS:

Basis:	RACT
Emission Limit 1:	38.0000 LB NOX/TON PRODUCT
Emission Limit 2:	0.0000
Standardized:	0.0000
Percent Efficiency:	0
Emission Type:	P

COST DATA: Verified by Agency? No
Year Used in Cost Estimates:
Capital Cost of Control Equip: $ 0
Annualized Cost: $ 0
Cost Effectiveness: 0 $/ton

Pollutant Notes:

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Process Information - Details Help

FINAL

ID/Company: MO-0038 / CHEMICAL LIME CO
Plant Name:
Process: BUILD & OPERATE A 2700(TPD) LIME MANUFACTURE PLANT

Primary Fuel:	LOW SULFUR FUEL
Throughput:	2700 TPD OF LIME
Process Code:	90.019
SCC Code:	3-05-016
Compliance Verified?	No
Verification Method	
Stack Testing:	No
Inspections:	No
Calculation:	No
Other Method:	No
Description:	TEST RESULTS 7/30/97

Pollutant Information - List of Pollutants Help

Pollutant	Primary Emission Limit	Basis
NO2	1 LB/TON OF FEED	BACT-PSD
SO2	90 LB/HR	BACT-PSD
PM10 (LIME KILNS)	.015 GR/DSCF @ 7% OXYGEN	BACT-PSD
CO	56.3 LB/HR	BACT-PSD
PM10 (HAUL ROAD)	0 SEE P2	BACT-PSD

Process Notes: BAGHOUSES, LOW SULFUR FUEL BLEND, & MAGNESIUM CHLORIDE WILL BE USED TO KEEP EMISSIONS DOWN.

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Click on the Pollutant Information button to return to the list of pollutants for this process or click on the Process Information button to return to the list of processes.

Pollutant Information Help

FINAL

ID/Company: MO-0038 / CHEMICAL LIME CO
Plant Name:
Process: BUILD & OPERATE A 2700(TPD) LIME MANUFACTURE PLANT

Pollutant: NO2 ←
CAS Number: 10102-44-0

Pollution Prevention/Add-on Control Equipment/Both/No Controls Feasible: A

P2/Add-on Description: PROPER KILN DESIGN & OPERATE, LOW EXCESS AIR WITH COMPUTERIZED CONTROLS. TO ENSURE LOW EXCESS OF AIRAN O2 CEM WILL BE REQUIRED IN COMBUSTION ZONE.

[illegible]king Info: Number Considered: 5
Rank Selected: 5

EMISSION LIMITS:
Basis: BACT-PSD
Emission Limit 1: 1.0000 LB/TON OF FEED
Emission Limit 2: 0.0000
Standardized: 0.0000
Percent Efficiency: 0
Emission Type: P

COST DATA: Verified by Agency? No
Year Used in Cost Estimates: 1994
Capital Cost of Control Equip: $ 0
Annualized Cost: $ 0
Cost Effectiveness: 0 $/ton

Pollutant Notes:

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For information about the pollutants related to this process, click on the Pollutant Information button above.

Process Information - Details Help

DRAFT

ID/Company: TN-0097 / TENN LUTTRELL COMPANY
Plant Name:
Process: VERTICAL SHAFT LIME KILN

Primary Fuel: COAL, COKE
Throughput: 370 T/D
Process Code: 90.019
SCC Code: 3-05-016-03
Compliance Verified? No
Verification Method

Stack Testing: No
Inspections: No
Calculation: No
Other Method: No
Description:

Pollutant Information - List of Pollutants Help

Pollutant	Primary Emission Limit	Basis
CO	41.63 LB/H	BACT-PSD
NOX	31.14 LB/H	BACT-PSD
PM10	1.85 LB/H	BACT-PSD
SO2	7.71 LB/H	BACT-PSD
TSP	3.24 LB/H	BACT-PSD
VE	10 % OPAC	OTHER
VOC	6.3 LB/H	OTHER

Process Notes: CONSISTS OF TWO IDENTICAL KILNS. THROUGHPUT AND EMISSION LIMITS ARE FOR EACH KILN. SULFUR CONTENT OF FUEL OIL LIMITED TO 3% BY WEIGHT.

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Pollutant Information Help

ID/Company: TN-0097 / TENN LUTTRELL COMPANY
Plant Name:
Process: VERTICAL SHAFT LIME KILN

Pollutant: NOX ← **CAS Number:** 10102

Pollution Prevention/Add-on Control Equipment/Both/No Controls Feasible: P

P2/Add-on Description: INHERENT DESIGN OF THE VERTICAL SHAFT KILN

Ranking Info: Number Considered: 6
Rank Selected: 2

EMISSION LIMITS:
Basis: BACT-PSD
Emission Limit 1: 31.1400 LB/H
Emission Limit 2: 2.0200 LB/T LIME PRODUCED
Standardized:
Percent Efficiency:
Emission Type: P

COST DATA: Verified by Agency? No
Year Used in Cost Estimates:
Capital Cost of Control Equip: $ 0
Annualized Cost: $ 0
Cost Effectiveness: 0 $/ton

Pollutant Notes:

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Process / Pollutant Information

For information about the pollutants related to this process, click on the Pollutant Information button above.

Process Information - Details

Help

FINAL

ID/Company: WI-0082 / CLM CORP.
Plant Name:
Process: KILN, LIME (4)

Primary Fuel:	
Throughput:	36 T/H INPUT
Process Code:	90.019
SCC Code:	30501604
Compliance Verified?	No
Verification Method	
Stack Testing:	No
Inspections:	No
Calculation:	No
Other Method:	No
Description:	

Process Notes:

Pollutant Information - List of Pollutants

Help

Pollutant	Primary Emission Limit	Basis
PM	.12 LB/T STONE FEED	BACT-OTHER
SO2	5.97 LB/T STONE FEED	BACT-OTHER
NOX	56 LB/H	BACT-OTHER
CO	102 LB/H	BACT-OTHER

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Process / Pollutant Information

Click on the Pollutant Information button to return to the list of pollutants for this process or click on the Process Information button to return to the list of processes.

Pollutant Information

Help

ID/Company: WI-0082 / CLM CORP.
Plant Name:
Process: KILN, LIME (4)

Pollutant: NOX ← CAS Number: 10102

Pollution Prevention/Add-on Control Equipment/Both/No Controls Feasible: P

P2/Add-on Description: COMBUSTION CONTROL

Ranking Info: Number Considered: 4
Rank Selected: 1

EMISSION LIMITS:

Basis:	BACT-OTHER
Emission Limit 1:	56.0000 LB/H
Emission Limit 2:	0.0000
Standardized:	0.0000
Percent Efficiency:	0
Emission Type:	P

COST DATA: Verified by Agency? No
Year Used in Cost Estimates:
Capital Cost of Control Equip: $ 0
Annualized Cost: $ 0
Cost Effectiveness: 0 $/ton

Pollutant Notes:

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For information about the pollutants related to this process, click on the Pollutant Information button above.

