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67°, Clear, Humidity 97%
TODAY'S FORECAST
84°, Partly Cloudy
TOMORROW
Partly Cloudy
High: 85°, Low: 71°

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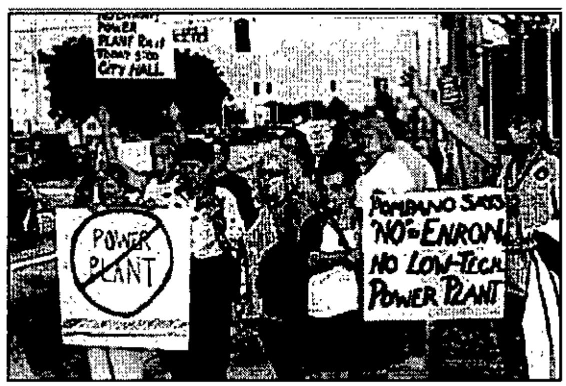
Plan to build power plant in Pompano approved

By DAVID FLESHLER, Sun-Sentinel
Web-posted: 11:14 p.m. Feb. 28, 2001

Updated at 11 a.m. Thursday

A controversial power plant proposed for Pompano Beach won the endorsement of the city's planning and zoning board, after a raucous meeting that lasted until 1 a.m. Thursday.



(Richard Sheinwald/Photo)

Annabelle Russell, of Pompano Beach, left, and Becky Tooley, of Coconut Creek, hold one sign while Rose DelGardo of Coconut Creek and Linda Brown, of Fort Lauderdale, far right, hold another as they lead the protest.

The board voted 6 to 1 to recommend a zoning change for 28 acres south of Sample Road and east of Florida's Turnpike. The plan now goes to the City Commission, which is scheduled to vote March 27.

Before the meeting, protesters lined Atlantic Boulevard, wearing gas masks and holding signs that read: "JUST SAY NO TO ENRON." A charter bus brought in reinforcements from Coconut Creek. And about 200 people packed the hearing room at Pompano Beach City Hall.

Enron Co., one of the biggest power companies in the world, proposes to build a plant that would generate 510 megawatts,

Today's News Poll

Do you agree with Pompano's decision to build a power plant?
See story
see past surveys.

Yes -- we don't want to end up with a power shortage like they have in California.	67%
No -- it will create too much pollution.	32%

Total votes: 363

Vote

shopping@sun-sentinel.com

Pick a city and shop:
Broward East
Fort Lauderdale
Lauderdale-by-the-Sea
Oakland Park
Wilton Manors
Broward Northeast
Deerfield Beach
Lighthouse Point
Pompano Beach
Broward Northwest
Coconut Creek
Coral Springs
Margate
North Lauderdale
Parkland
Tamarac
Broward Southeast
Dania Beach

putting it on the map as a major power plant. Its 80-foot stacks would emit nitrogen oxides and other pollutants, but far less than what comes out of older plants, such as the one at Port Everglades, air-quality regulators said.

The project is one of three power plants proposed for northern Broward County, and it clearly faces a fight.

Before the hearing, just in time for the evening rush hour, about two dozen protesters organized by the Sierra Club of Broward County stood outside City Hall and held signs reading: "JUST SAY NO TO ENRON" and "POMPANO SAYS NO TO ENRON -- NO LOW-TECH POWER PLANT" and "NO ENRON POWER PLANT."

"I know everyone talks about what's going on in California, but there's no such crisis here in South Florida," said Linda Brown, of Fort Lauderdale. "What could happen is we could become a generating point for other states. I don't think it would be fair for the area to bear the pollution to provide power for another state."

Joining the protesters were city commissioners from Margate and Coconut Creek, which would be downwind from the plant.

"We like to look at blue skies," Coconut Creek Mayor Marilyn Gerber said, standing a few yards from the line of protesters. "We're concerned about air pollution. We don't want things to look the way they do over in Houston."

As the time of the planning board meeting approached, a bus pulled up and discharged more than 40 residents of the Township Community, a section of Coconut Creek near the site of the proposed plant.

"There are going to be three plants in this community when they're done," said Larry Lemelbaum, president of the Township Community Master Association, as the neighborhood's residents crowded around him to listen. "We have landfills, we have incinerators, we have jails. We have a sewer plant and a recycling plant. We don't have to stand for every whim that a big company has and wants to drop in our lap."

Eric Thode, spokesman for Enron, came to the protest to talk to reporters. He said it was a misconception that the plant would sell power out of the area. It would be strictly for South Florida, he said, because it's simply not feasible to sell power to customers several hundred miles away. He said concerns about air pollution were unfounded.

"They're making their statements based on

Hallandale
Hollywood
Pembroke_Park
Broward Southwest
Cooper_City
Davie
Miramar
Pembroke_Pines
Weston
Broward West
Lauderdale_Lakes
Lauderhill
Plantation
Sunrise
Palm Central
Boynton_Beach
Greenacres
Lake_Worth
Palm South
Boca_Raton
Delray_Beach
Reference_Map

rumor, innuendo and not scientific fact," he said. "The fact of the matter is we are signing the most stringent air permit for a facility like this that the state of Florida has ever issued."

He said he expected the state Department of Environmental Protection to issue a notice within a week of its intent to issue a permit for the plant.

Opponents said the plant would stand too close to residential neighorhoods and would lack the latest technology.

David Fleshler can be reached at dfleshler@sun-sentinel.com or 954-356-4535.

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Panel gives OK to plan for power plant in Pompano

By DAVID FLESHLER Sun-Sentinel
Web-posted: 10:04 p.m. Mar. 1, 2001

As environmentalists and neighborhood residents complained bitterly about being shut out, Enron Corp. moved forward Thursday with plans for a major power plant in Pompano Beach.

The Houston energy giant won approval from the city's planning and zoning board by a 6-1 vote just after midnight Wednesday, after a raucous hearing that left opponents complaining that it was stacked. And the state Department of Environmental Protection moved closer to issuing a permit for the plant, now that the company has made concessions on how much diesel fuel it would use.

The planning board recommended approval of a request to rezone the 28-acre site from industrial to public utility.

The final decision is up to the city commission, which is expected to vote next month. The board also approved a site plan for the 510-megawatt plant, which would stand south of Sample Road and east of Florida's Turnpike.

These decisions came despite picketing by the Sierra Club and protests from people who would live near the plant, especially in Margate and Coconut Creek. But planning board members said they were swayed by assurances that the plant would rely primarily on relatively clean natural gas and provide an important source of electricity for the region.

"I think we need the power plant for the future," said board member Dave Greenbaum. "The impact to the area would be nominal."

Only board member, Penny Sugar, voted against it, saying she was simply unsatisfied that public health would be protected.

"The environment can tip the balance for so many genetic problems," she said. "I also see a great deal that we don't know about this. It exhaust pipe," said Daniel Shooster, owner of Festival Flea Market, on Sample Road just north of the proposed plant site. "It's a shame they have so much money and so much power to literally run over the people at the festival."

But Enron spokesman Eric Thode praised the board for ignoring what he said were emotional protests that lacked any scientific foundation.

"I think the board members listened to facts rather than rumors and innuendo from the people that have been opposed," he said.

Even though it won overwhelming approval from the planning and zoning board, the proposal will face a harder time with the City Commission, which has final say over the zoning change.

David Fleshler can be reached at dfleshler@sun-sentinel.com or 954-356-4535.

Enron North America Corp.
P.O. Box 1188
Houston, TX 77251-1188

February 22, 2001

Mr. Al Linero, P.E.
Administrator, New Source Review Section
Bureau of Air Regulation, Division of Air Resource Management
Florida Department of Environmental Protection
2600 Blair Stone Rd.
Tallahassee, FL 32399-2400

Re: Replacement Pages
PSD Permit Application
Pompano Beach Energy Center
DEP File No. 0112515-001-AC (PSD-FL-304)

Dear Mr. Linero:

On behalf of Pompano Beach Energy Center, LLC (PBEC), I am submitting four copies of replacement pages for our PSD permit application. Included in this submission package is:

1) An updated PSD Class I impact assessment in Section 7.3,
2) Revised Appendix F (updated key to modeling files),
3) New Appendix H listing the PSD background sources used in the cumulative modeling analysis for Everglades National Park,
4) The updated modeling archive on CD-ROM, and
5) PE certification pages in support of the Class I area modeling.

Copies of this information (minus the CD-ROM) have been sent to the Southeast District office of DEP and to the Broward County Air Quality Division.

Please contact me at (713) 853-3161 if you have any questions.

Sincerely,
Enron North America

David A. Kellermeyer

David A. Kellermeyer
Director

Enclosure

cc: Mr. Lennon Anderson, Southeast District
Mr. Jarrett Mack, Air Quality Division, Broward County

Revision Sheet
PSD Permit Application – Pompano Beach Energy Center, LLC
ENSR Document 6792-140-100R
February 21, 2001

Section	Page Number	Modification
7.0	Entire section	Revised Section 7.3 (Class I Area Impact Analysis) to address comments from the National Park Service on the Class I Modeling Protocol
App. F	Entire appendix	Updated key to files on CD-ROM containing new CALPUFF modeling results
App. H	Entire appendix	New appendix containing PSD source inventory used in Class I cumulative increment analysis for SO_2 .
Cover Page		Updated document date to reflect this February 2000 revision
T of C	Pages I to vi	Updated table of contents

7.0 ADDITIONAL IMPACTS

The preceding sections of this permit application have focused on demonstrating the proposed action will incorporate Best Available Control Technology and will not have a significant impact on air quality. Beyond consideration of these basic air quality concerns, PSD regulations require a review of some of the more subtle effects a project may induce. The following section discusses the potential impacts which may result from the proposed project with respect to the following:

- Vegetation and Soils
- Associated Growth
- PSD Class I Area Impacts – Air Quality Increments, Regional Haze, and Deposition

7.1 Vegetation and Soils

The project lies in an area of primarily agricultural use. No significant off-site impacts are expected from the proposed action. Therefore, the potential for adverse impacts to either soils or vegetation is minimal. The following discussion reviews the project's potential to impact its surroundings, based on the facility's PTE and the model-predictions of maximum ground level concentrations of SO_2, NO_x and CO, the PSD-applicable pollutants of concern for potential impact to soils and vegetation.

The criteria for evaluating impacts on soils and vegetation is taken from U.S. EPA's A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils and Animals (U.S. EPA 1980). Table 7-1 lists the U.S. EPA suggested criteria for the gaseous pollutants emitted directly from the proposed facility and the predicted facility impacts. These criteria are established for sensitive vegetation and crops exposed to the effects of the gaseous pollutants through direct exposure. Adverse impacts on soil systems result more readily from the secondary effects of these pollutants' impacts on the stability of the soil system. These impacts could include increased soil temperature and moisture stress and/or increased runoff and erosion resulting from damage to vegetative cover. Thus, the Table 7-1 criteria have been applied to the proposed facility to evaluate impacts on both soils and vegetation. As shown in Table 7-1, the results clearly indicate that no adverse impacts will occur to sensitive vegetation, crops, or soil systems as a result of operation of the proposed facility.

Table 7-1 Comparison to U.S. EPA Criteria for Gaseous Pollutant Impacts on Natural Vegetation and Crops

Pollutant	Averaging Time*	Minimum Impact Level for Affects On Sensitive Plants ($\mu g/m^3$)	Maximum Impact of Proposed Facility ($\mu g/m^3$)
SO_2	1 hour	917	10.27
	3 hours	786	3.94
	Annual	18	0.009
NO_x	4 hours	3760	12.40
	8 hours	3760	7.53
	1 month	564	2.72
	Annual	94	0.034
CO	1 week	1,800,000	2.88

*** 24-hour average used to conservatively represent 1-week and 1-month average impacts and 3-hour average used to conservatively represent 4-hour average impact.**

7.2 Associated Growth

The proposed project will employ approximately 200 personnel during the construction phase. The project will employ approximately 10 personnel on a permanent basis. It is a goal of the project to hire from the local community when possible. There should be no substantial increase in community growth, or need for additional infrastructure. It is not anticipated that the proposed action will result in an increase in secondary emissions associated with non-project related activities. Therefore, in accordance with PSD guidelines, the analysis of ambient air quality impacts need consider only emissions from the facility itself.