Process Information - Details

Help

DRAFT

ID/Company: KY-0062 / NEW RIVER LIME, INC.
Plant Name:
Process: KILN, ROTARY LIME (4)

Primary Fuel:
Throughput: 46 T/H
Process Code: 90.019
SCC Code: 3-05-016-04
Compliance Verified? No
Verification Method

Stack Testing: No
Inspections: No
Calculation: No
Other Method: Yes
Description: NSPS METHOD 22

Pollutant Information - List of Pollutants

Help

Pollutant	Primary Emission Limit	Basis
PM10	.02 GR/ACF	BACT-PSD
NOX	96 LB/H	BACT-PSD
SO2	23.33 LB/H	BACT-PSD
CO	42 LB/H	BACT-PSD
BE	2.87 E-5 LB/H	BACT-PSD
VE	15 % OPACITY (LESS)	BACT-PSD

Process Notes: LIME PRODUCTION - 4 ROTARY LIME KILNS LIMESTONE QUARRY AND PROCESSING - LIME HANDLING - LOG #C078 THROUGHPUT: 46 TON/HR CAO OUTPUT AND 403,000 TON/YR (EACH KILN) HEAT INPUT 4.5 MMBTU/TON, 92 TON/HR LIMESTONE INPUT

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Process/ Pollutant Information

Click on the Pollutant Information button to return to the list of pollutants for this process or click on the Process Information button to return to the list of processes.

Pollutant Information Help

ID/Company: KY-0062 / NEW RIVER LIME, INC.
Plant Name:
Process: KILN, ROTARY LIME (4)

Pollutant: NOX ← **CAS Number:** 10102

Pollution Prevention/Add-on Control Equipment/Both/No Controls Feasible: P

P2/Add-on Description: LOW NOX BURNERS

Ranking Info: Number Considered: 4
Rank Selected: 1

EMISSION LIMITS:

Basis:	BACT-PSD
Emission Limit 1:	96.0000 LB/H
Emission Limit 2:	402.5000 T/YR
Standardized:	0.0000
Percent Efficiency:	0
Emission Type:	P

COST DATA: Verified by Agency? No
Year Used in Cost Estimates:
Capital Cost of Control Equip: $ 0
Annualized Cost: $ 0
Cost Effectiveness: 0 $/ton

Pollutant Notes:

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Process/ Pollutant Information

For information about the pollutants related to this process, click on the Pollutant Information button above.

Process Information - Details

Help

DRAFT

ID/Company: KY-0065 / DRAVO LIME COMPANY - KY ROUTE 8
Plant Name:
Process: KILN, ROTARY LIME (3)

Primary Fuel:	LIMESTONE
Throughput:	46 T/H
Process Code:	90.019
SCC Code:	3-05-016-04
Compliance Verified?	No
Verification Method	

Stack Testing:	No
Inspections:	No
Calculation:	No
Other Method:	Yes
Description:	NSPS METHOD 22

Pollutant Information - List of Pollutants

Help

Pollutant	Primary Emission Limit	Basis
PM10	.02 GR/ACF	BACT-PSD
CO	91.67 LB/H	BACT-PSD
SO2	22.97 LB/H	BACT-PSD
NOX	128.33 LB/H	BACT-PSD

Process Notes: ADD 3 ROTARY LIME KILNS AND ASSOCIATED EQUIPMENT AT EXISTING LIMESTONE PROCESSING AND LIME PRODUCTION PLANT - LOG #B921 THROUGHPUT: (EACH OF 3 KILNS) 386,400 TONS/YR CAO - 92 TONS/HR LIMESTONE INPUT (EACH KILN)

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Click on the Pollutant Information button to return to the list of pollutants for this process or click on the Process Information button to return to the list of processes.

Pollutant Information

Help

ID/Company: KY-0065 / DRAVO LIME COMPANY - KY ROUTE 8
Plant Name:
Process: KILN, ROTARY LIME (3)

Pollutant: NOX ← CAS Number: 10102

Pollution Prevention/Add-on Control Equipment/Both/No Controls Feasible: P

P2/Add-on Description: NOX REDUCTION FROM COMBUSTION - STANDARD COMBUSTION PROCI

Ranking Info: Number Considered: 5
Rank Selected: 5

EMISSION LIMITS:

Basis: BACT-PSD
Emission Limit 1: 128.3300 LB/H
Emission Limit 2: 539.0000 T/YR
Standardized: 0.0000
Percent Efficiency: 0
Emission Type: P

COST DATA: Verified by Agency? No
Year Used in Cost Estimates:
Capital Cost of Control Equip: $ 0
Annualized Cost: $ 0
Cost Effectiveness: 0 $/ton

Pollutant Notes:

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Process/ Pollutant Information

For information about the pollutants related to this process, click on the Pollutant Information button above.

Process Information - Details

Help

FINAL

ID/Company: VA-0210 / W. S. FREY COMPANY, INC.
Plant Name:
Process: KILN, LIME

Primary Fuel: COAL
Throughput: 182500 T/YR
Process Code: 90.019
SCC Code: 30501618
Compliance Verified? No
Verification Method

Stack Testing: No
Inspections: No
Calculation: No
Other Method: No
Description:

Pollutant Information - List of Pollutants

Help

Pollutant	Primary Emission Limit	Basis
SO2	111.9 LB/H	NSPS
NOX	58.3 LB/H	NSPS
CO	29.2 LB/H	NSPS
TSP	7.2 LB/H	NSPS
PM10	7.2 LB/H	NSPS

Process Notes: Rotary Lime Kiln, 10 Ft Dia by 350 Ft Length; 20.83 T/h Coal as Approved Fuel.

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Process/ Pollutant Information

Click on the Pollutant Information button to return to the list of pollutants for this process or click on the Process Information button to return to the list of processes.