7.3 Class I Area Impact Analysis

The nearest PSD Class I area to the proposed facility is the Everglades National Park (ENP) located about 60 km to the southwest (see Figure 7-1). Given that the Class I area is greater than 50 km from the proposed facility, long-range transport modeling is required for the Class I impact assessment. The analysis used the CALPUFF model to evaluate the potential impact of the proposed facility emissions in terms of air quality increments and two Air Quality Related Values (AQRVs), regional haze and deposition of sulfur and nitrogen compounds. Unlike PSD Increments that are numerical values of ambient concentration of criteria pollutants that cannot be exceeded, AQRVs and the determination of significance are established by the designated FLM. Class I area modeling for ENP is based on a protocol (ENSR Document 6792-140-101) that was submitted to John Notar of the National Park Service in October 2000. Comments on the protocol provided by John Notar in December 2000 have been incorporated in the analysis. In addition, the analysis incorporates recommendations from Mr. Notar based on his later review of sample CALPUFF model input files prepared for the PBEC.

Figure 7-1 Location of Pompano Beach Energy with Respect to Everglades National Park

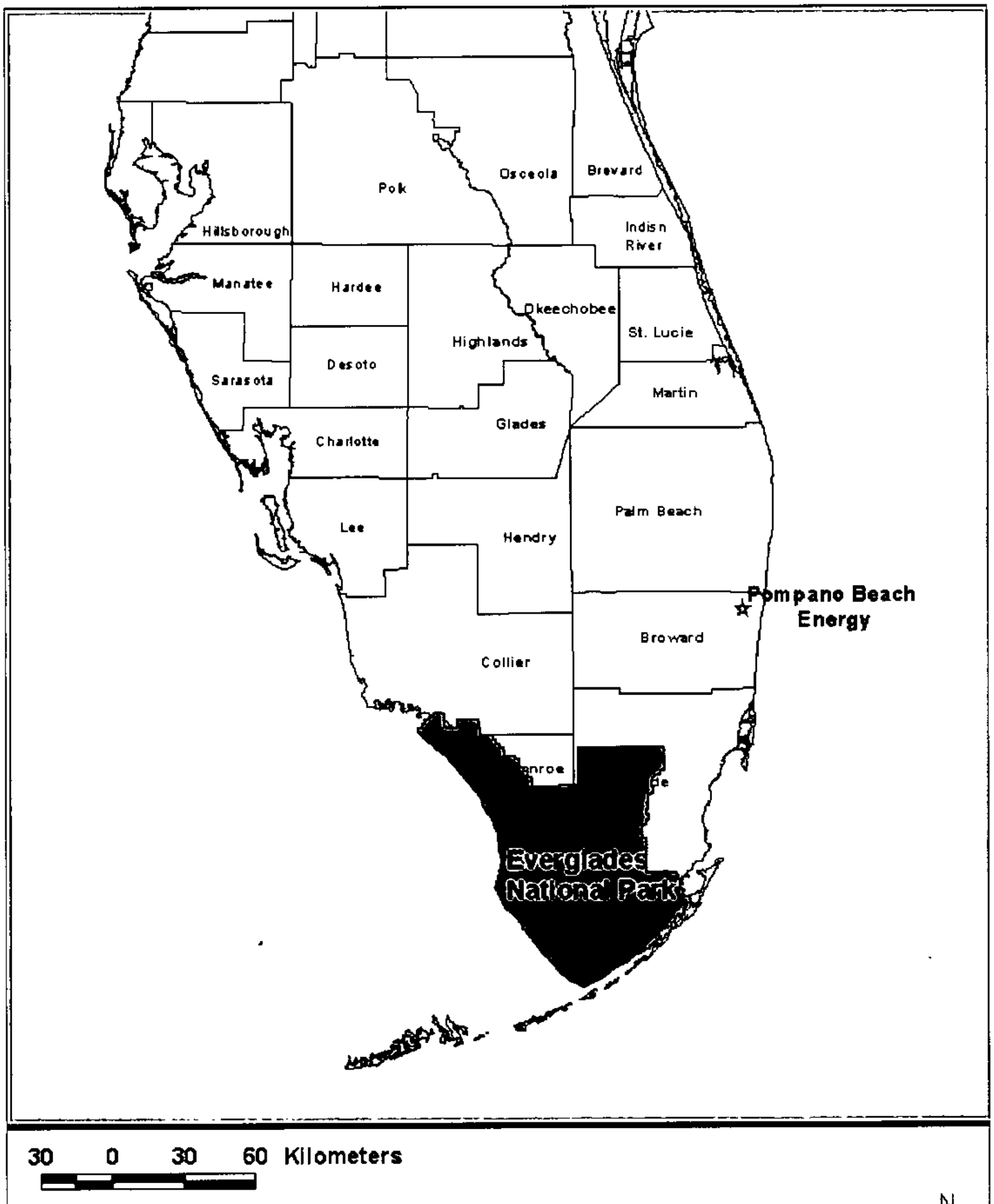


Figure 7-1
Location of Pompano Beach Energy
with Respect to Everglades National Park

The air quality dispersion model that was used to address the project's impacts is CALPUFF version 5.4 (level 000602; see Earth Tech web site). The first step was to run CALPUFF in a conservative screening mode. Because the screening level modeling indicated the potential for SO_2 concentrations to exceed the Class I significant impact levels, a refined application of CALPUFF was also conducted.

7.3.1 Class I Area Impact Criteria

7.3.1.1 Significant Impact Levels

Class I Significant Impact Levels were compared to the modeled impacts of the PBEC project to determine the need for a cumulative analysis of air quality impacts on the Class I area. Class I Significant Impact Levels, as proposed by EPA in the NSR reform (Federal Register, July 23, 1996), are listed in Table 7-2.

Table 7-2 PSD Class I Significant Impact Levels (µg/m³)

Pollutant	3-Hr*	24-Hr*	Annual*
SO_2	1.0	0.2	0.1
NO_2	NA	NA	0.1
PM_{10}	NA	0.3	0.2

* Maximum modeled concentration for the respective averaging period

7.3.1.2 PSD Increments

If the PBEC project impacts exceed the PSD Significant Impact levels for any pollutant, a cumulative impact assessment for that pollutant will be triggered. Class I PSD Increments are provided in Table 7-3.

Table 7-3 PSD Class I Area Increments (µg/m3)

Pollutant	3-Hr*	24–Hr*	Annual**
SO_2	25	5	2
NO_2	NA	NA	2.5
PM_{10}	NA	8	4

* highest of the second-highest modeled concentrations at any receptor

**highest arithmetic mean concentration at any receptor

7.3.1.3 Air Quality Related Values

For Air Quality Related Values (AQRVs), there are no uniform criteria or standards upon which a modeled impact is determined to be acceptable. For each Class I area the Federal Land Manager applies judgement based on site-specific conditions and established guidelines. The AQRV guidelines that are understood to apply to ENP are discussed below.

Regional Haze

The visibility (regional haze) analysis computes the maximum 24-hour average light extinction associated with modeled sources and compares it to the background extinction. The background extinction values (supplied by John Notar of the National Park Service) correspond to periods of good visibility, representing the 90^{th} percentile visual range in ENP.

The interpretation as to whether, or the extent to which, a modeled extinction value represents visibility impairment is at the discretion of the Federal Land Manager (FLM). Recent PSD interpretations by the National Park Service indicate that a project-related change in extinction is determined to be insignificant if it is less than 5% of the background extinction or if the number of days in a year that modeled values exceed 5% are limited. If this is not the case, the FLM may request a more refined assessment be conducted.

Acidic Deposition

CALPUFF was applied to obtain upper limit estimates of annual wet and dry deposition of sulfur and nitrogen compounds (kg/ha/yr) associated with emissions of SO_2 and NO_x from the proposed facility. Specifically, CALPUFF was used to model both wet and dry deposition of SO_2, SO_4, NO_3 and HNO_3 as well as dry deposition of NO_x to estimate the maximum annual wet and dry deposition of sulfur (S) and nitrogen (N).

Measurements of wet deposition at ENP have been taken in 1998 and 1999 as part of the National Acidic Deposition Program (NADP). Although dry deposition values are currently being taken at ENP, measurements are not yet available. However, consistent with FLAG Phase I guidance, the total existing deposition can be estimated by doubling the wet deposition values. Using this convention, the estimated average annual sulfur deposition at EVP is 8 kg/ha/yr and the average nitrogen deposition is 7 kg/ha/yr.

Dee Morse of the NPS has indicated that critical load guidelines for acidic deposition have not been established for ENP. However, it can be reasonably expected that if modeled sulfur and nitrogen deposition values associated with facility emissions are small in comparison to background deposition the NPS will determine the contribution of PBEC to acidic deposition at ENP to be insignificant. Given that refined modeling was required for the SO_2 increment analysis, a screening level deposition analysis was bypassed and refined CALPUFF deposition modeling for deposition was conducted to provide a more accurate estimate of deposition.

7.3.2 PBEC Emission Parameters

For the Class I area air quality increment assessment of pollutants with short-term average criteria (≤ 24-hour) and regional haze analysis (24-hour criteria), CALPUFF was applied with the maximum short-term emission rates for the PBEC turbine stacks. Maximum hourly emissions are associated with 100% load operation and distillate oil firing. For the annual air quality increment analysis and the deposition analysis, modeling was conducted with the maximum short-term emission limits for natural gas and oil weighted by the corresponding annual capacity factors for the worst-case operating schedule (i.e., 1000 hours/year on oil and 2500 hours/year on gas). In addition, note that for the CALPUFF modeling it will be assumed that 100% of the primary particulate are in the fine particulate size category.

7.3.3 CALPUFF Screening Modeling

7.3.3.1 Dispersion Model

CALPUFF Version 5.4, Level 000602 in Screen mode was applied using ISCST3 meteorological input data to ascertain the impacts on ENP. As recommended by John Notar, the partial plume penetration option in CALPUFF was used. The only exception to the IWAQM Phase II default technical options, as previously recommended by the NPS for other CALPUFF screening applications (Colorado Department of Public Health and Environment document entitled "Long-range Transport Model Selection and Application") was the option for no transitional plume rise. Note that the modeling is not sensitive to the plume rise option given the relatively large distance from the PBEC to the Class I area.

7.3.3.2 Meteorological Data

Five years of regionally representative meteorological data were used as input to CALPUFF screening mode. The source of the surface data was the Solar and Meteorological Surface Observation Network (SAMSON) data set that has been produced by National Data Climatic Center. Hourly SAMSON surface data for Miami International Airport supplemented with precipitation data (obtained from NCDC in TD3240 format) for the 5-year period 1986-1990 was used along with concurrent upper data from West Palm Beach.

The PCRAMMET program was used to process the meteorological data into a format that the CALPUFF model accepts for the screening runs, including both wet and dry deposition parameters, as well as additional records such as potential temperature lapse rate, wind speed power law exponent, short-wave solar radiation, and relative humidity.

7.3.3.3 Receptors

Four rings of receptors were centered on PBEC at distances bracketing ENP as shown in Figure 7-2. These distances represent the nearest boundary, the central portion, and the farthest boundary of the ENP with respect to the proposed project. As recommended in the IWAQM Phase II report, receptors were placed at 1-degree intervals over a 360 degree arc along each ring. This conservative receptor array is required to account for the potential short-comings of the use one meteorological data station in the screening level analysis versus the wind-field generated for the refined analysis from many meteorological stations. Given that the terrain is flat, the all receptors were at the same height as the base of the source.

7.3.3.4 Screening Model Results

Air Impacts Analysis

CALFUFF in the screening mode was used to model the maximum ambient concentrations to compare to Class I Area SILs. The CALPOST program was used to obtain pollutant specific impacts for the pertinent averaging periods. The screening results are summarized in Table 7-4. As shown in the table, the maximum 3-hour and 24-hour SO_2 impacts are greater than the SILs while the maximum impacts for annual SO_2, 24-hour and annual PM_{10}, and annual NO_x are less than the SILs. Therefore, refined CALPUFF modeling was conducted to further refine the 3-hour and 24-hour SO_2 impacts.