Pollutant Information

Help

ID/Company: VA-0210 / W. S. FREY COMPANY, INC.
Plant Name:
Process: KILN, LIME

Pollutant: NOX
CAS Number: 10102

Pollution Prevention/Add-on Control Equipment/Both/No Controls Feasible: N

P2/Add-on Description:

Ranking Info: Number Considered: 0
Rank Selected: 0

EMISSION LIMITS:

Basis:	NSPS
Emission Limit 1:	58.3000 LB/H
Emission Limit 2:	256.0000 T/YR
Standardized:	0.0000
Percent Efficiency:	99
Emission Type:	P

COST DATA: Verified by Agency? No
Year Used in Cost Estimates:
Capital Cost of Control Equip: $ 0
Annualized Cost: $ 0
Cost Effectiveness: 0 $/ton

Pollutant Notes:

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Process / Pollutant Information

For information about the pollutants related to this process, click on the Pollutant Information button above.

Process Information - Details Help

DRAFT

ID/Company: IL-0052 / MISSISSIPPI LIME COMPANY
Plant Name:
Process: KILN, ROTARY, LIME

Primary Fuel:
Throughput: 2600 T/D
Process Code: 90.019
SCC Code: 30501604
Compliance Verified? No
Verification Method

Stack Testing: No
Inspections: No
Calculation: No
Other Method: No
Description:

Pollutant Information - List of Pollutants Help

Pollutant	Primary Emission Limit	Basis
PM	.02 GR/DSCF	BACT-PSD
SO2	1.57 LB/T FEED, S < 4%	BACT-PSD
NOX	.56 LB/T OF STEEL	BACT-PSD
VE	10 % OPACITY	BACT-PSD

Process Notes: 650 TON/DAY EACH AND OR PREHEATER KILNS 800 TONS/DAY EACH

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Process / Pollutant Information

Click on the Pollutant Information button to return to the list of pollutants for this process or click on the Process Information button to return to the list of processes.

Pollutant Information Help

ID/Company: *IL-0052* / MISSISSIPPI LIME COMPANY
Plant Name:
Process: KILN, ROTARY, LIME

Pollutant: NOX
CAS Number: 10102

Pollution Prevention/Add-on Control Equipment/Both/No Controls Feasible: P

P2/Add-on Description: LIME CALCINATION PROCESS

Ranking Info: Number Considered: 4
Rank Selected: 3

EMISSION LIMITS:

Basis:	BACT-PSD
Emission Limit 1:	0.5600 LB/T OF STEEL
Emission Limit 2:	1.0000 % O2 IN EXHAUST
Standardized:	0.0000
Percent Efficiency:	0
Emission Type:	P

COST DATA: Verified by Agency? No
Year Used in Cost Estimates:
Capital Cost of Control Equip: $ 0
Annualized Cost: $ 0
Cost Effectiveness: 0 $/ton

Pollutant Notes:

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For information about the pollutants related to this process, click on the Pollutant Information button above.

Process Information - Details Help

DRAFT

ID/Company: IL-0052 / MISSISSIPPI LIME COMPANY
Plant Name:
Process: KILN, PREHEATER, LIME

Primary Fuel:
Throughput: 800 T/D EACH
Process Code: 90.019
SCC Code: 30501699
Compliance Verified? No
Verification Method

Stack Testing: No
Inspections: No
Calculation: No
Other Method: No
Description:

Process Notes:

Pollutant Information - List of Pollutants Help

Pollutant	Primary Emission Limit	Basis
PM	.02 GR/DSCF	BACT-PSD
SO2	1.12 LB/T FEED, S < 4%	BACT-PSD
VE	15 % OPACITY	BACT-PSD

No Emission Limit on NOx

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For information about the pollutants related to this process, click on the Pollutant Information button above.

Process Information - Details Help

DRAFT

ID/Company: KY-0064 / DRAVO LIME COMPANY - KY ROUTE 10
Plant Name:
Process: KILN, ROTARY LIME (2)

Primary Fuel:	
Throughput:	46 T/H
Process Code:	90.019
SCC Code:	3-05-016-04
Compliance Verified?	No
Verification Method	

Stack Testing:	No
Inspections:	No
Calculation:	No
Other Method:	Yes
Description:	NSPS METHOD 22

Pollutant Information - List of Pollutants Help

Pollutant	Primary Emission Limit	Basis
PM10	.02 GR/ACF	BACT-PSD
CO	91.667 LB/H	BACT-PSD
NOX	90.292 LB/H	BACT-PSD
SO2	25.1 LB/H	BACT-PSD

Process Notes: ADD 2 ROTARY KILNS AND VERTICAL CALCINER AT EXISTING LINE PRODUCTION PLANT AND QUARRY WITH LIMESTONE PROCESSING - LOG #B685 - THROUGHPUT (EACH KILN AND CALCINER- 363,000 TONS/YR

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Process / Pollutant Information

Click on the Pollutant Information button to return to the list of pollutants for this process or click on the Process Information button to return to the list of processes.

Pollutant Information

Help

ID/Company: KY-0064 / DRAVO LIME COMPANY - KY ROUTE 10
Plant Name:
Process: KILN, ROTARY LIME (2)

Pollutant: NOX ← CAS Number: 10102

Pollution Prevention/Add-on Control Equipment/Both/No Controls Feasible: P

P2/Add-on Description: REDUCE NOX FROM COMBUSTION WITH NEW ROTARY KILN AND CALCI
PREHEATER KILNS (PROCESS EQUIPMENT)

Ranking Info: Number Considered: 5
Rank Selected: 5

EMISSION LIMITS:

Basis:	BACT-PSD
Emission Limit 1:	90.2920 LB/H
Emission Limit 2:	357.0000 T/YR
Standardized:	0.0000
Percent Efficiency:	0
Emission Type:	P

COST DATA: Verified by Agency? No
Year Used in Cost Estimates:
Capital Cost of Control Equip: $ 0
Annualized Cost: $ 0
Cost Effectiveness: 0 $/ton

Pollutant Notes:

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Process/ Pollutant Information

For information about the pollutants related to this process, click on the Pollutant Information button above.

Process Information - Details

Help

FINAL

ID/Company: WI-0062 / WESTERN LIME AND CEMENT CO.
Plant Name:
Process: KILN, LIME, P38,S18

Primary Fuel:
Throughput: 350 T/D
Process Code: 90.019
SCC Code:
Compliance Verified? No
Verification Method

Stack Testing: No
Inspections: No
Calculation: No
Other Method: No
Description:

Process Notes:

Pollutant Information - List of Pollutants

Help

Pollutant	Primary Emission Limit	Basis
PM	.6 LB/T OF FEED	NSPS
SO2	68.0999 LB/H	BACT-PSD
NOX	40.8 LB/H	BACT-PSD
CO	22.6 LB/H	OTHER
VE	15 % OPACITY	NSPS

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Process / Pollutant Information

Click on the Pollutant Information button to return to the list of pollutants for this process or click on the Process Information button to return to the list of processes.