Table 7-4 Comparison of Maximum Modeled Refined CALPUFF Concentrations Associated with PBEC to Class I Significant Impact Levels

Pollutant	Averaging Period	Maximum Concentration ($\mu g/m^3$)*	Class I SIL ($\mu g/m^3$)
NO_2	Annual	0.021	0.1
PM_{10}	24-hour	0.187	0.3
	Annual	0.004	0.2
SO_2	3-hour	1.64	1.0
	24-hour	0.517	0.2
	Annual	0.007	0.1

* Maximum short-term concentrations based on maximum hourly emissions for three turbines operating on oil and annual concentrations based on a worst-case operating schedule of 2500 hours/year on natural gas and 1000 hours/year on oil.

Regional Haze

CALPUFF and CALPOST processing were used for the regional haze analysis. The CALPUFF screening modeling was conducted with a background ozone concentration of 23.5 ppb (provided by John Notar) and a background concentration of ammonia of 10 ppb (representative of grasslands as listed in the IWAQM Phase II report). The computation of incremental background light extinction due to the proposed project used the option to calculate extinction from speciated particulate matter measurements. In CALPOST, the maximum relative humidity value for the particle growth curve was capped at 95% (RHMAX = 95.0). Additionally, annual background values of the extinction coefficients for ENP provided by John Notar of the NPS (corresponding to 90th percentile of measured values) were used. Annual averages of the dry hygroscopic (divided by 3) and non-hygroscopic components of the background extinction coefficient were input to CALPOST as ammonium sulfate and soil, respectively. Those annual averages are 5.59 for the dry hygroscopic background extinction and 14.91 for the non-hygroscopic, in units of inverse megameters. The Rayleigh scattering extinction coefficient was specified as the default 10 inverse megameters.

Initially, CALPUFF modeling of regional haze impacts was conducted with the maximum short-term emission rates for the combustion turbines (i.e., unlimited operation of 3 turbines on oil for 24-hours). These results are summarized in Table 7-5. As shown in the table, the maximum extinction change from the background never exceeds 10% but is greater than 5% for each year modeled for up to 8 days per year. In order to mitigate the potential for an adverse regional haze impact, the PBEC will accept an enforceable permit condition to limit the number of hours that oil can be fired in all three units in a 24-hour period. That is, oil use will be limited to a total of 60 turbine-hours/day. To simulate this in CALPUFF, an additional modeling iteration for regional haze was performed with the maximum hourly oil emission rates for three turbines scaled by 60/72 (i.e., a maximum of 60 turbine-hours on oil out of a possible 72 turbine-hours in a 24-hour period). Therefore, the scaled maximum hourly emissions rates for SO_2, PM_{10}, and NO_x, are representative of a daily maximum limit of 60 turbine-hours on oil. The results for limited daily oil use are summarized in Table 7-6. The table shows that the maximum change in extinction associated with the PBEC project is 7.0% and the 5% change threshold is exceeded no more than 3 days in any year modeled. Thus in limiting oil use in the turbines to a total of 60 turbine-hours/day, the PBEC project will not have an adverse regional haze impact and no further modeling is necessary.

Table 7-5 Maximum 24-Hour Average Regional Haze Impacts of PBEC for Unlimited Daily Oil Use

Model Year	Maximum Extinction Change from Background (%)	Number of Days Maximum Change from Background is > 5%
1986	5.37	4
1987	7.44	8
1988	8.40	7
1989	5.81	3
1990	8.00	6
Note: Results based on maximum hourly emissions for three turbines firing oil.		

Table 7-6 Maximum 24-Hour Average Regional Haze Impacts of PBEC for Limited Daily Oil Use

Model Year	Maximum Extinction Change from Background (%)	Number of Days Maximum Change from Background is > 5%
1986	4.48	0
1987	6.20	3
1988	7.01	3
1989	4.84	0
1990	6.66	3
Note: Results based on maximum hourly emissions for three turbines firing oil but oil firing limited to a total of 60 turbine-hours in a 24-hour period.		