Pollutant Information Help

ID/Company: WI-0062 / WESTERN LIME AND CEMENT CO.
Plant Name:
Process: KILN, LIME, P38,S18

Pollutant: NOX ←
CAS Number: 10102

Pollution Prevention/Add-on Control Equipment/Both/No Controls Feasible: P

P2/Add-on Description: DESIGN <1.1% O2 AT KILN OUTLET

Ranking Info: Number Considered: 0
Rank Selected: 0

EMISSION LIMITS:

Basis:	BACT-PSD
Emission Limit 1:	40.8000 LB/H
Emission Limit 2:	0.0000
Standardized:	0.0000
Percent Efficiency:	0
Emission Type:	

COST DATA: Verified by Agency? No
Year Used in Cost Estimates:
Capital Cost of Control Equip: $ 0
Annualized Cost: $ 0
Cost Effectiveness: 0 $/ton

Pollutant Notes:

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Process / Pollutant Information

For information about the pollutants related to this process, click on the Pollutant Information button above.

Process Information - Details Help

FINAL

ID/Company: UT-0055 / CONTINENTAL LIME INC. - CRICKET MTN. LIME PLANT
Plant Name:
Process: KILN, #3

Primary Fuel: NATURAL GAS
Throughput: 840 T/D, LIME
Process Code: 90.019
SCC Code: 30501604
Compliance Verified? No
Verification Method

Stack Testing: No
Inspections: No
Calculation: No
Other Method: No
Description:

Pollutant Information - List of Pollutants Help

Pollutant	Primary Emission Limit	Basis
PM10	7.54 LB/H	BACT-PSD
SO2	27.2 LB/H	BACT-PSD
NOX	160 LB/H	BACT-PSD

Process Notes: KILN EMISSIONS CONTROLLED BY BAGHOUSE

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Process / Pollutant Information

Click on the Pollutant Information button to return to the list of pollutants for this process or click on the Process Information button to return to the list of processes.

Pollutant Information Help

ID/Company: UT-0055 / CONTINENTAL LIME INC. - CRICKET MTN. LIME PLANT
Plant Name:
Process: KILN, #3

Pollutant: NOX ←
CAS Number: 10102

Pollution Prevention/Add-on Control Equipment/Both/No Controls Feasible: N

P2/Add-on Description:

Ranking Info: Number Considered: 0
Rank Selected: 0

EMISSION LIMITS:
Basis: BACT-PSD
Emission Limit 1: 160.0000 LB/H
Emission Limit 2: 0.0000
Standardized: 4.5700 LB/T
Percent Efficiency: 0
Emission Type: P

COST DATA: Verified by Agency? No
Year Used in Cost Estimates:
Capital Cost of Control Equip: $ 0
Annualized Cost: $ 0
Cost Effectiveness: 0 $/ton

Pollutant Notes:

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Appendix C
Meteorological Data

Table B-2. First 2 days of meterological data (ISC, Extended format, 1986)

12844 1986 12844 1986

yr	mo	day	hr	Random Flow Vector	Wind Speed (m/s)	Ambient Temperature (K)	Stability Category	Rural Mixing Height (m)	Urban Mixing Height (m)	Friction Velocity at the Application Site (m/s)	Monin-Obukhov Length at the Application Site (m)	Roughness Length at the Application Site (m)	Precipitation Amount (mm)	Precipitation Rate (mm/hr)	Global Horizontal Radiation (W/m²)	Relative Humidity (%)
86	1	1	1	181	0	288.2	7	1057.8	40	0	0	0.01	0	0	0	93
86	1	1	2	28	2.0578	287.6	6	1058.6	40	0.1984	29.7	0.01	0	0	0	97
86	1	1	3	4	2.0578	289.3	6	1059.4	40	0.1985	29.9	0.01	0	0	0	90
86	1	1	4	33	1.5433	289.8	7	1060.2	40	0.1482	25	0.01	0	0	0	90
86	1	1	5	53	1.5433	289.8	6	1061	40	0.1474	25	0.01	0	0	0	90
86	1	1	6	52	0	290.4	5	1061.7	40	0	0	0.01	0	0	0	90
86	1	1	7	15	2.0578	290.9	5	1062.5	40	0.199	33	0.01	0	0	0	93
86	1	1	8	33	2.5722	291.5	4	122.8	158.2	0.2569	-224.7	0.01	0	0	49	93
86	1	1	9	17	4.1155	294.3	4	280.3	309.8	0.4105	-401.2	0.01	0	0	107	87
86	1	1	10	181	3.0866	292.6	4	437.8	461.4	0.3106	-70.4	0.01	0	0	224	87
86	1	1	11	194	2.5722	294.3	4	595.4	613.1	0.2639	-22.8	0.01	4	0	297	79
86	1	1	12	186	0	296.5	3	752.9	764.7	0	0	0.01	0	0	587	71
86	1	1	13	13	2.5722	298.7	2	910.5	916.4	0.2648	-20	0.01	0	0	629	67
86	1	1	14	59	1.5433	298.2	2	1068	1068	0.1673	-6.4	0.01	0	0	455	69
86	1	1	15	292	3.0866	295.9	3	1068	1068	0.3103	-76.9	0.01	0	0	155	82
86	1	1	16	344	3.0866	296.5	4	1068	1068	0.3085	-185.1	0.01	0	0	172	79
86	1	1	17	1	2.5722	295.9	4	1068	1068	0.2518	57	0.01	0	0	90	84
86	1	1	18	357	2.5722	294.3	5	1074.3	1015	0.2518	56.7	0.01	0	0	24	87
86	1	1	19	24	3.0866	294.3	5	1088.9	891	0.304	89.5	0.01	0	0	0	90
86	1	1	20	7	3.6011	293.2	5	1103.5	767	0.3548	93.5	0.01	0	0	0	97
86	1	1	21	20	3.0866	292.6	6	1118.2	643	0.3029	67.1	0.01	0	0	0	93
86	1	1	22	22	2.5722	292	6	1132.8	519	0.2508	46.1	0.01	0	0	0	97
86	1	1	23	20	2.5722	291.5	6	1147.4	395	0.2508	46	0.01	0	0	0	100
86	1	1	24	30	2.0578	290.4	6	1162.1	271	0.1982	28.6	0.01	0	0	0	100
86	1	2	1	76	2.5722	289.8	6	1176.6	271	0.2508	45.5	0.01	0	0	0	100
86	1	2	2	12	2.0578	290.4	6	1191.3	271	0.1982	28.6	0.01	0	0	0	100
86	1	2	3	102	1.5433	289.3	7	1205.9	271	0.1498	25	0.01	0	0	0	100
86	1	2	4	90	2.0578	289.3	6	1220.6	271	0.2015	58.5	0.01	0	0	0	100
86	1	2	5	116	2.5722	290.9	5	1235.2	271	0.2534	92.8	0.01	0	0	0	100
86	1	2	6	47	1.5433	290.4	4	1249.8	1249.8	0.1492	32.4	0.01	0	0	0	100
86	1	2	7	89	2.0578	289.3	5	1264.5	271	0.1994	35.1	0.01	0	0	0	100
86	1	2	8	86	0	289.3	4	156.4	396.4	0	0	0.01	0	0	38	100
86	1	2	9	350	1.5433	292	3	358.1	558.1	0.1621	-11.5	0.01	0	0	207	100
86	1	2	10	341	2.0578	295.9	3	559.9	719.9	0.2143	-14.2	0.01	0	0	383	82
86	1	2	11	335	2.5722	298.2	2	761.7	881.7	0.2644	-21	0.01	0	0	539	69
86	1	2	12	41	3.0866	298.7	2	963.5	1043.5	0.3141	-32.2	0.01	0	0	595	64
86	1	2	13	359	2.5722	299.3	2	1165.2	1205.2	0.265	-19.5	0.01	0	0	688	62
86	1	2	14	77	3.6011	300.4	2	1367	1367	0.3629	-61.3	0.01	0	0	583	56