Figure 7-2 Receptors Used in the CALPUFF Screening Analysis

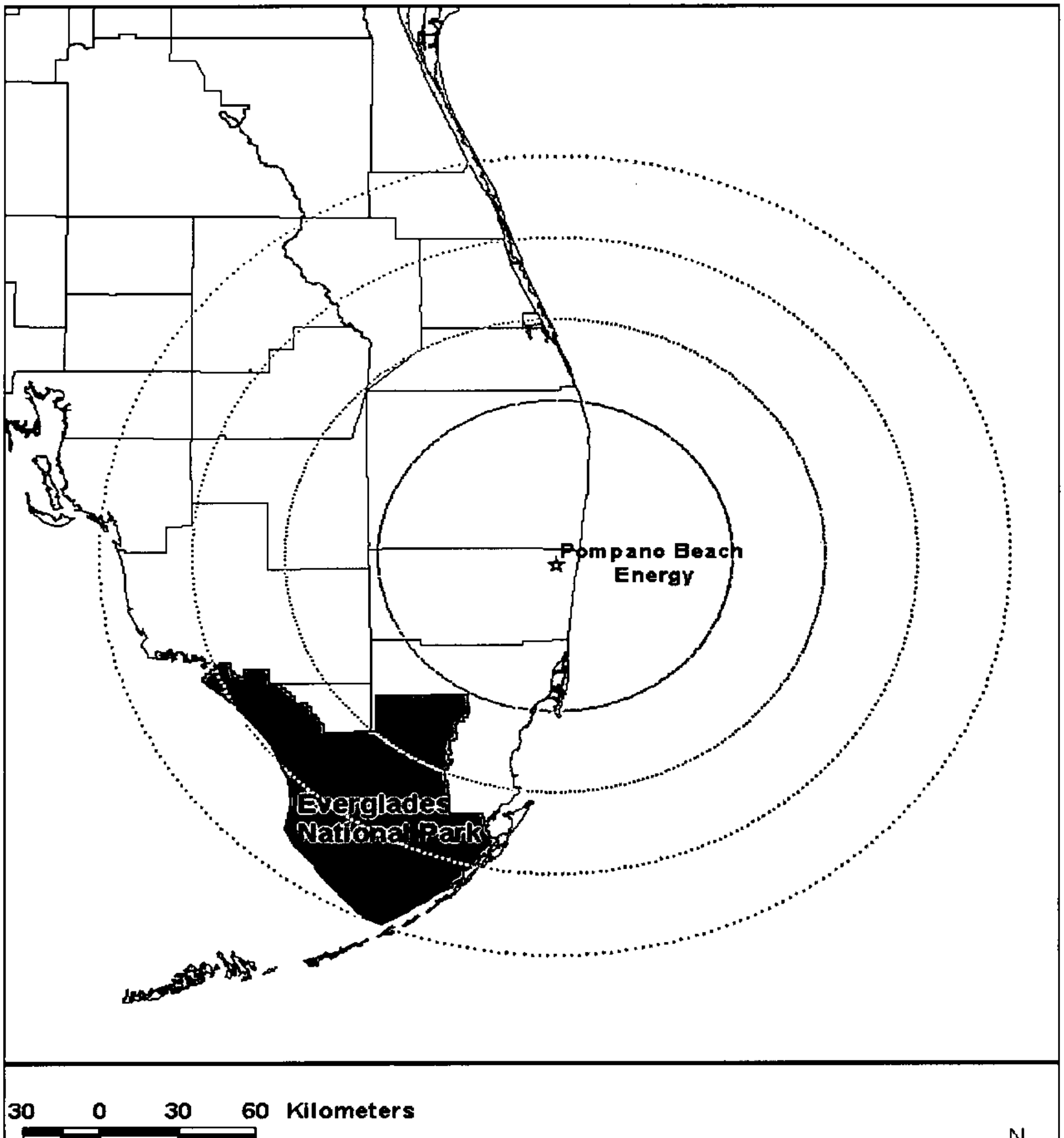


Figure 7-2
Receptors Used in the
CALPUFF Screening analysis

7.3.4 Refined CALPUFF Modeling

Given that CALPUFF screening predicted SO_2 concentrations greater than the SILs for the 3-hour and 24-hour averaging periods, refined CALPUFF modeling was performed to further resolve the PBEC impacts. In addition, deposition modeling for total sulfur and nitrogen was also conducted to obtain refined results.

7.3.4.1 Meteorological Wind Field Processing

As described in the IWAQM Phase II report, the major difference between CALPUFF screening and refined modeling applications is the incorporation of three dimensional meteorological wind fields. Five years of surface and upper air meteorological data (1986-1990) were obtained to generate a three-dimensional wind field grid over the modeling domain (500 km x 500 km) centered on the northern boundary of ENP, using CALMET. The grid spacing was 10 km. Figure 7-3 shows the stations that were used to generate the wind field and define the precipitation pattern. Surface stations included Key West, Miami, Tampa, and West Palm Beach and upper air stations used were Key West, Tampa, and West Palm Beach. Hourly precipitation data was obtained from Miami, Moorehaven, Key West, Tampa, West Palm Beach, Venice, Fort Meyers, Melbourne, and Homestead. The CALMET model parameter settings followed the recommendations in Appendix A of the IWAQM Phase II report.

7.3.4.2 Refined Receptors

Receptors were placed at 1 kilometer intervals along the boundary of the ENP and were supplemented with the portions of the model receptor rings used in the screening-level analysis that are within ENP. The refined receptor grid is provided in Figure 7-4.

7.3.4.3 Model Options and Parameters

CALGRID/CALPUFF modeling followed the input parameters recommended in Appendix B of the IWAQM Phase II report. Table 7-7 and Table 7-8 provide the discretionary user-specified CALGRID and CALPUFF control file variables, respectively. In addition, consistent with the CALPUFF screening analysis, the partial plume penetration option was used and transitional plume rise was not used. Hourly ozone data, concurrent with the meteorological data, from six FDEP monitoring sites and the ENP monitor were also used. The locations of the monitors are shown in Figure 7-5.

Figure 7-3 Meteorological Stations in South Florida

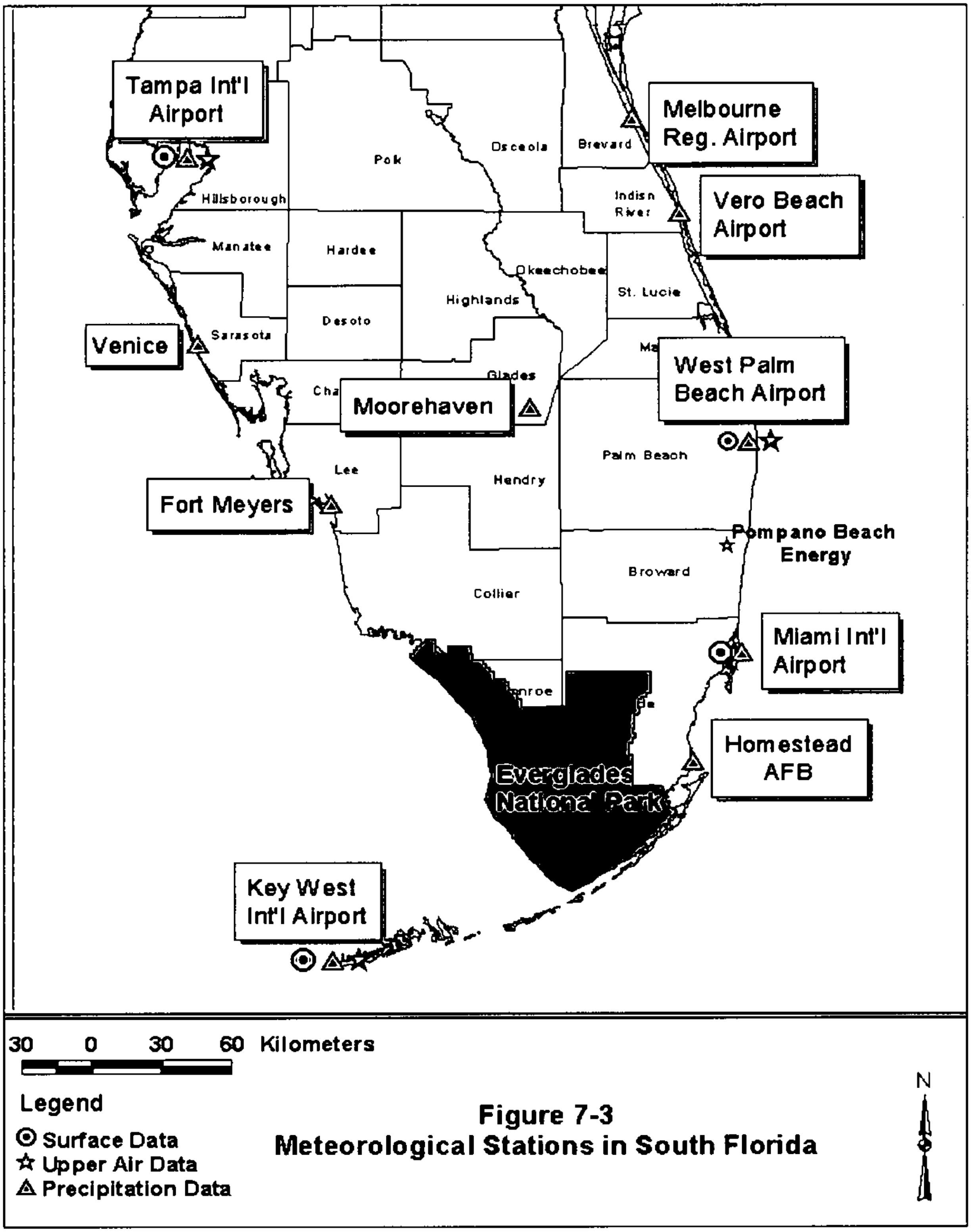


Figure 7-3
Meteorological Stations in South Florida

Figure 7-4 Refined Receptor Grid Covering The Everglades National Park

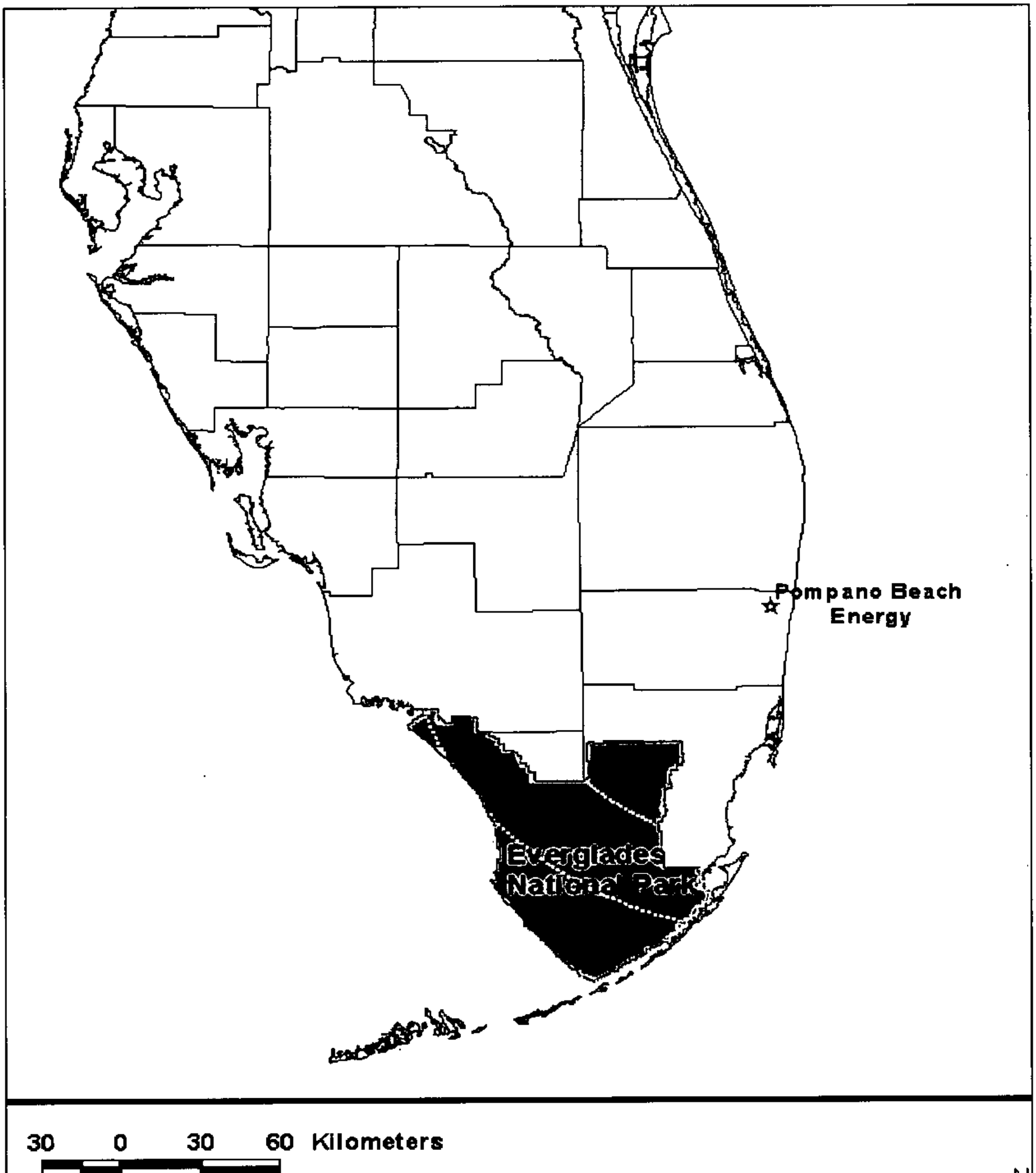


Figure 7- 4
Refined Receptor Grid Covering
The Everglades National Park

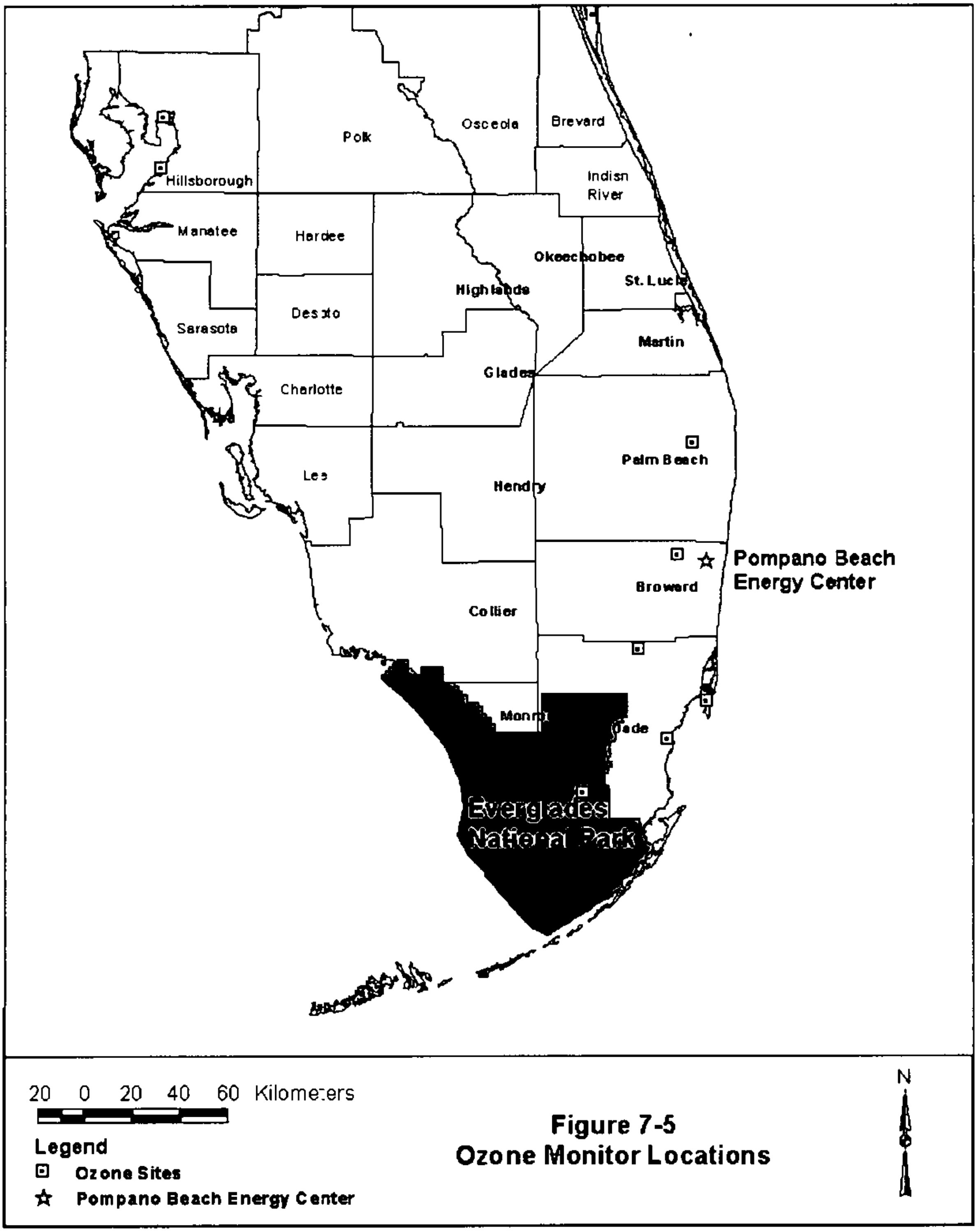
Table 7-7 CALMET User-Defined Fields not Specified in IWAQM Appendix A

Variable	Description	Value
NZ	Number of vertical layers	9
ZFACE	Vertical cell face heights (m)	20, 50, 100, 200, 400 800,1500, 2500, 4000
RMAX1	Max surface over-land extrapolation radius (km)	30
RMAX2	Max aloft over-land extrapolation radius (km)	30
RMAX3	Maximum over-water extrapolation radius (km)	50
RMIN	Min radius of influence for the wind field interpolation (km)	50
TERRAD	Radius of influence of terrain features (km)	10
R1	Relative weight at surface of Step 1 field and obs	1
R2	Relative weight aloft of Step 1 field and obs	1
ISURFT	Surface Station to use for surface temperature	West Palm Beach
IUPT	Station for lapse rates	West Palm Beach

Table 7-8 CALPUFF User-Defined Fields not Specified in IWAQM Appendix B

Variable	Description	Value
CSPECn	Names of Species	SO2, SO4, NOX, HNO3, NO3, PM10
NX	Number of east-west grids of input meteorology	50
NY	Number of north-south grids of input meteorology	50
NZ	Number of Vertical layers of input meteorology	9
DGRIDKM	Meteorology grid spacing (km)	10
IBCOMP	Southwest X-index of computational domain	1
JBCOMP	Southwest J-index of computational domain	1
IECOMP	Northeast X-index of computational domain	50
JECOMP	Northeast Y-index of computational domain	50