86	1	2	15	360	4.1155	300.4	3	1367	1367	0.4116	-166.9	0.01	0	0	486	54
86	1	2	16	54	4.63	299.8	3	1367	1367	0.4613	-861.5	0.01	0	0	329	58
86	1	2	17	338	3.0866	298.2	4	1367	1367	0.303	68.4	0.01	0	0	156	69
86	1	2	18	351	3.0866	295.9	5	1362.1	1290.5	0.303	67.9	0.01	0	0	33	79
86	1	2	19	2	3.0866	295.4	6	1350.3	1107.3	0.303	67.8	0.01	0	0	0	84
86	1	2	20	5	2.5722	294.3	6	1338.6	924	0.2509	46.4	0.01	0	0	0	93
86	1	2	21	14	2.5722	294.3	6	1326.8	740.8	0.2509	46.4	0.01	0	0	0	93
86	1	2	22	25	2.5722	293.7	6	1315.1	557.5	0.2508	46.3	0.01	0	0	0	97
86	1	2	23	37	2.5722	293.7	6	1303.3	374.3	0.2508	46.1	0.01	0	0	0	97
86	1	2	24	158	3.0866	292.6	6	1291.6	191	0.3029	66.8	0.01	0	0	0	97

Appendix D
Dispersion Modeling Files

Sample C1: ISCST output file. First and last few pages of CORef87.out (CO Refined Analysis 1987)

```
**
****************************************
**
** ISCST3 INPUT PRODUCED BY:
** ISC-AERMOD VIEW VER. 4.6.2
** LAKES ENVIRONMENTAL SOFTWARE INC.
** DATE: 7/10/2003
** FILE: C:\TEMP\NEW_ISC\COREF87.INP
**
****************************************
**
**
****************************************
** ISCST3 CONTROL PATHWAY
****************************************
**
** SOLID WASTE AUTHORITY OF PALM BEACH COUNTY, PPSA/PSD/TITLEV
** MODIFICATION.
** THIS MODEL REPRESENTS EMISSIONS FROM THE PROPOSED NEW SOURCES AT THE
** SWA'S NCRRF SITE IN WEST PALM BEACH, FLORIDA.
**
CO STARTING
   TITLEONE LIME RECALCINATION AND BIOSOLIDS PELLETIZING FACILITY
   TITLETWO PSD PERMIT APPLICATION - CO REFINED RUN 1987
   MODELOPT DFAULT CONC  RURAL
   AVERTIME 1 8
   POLLUTID CO
   TERRHGTS FLAT
   RUNORNOT RUN
   ERRORFIL COREF87.ERR
CO FINISHED
**
****************************************
** ISCST3 SOURCE PATHWAY
****************************************
**
** 6/29/03 - FLARES HAVE BEEN ADDED ASSUMING 1,000, 2,000 AND 3500 CFM
** FLOW AND PARAMETERS DETERMINED USING THE METHODS SPECIFED IN SCREEN3
** DISPERSION MODELING GUIDANCE.
```

```
                                        *** THE SUMMARY OF HIGHEST  1-HR RESULTS ***

                                ** CONC OF CO       IN MICROGRAMS/M**3                          **
                                                 DATE
NETWORK
GROUP ID                   AVERAGE CONC      (YYMMDDHH)            RECEPTOR  (XR, YR, ZELEV, ZFLAG)     OF TYPE
GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - -

ALL      HIGH  1ST HIGH VALUE IS      16.42279  ON 87053013: AT (  237468.67,   269198.78,      0.00,      0.00)  GC
REFINED
         HIGH  2ND HIGH VALUE IS      16.23131  ON 87053012: AT (  237468.67,   269198.78,      0.00,      0.00)  GC
REFINED


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY
 *** ISCST3 - VERSION 02035 ***    *** LIME RECALCINATION AND BIOSOLIDS PELLETIZING FACILITY                ***
07/10/03
                                   *** PSD PERMIT APPLICATION - CO REFINED RUN 1987                         ***
CONC                        RURAL FLAT         DFAULT

                                        *** THE SUMMARY OF HIGHEST  8-HR RESULTS ***


                                ** CONC OF CO       IN MICROGRAMS/M**3                          **

                                                 DATE
NETWORK
GROUP ID                   AVERAGE CONC      (YYMMDDHH)            RECEPTOR  (XR, YR, ZELEV, ZFLAG)     OF TYPE
GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - -

ALL      HIGH  1ST HIGH VALUE IS      10.29876  ON 87053016: AT (  237368.67,   269098.78,      0.00,      0.00)  GC
REFINED
         HIGH  2ND HIGH VALUE IS       7.96535  ON 87061316: AT (  237073.53,   270340.81,      0.00,      0.00)  DC
NA

 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY
```

Sample C2: CALPUFF control/input file. Input groups 0 and 1 for SWADEP87.inp

```
SWA Deposition and Visibility Modeling at Class 1 (1987)


---------------- Run title (3 lines) ------------------------------------------

                    CALPUFF MODEL CONTROL FILE
                    --------------------------

-------------------------------------------------------------------------------

INPUT GROUP: 0 -- Input and Output File Names

--------------
Default Name  Type          File Name
------------  ----          ---------
CALMET.DAT    input    * METDAT =             *
    or
ISCMET.DAT    input    ! ISCDAT =C:\TEMP\CALPUFF\WPBEX87.MET   !
    or
PLMMET.DAT    input    * PLMDAT =             *
    or
PROFILE.DAT   input    * PRFDAT =             *
SURFACE.DAT   input    * SFCDAT =             *
RESTARTB.DAT  input    * RSTARTB=             *
--------------------------------------------------------------------------------
CALPUFF.LST   output   ! PUFLST =SWADEP87.LST  !
CONC.DAT      output   ! CONDAT =CONC87.DAT     !
DFLX.DAT      output   ! DFDAT  =DFLX87.DAT     !
WFLX.DAT      output   ! WFDAT  =WFLX87.DAT     !

VISB.DAT      output   ! VISDAT =VISB87.DAT     !
RESTARTE.DAT  output   * RSTARTE=             *
--------------------------------------------------------------------------------
Emission Files
--------------
PTEMARB.DAT   input    * PTDAT  =             *
VOLEMARB.DAT  input    * VOLDAT =             *
BAEMARB.DAT   input    * ARDAT  =             *
LNEMARB.DAT   input    * LNDAT  =             *
--------------------------------------------------------------------------------
```

```
Other Files
-----------
OZONE.DAT     input    * OZDAT  =             *
VD.DAT        input    * VDDAT  =             *
CHEM.DAT      input    * CHEMDAT=             *
H2O2.DAT      input    * H2O2DAT=             *
HILL.DAT      input    * HILDAT=             *
HILLRCT.DAT   input    * RCTDAT=             *
COASTLN.DAT   input    * CSTDAT=             *
FLUXBDY.DAT   input    * BDYDAT=             *
BCON.DAT      input    * BCNDAT=             *
DEBUG.DAT     output   * DEBUG =             *
MASSFLX.DAT   output   * FLXDAT=             *
MASSBAL.DAT   output   * BALDAT=             *
FOG.DAT       output   * FOGDAT=             *
--------------------------------------------------------------------------------
All file names will be converted to lower case if LCFILES = T
Otherwise, if LCFILES = F, file names will be converted to UPPER CASE
         T = lower case       ! LCFILES = T !
         F = UPPER CASE
NOTE: (1) file/path names can be up to 70 characters in length


Provision for multiple input files
----------------------------------

     Number of CALMET.DAT files for run (NMETDAT)
                                     Default: 1        ! NMETDAT =   0   !

     Number of PTEMARB.DAT files for run (NPTDAT)
                                     Default: 0        ! NPTDAT =  0  !

     Number of BAEMARB.DAT files for run (NARDAT)
                                     Default: 0        ! NARDAT =  0  !

     Number of VOLEMARB.DAT files for run (NVOLDAT)
                                     Default: 0        ! NVOLDAT =  0  !

!END!

-------------
Subgroup (0a)
-------------
```

```
  The following CALMET.DAT filenames are processed in sequence if NMETDAT>1

Default Name  Type          File Name
------------  ----          ---------
 none         input    * METDAT=      *   *END*


--------------------------------------------------------------------------------

INPUT GROUP: 1 -- General run control parameters
--------------

    Option to run all periods found
    in the met. file     (METRUN)   Default: 0       ! METRUN =   1  !

         METRUN = 0 - Run period explicitly defined below
         METRUN = 1 - Run all periods in met. file

     Starting date:   Year (IBYR) -- No default       ! IBYR =  1987  !
     (used only if   Month (IBMO) -- No default       ! IBMO =  0  !
      METRUN = 0)      Day (IBDY) -- No default       ! IBDY =  0  !
                      Hour (IBHR) -- No default       ! IBHR =  0  !

     Base time zone         (XBTZ) -- No default       ! XBTZ = 5.0  !
        PST = 8., MST = 7.
        CST = 6., EST = 5.

     Length of run (hours) (IRLG) -- No default       ! IRLG =  0  !

     Number of chemical species (NSPEC)
                                Default: 5       ! NSPEC =  5   !

     Number of chemical species
     to be emitted  (NSE)       Default: 3       ! NSE =  2   !

     Flag to stop run after
     SETUP phase (ITEST)        Default: 2       ! ITEST =  2   !
     (Used to allow checking
     of the model inputs, files, etc.)
           ITEST = 1 - STOPS program after SETUP phase
           ITEST = 2 - Continues with execution of program
                       after SETUP
```

```
     Restart Configuration:

        Control flag (MRESTART)      Default: 0       ! MRESTART =  0   !

           0 = Do not read or write a restart file
           1 = Read a restart file at the beginning of
               the run
           2 = Write a restart file during run
           3 = Read a restart file at beginning of run
               and write a restart file during run

        Number of periods in Restart
        output cycle (NRESPD)        Default: 0       ! NRESPD =  0   !

           0 = File written only at last period
          >0 = File updated every NRESPD periods

     Meteorological Data Format (METFM)
                                     Default: 1       ! METFM =  2   !

           METFM = 1 - CALMET binary file (CALMET.MET)
           METFM = 2 - ISC ASCII file (ISCMET.MET)
           METFM = 3 - AUSPLUME ASCII file (PLMMET.MET)
           METFM = 4 - CTDM plus tower file (PROFILE.DAT) and
                       surface parameters file (SURFACE.DAT)

     PG sigma-y is adjusted by the factor (AVET/PGTIME)**0.2
     Averaging Time (minutes) (AVET)
                                     Default: 60.0    ! AVET = 60. !
     PG Averaging Time (minutes) (PGTIME)
                                     Default: 60.0    ! PGTIME = 60. !


!END!
```

Sample C3: CALPOST Visibility *.lst output. First and last pages of Vis89.lst (Visibility calculations for 1989)

```
*********************************************************************************************************
                                             CALPOST  Version 5.4          Level 030402
*********************************************************************************************************

  Run Title:
     Visibility - 1989



 ------------------------------------------------------------------------------

 INPUT GROUP: 1 -- General run control parameters
 --------------

      Option to run all periods found
      in the met. file(s)  (METRUN)        Default: 0    ! METRUN =   1  !

          METRUN = 0 - Run period explicitly defined below
          METRUN = 1 - Run all periods in CALPUFF data file(s)

      Starting date:    Year  (ISYR) --    No default    ! ISYR  =  1989   !
      (used only if     Month (ISMO) --    No default    ! ISMO  =  0   !
       METRUN = 0)      Day   (ISDY) --    No default    ! ISDY  =  0   !
                        Hour  (ISHR) --    No default    ! ISHR  =  0   !

      Number of hours to process (NHRS) -- No default    ! NHRS  =  0  !

      Process every hour of data?(NREP) -- Default: 1    ! NREP  =  1  !
       (1 = every hour processed,
        2 = every 2nd hour processed,
        5 = every 5th hour processed, etc.)

 Species & Concentration/Deposition Information
 ---------------------------------------------

       Species to process (ASPEC)       -- No default    ! ASPEC = VISIB  !
       (ASPEC = VISIB for visibility processing)

       Layer/deposition code (ILAYER)   -- Default: 1    ! ILAYER =  1  !
         '1'  for CALPUFF concentrations,
         '-1' for dry deposition fluxes,
         '-2' for wet deposition fluxes,
         '-3' for wet+dry deposition fluxes.

       Scaling factors of the form:     -- Defaults:     ! A =  0.0    !
```

```
************************************************************************************************************
                                               CALPOST  Version 5.4            Level 030402
************************************************************************************************************


                                                      Run-Length VISIBILITY

                                                         VISIB   B _SN__

                                                            (deciview)


             RECEPTOR    COORDINATES (km)  TYPE  DV(Total)    DV(BKG)  DELTA DV  F(RH)

              127        162.495   223.553   D      9.282      9.281      0.001  3.775

 --- Number of recs with Delta-Deciview  >    0.10:          0
 ---             Largest Delta-Deciview  =             0.001

************************************************************************************************************
                                               CALPOST  Version 5.4            Level 030402
************************************************************************************************************


                                                         SUMMARY SECTION

                                                         VISIB   B _SN__

                                                           (1/Mega-m)

 RECEPTOR     COORDINATES (km)    TYPE       PEAK (YEAR,DAY,ENDING TIME)     FOR RANK    FOR AVERAGE PERIOD

     37      190.416   157.506  DISCRETE     2.5728E+01 (1989,335,0000)       RANK  1          24    HOUR
    127      162.495   223.553  DISCRETE     2.5723E+01 (1989,311,0000)       RANK  2          24    HOUR
```

Sample C4: CALPOST Deposition *.lst output. First and last few pages of HNO3d87.lst (dry deposition of HNO_3 in 1987)

```
*****************************************************************************************************************
                                                             CALPOST  Version 5.4           Level 030402
*****************************************************************************************************************



 Run Title:
    HNO3 Dry Deposition - 1987



--------------------------------------------------------------------------------

INPUT GROUP: 1 -- General run control parameters
--------------

     Option to run all periods found
     in the met. file(s)  (METRUN)        Default: 0    ! METRUN =   1  !

         METRUN = 0 - Run period explicitly defined below
         METRUN = 1 - Run all periods in CALPUFF data file(s)

     Starting date:    Year  (ISYR) --    No default    ! ISYR  =  1987   !
     (used only if     Month (ISMO) --    No default    ! ISMO  =  0   !
      METRUN = 0)      Day   (ISDY) --    No default    ! ISDY  =  0   !
                       Hour  (ISHR) --    No default    ! ISHR  =  0   !

     Number of hours to process (NHRS) -- No default    ! NHRS  =  0  !

     Process every hour of data?(NREP) -- Default: 1    ! NREP  =  1  !
      (1 = every hour processed,
       2 = every 2nd hour processed,
       5 = every 5th hour processed, etc.)

Species & Concentration/Deposition Information
----------------------------------------------

      Species to process (ASPEC)       -- No default    ! ASPEC = HNO3   !
      (ASPEC = VISIB for visibility processing)

      Layer/deposition code (ILAYER)   -- Default: 1    ! ILAYER = -1   !
        '1'  for CALPUFF concentrations,
        '-1' for dry deposition fluxes,
        '-2' for wet deposition fluxes,
        '-3' for wet+dry deposition fluxes.
```

```
     8760   HOUR AVERAGE DRY DEPOSITION AT EACH RECEPTOR FOR THE PERIOD ENDING      YEAR: 1988 DAY:    1 HOUR(0-23):   0
SEC:      0


      DISCRETE RECEPTORS:  HNO3         DF

RECEPTOR     COORDINATES (km)          DRY DEPOSITION              RECEPTOR     COORDINATES (km)          DRY DEPOSITION

     1       209.416     97.906          1.3835E-05                   64       166.916    155.506          4.4965E-05
     2       209.016    100.906          1.5199E-05                   65       166.916    153.906          4.3615E-05
     3       208.416    104.906          1.6765E-05                   66       166.916    152.906          4.2811E-05
     4       205.416    105.406          1.6720E-05                   67       166.916    151.906          4.2021E-05
     5       200.416    105.406          1.6255E-05                   68       166.916    150.906          4.1260E-05
     6       195.116    105.406          1.6041E-05                   69       166.916    149.906          4.0467E-05
     7       195.116    108.906          1.7288E-05                   70       166.916    148.906          3.9538E-05
     8       195.116    113.906          1.9150E-05                   71       166.916    147.906          3.8724E-05
     9       195.116    118.906          2.0970E-05                   72       166.916    146.906          3.8047E-05
    10       194.416    119.906          2.1325E-05                   73       166.916    145.906          3.7409E-05
    11       193.716    122.906          2.2477E-05                   74       166.916    144.906          3.6544E-05
    12       195.116    124.906          2.3299E-05                   75       166.916    143.906          3.5524E-05
    13       196.516    128.906          2.5007E-05                   76       166.916    142.906          3.4716E-05
    14       195.916    133.506          2.7096E-05                   77       166.916    141.906          3.3900E-05
    15       197.416    137.906          2.9205E-05                   78       166.916    141.406          3.3501E-05
    16       198.116    141.106          3.0825E-05                   79       162.416    141.406          3.4743E-05
    17       198.616    144.606          3.2753E-05                   80       161.416    141.406          3.5059E-05
    18       201.016    146.406          3.3816E-05                   81       160.416    141.406          3.5341E-05
    19       202.716    147.906          3.4783E-05                   82       159.416    141.406          3.5626E-05
    20       197.416    147.906          3.5063E-05                   83       158.416    141.406          3.5900E-05
    21       192.416    147.906          3.5156E-05                   84       157.416    141.406          3.6155E-05
    22       202.916    152.906          3.8054E-05                   85       156.416    141.406          3.6413E-05
    23       197.416    152.906          3.8104E-05                   86       155.416    141.406          3.6676E-05
    24       192.416    152.906          3.8163E-05                   87       154.416    141.406          3.6939E-05
    25       202.716    157.506          4.1518E-05                   88       153.416    141.406          3.7200E-05
    26       201.416    157.506          4.1535E-05                   89       152.416    141.406          3.7443E-05
    27       200.416    157.506          4.1519E-05                   90       151.416    141.406          3.7629E-05
    28       199.416    157.506          4.1392E-05                   91       150.416    141.406          3.7853E-05
    29       198.416    157.506          4.1336E-05                   92       149.416    141.406          3.8107E-05
    30       197.416    157.506          4.1274E-05                   93       148.416    141.406          3.8331E-05
    31       196.416    157.506          4.1259E-05                   94       147.416    141.406          3.8569E-05
    32       195.416    157.506          4.1266E-05                   95       147.416    141.906          3.8813E-05
    33       194.416    157.506          4.1274E-05                   96       147.416    142.906          3.9527E-05
    34       193.416    157.506          4.1323E-05                   97       147.416    143.906          4.0081E-05
    35       192.416    157.506          4.1365E-05                   98       147.416    144.906          4.0851E-05
    36       191.416    157.506          4.1358E-05                   99       146.916    145.906          4.1715E-05
    37       190.416    157.506          4.1374E-05                  100       143.916    149.906          4.5186E-05
    38       189.416    157.506          4.1481E-05                  101       140.916    154.406          4.8103E-05
    39       188.416    157.506          4.1609E-05                  102       135.416    157.406          4.5845E-05
    40       187.416    157.506          4.1774E-05                  103       132.416    161.406          4.4937E-05
```

```
  41      186.416   157.506         4.1953E-05             104      127.416   162.906         4.3764E-05
  42      185.416   157.506         4.2157E-05             105      125.916   165.906         4.5434E-05
  43      184.416   157.506         4.2368E-05             106      125.416   168.906         4.7981E-05
  44      183.416   157.506         4.2615E-05             107      124.416   168.906         4.7858E-05
  45      182.416   157.506         4.2858E-05             108      123.416   168.906         4.7697E-05
  46      181.416   157.506         4.3131E-05             109      122.416   168.906         4.7513E-05
  47      180.416   157.506         4.3399E-05             110      121.416   168.906         4.7293E-05
  48      179.416   157.506         4.3675E-05             111      120.416   168.906         4.7035E-05
  49      178.416   157.506         4.3991E-05             112      119.416   168.906         4.6725E-05
  50      177.416   157.506         4.4299E-05             113      118.416   168.906         4.6368E-05
  51      176.416   157.506         4.4664E-05             114      117.416   168.906         4.5961E-05
  52      175.416   157.506         4.4907E-05             115      116.416   168.906         4.5492E-05
  53      174.416   157.506         4.5119E-05             116      115.416   168.906         4.4987E-05
  54      173.416   157.506         4.5320E-05             117      114.416   168.906         4.4384E-05
  55      172.416   157.506         4.5469E-05             118      113.416   168.906         4.3708E-05
  56      171.416   157.506         4.5793E-05             119      112.416   168.906         4.2953E-05
  57      170.416   157.506         4.5947E-05             120      111.916   172.106         4.3630E-05
  58      169.416   157.506         4.6031E-05             121      111.416   172.106         4.3170E-05
  59      168.416   157.506         4.6205E-05             122      110.416   172.106         4.2199E-05
  60      167.416   157.506         4.6403E-05             123      109.416   172.106         4.1172E-05
  61      166.916   157.506         4.6502E-05             124      108.416   172.106         4.0090E-05
  62      166.916   156.906         4.6097E-05             125      107.416   172.106         3.8950E-05
  63      166.916   156.506         4.5863E-05             126      106.416   172.106         3.7764E-05
                                                           127      162.495   223.553         1.0691E-04

********************************************************************************************************************
***********
                                   CALPOST  Version 5.4           Level 030402
********************************************************************************************************************
***********


                                             SUMMARY SECTION


                                             HNO3          DF


                                               ( g/m**2/s)


 RECEPTOR     COORDINATES (km)     TYPE      PEAK (YEAR,DAY,ENDING TIME)      FOR RANK    FOR AVERAGE PERIOD

    127       162.495   223.553  DISCRETE    1.0691E-04                        RANK  1       8760   HOUR
```

Sample C5: CALPOST Concentration *.lst output. First and last pages of PB86.lst (Lead concentrations in 1986)

```
************************************************************************************************************************
                                                   CALPOST  Version 5.4          Level 030402
************************************************************************************************************************



  Run Title:
     Lead Concentrations - 1986



 ------------------------------------------------------------------------------

 INPUT GROUP: 1 -- General run control parameters
 --------------

      Option to run all periods found
      in the met. file(s)  (METRUN)        Default: 0    ! METRUN =   1  !

          METRUN = 0 - Run period explicitly defined below
          METRUN = 1 - Run all periods in CALPUFF data file(s)

      Starting date:    Year  (ISYR) --    No default    ! ISYR   =  1986   !
      (used only if     Month (ISMO) --    No default    ! ISMO   =  0   !
       METRUN = 0)      Day   (ISDY) --    No default    ! ISDY   =  0   !
                        Hour  (ISHR) --    No default    ! ISHR   =  0   !

      Number of hours to process (NHRS) -- No default    ! NHRS   =  0  !

      Process every hour of data?(NREP) -- Default: 1    ! NREP   =  1  !
       (1 = every hour processed,
        2 = every 2nd hour processed,
        5 = every 5th hour processed, etc.)

 Species & Concentration/Deposition Information
 ----------------------------------------------

       Species to process (ASPEC)       -- No default    ! ASPEC = PB  !
       (ASPEC = VISIB for visibility processing)

       Layer/deposition code (ILAYER)   -- Default: 1    ! ILAYER =  1  !
         '1'  for CALPUFF concentrations,
         '-1' for dry deposition fluxes,
         '-2' for wet deposition fluxes,
         '-3' for wet+dry deposition fluxes.
```

```
*******************************************************************************************************************
                                        CALPOST  Version 5.4          Level 030402
*******************************************************************************************************************


                                                     SUMMARY SECTION


                                                     PB            1


                                                        (ug/m**3)

RECEPTOR      COORDINATES (km)      TYPE       PEAK (YEAR,DAY,ENDING TIME)      FOR RANK     FOR AVERAGE PERIOD

   127       162.495    223.553  DISCRETE    1.8431E-07 (1986,349,0000)         RANK  1            24    HOUR
   127       162.495    223.553  DISCRETE    1.5536E-07 (1986,256,0000)         RANK  2            24    HOUR
   127       162.495    223.553  DISCRETE    1.5440E-07 (1986,090,0000)         RANK  3            24    HOUR
   127       162.495    223.553  DISCRETE    1.4080E-07 (1986,146,0000)         RANK  4            24    HOUR
```

CDM

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