Dry Gas Dep	Chemical parameters of gaseous deposition	CALPUFF default
Dry Part. Dep	Chemical parameters of particle deposition	CALPUFF default
Wet Dep	Wet deposition parameters	CALPUFF default
MOZ	Ozone background (0 = constant background)	1
BCKO3	Ozone background (ppb)	Hourly Data Base Used
BCKNH3	Ammonia background	10
IRESPLIT	Hours when puff are eligible to split	17*0, 1, 6*0
NPT1	Number of point sources	1 (for project)
NREC	Number of user-defined receptors	830
Receptors	Location (see Figure 7-4)	boundary receptors at 1 km interval and 1 deg spacing along two arcs within ENP

Figure 7-5 Ozone Monitor Locations



7.3.5 Refined modeling results

Air Impact Analysis

The results of the CALPUFF refined modeling for 3-hour and 24-hour SO_2 are summarized in Table 7-9. The table lists the maximum modeled concentrations over the 5-year period. These results are for the three turbine stacks and are based on the maximum hourly SO_2 emissions for oil use. The refined modeled concentrations are still above the SILs. Note that when the restriction limiting daily oil usage to 60 turbine-hours per day is used (the same assumption applied to show insignificant regional haze impacts in the screening modeling), the maximum 24-hour impact is less than the 0.2 $\mu g/m^3$ SIL (i.e. 0.22 $\mu g/m^3$ x 60/72 = 0.18 $\mu g/m^3$). However, this restriction on daily oil usage has no affect on the 3-hour average impact of 1.11 $\mu g/m^3$ which is greater than the 1.0 $\mu g/m^3$ SIL. Therefore, interactive modeling of all PSD sources within 200 km of ENP was required to demonstrate compliance with the 3-hour and 24-hour SO_2 Class I increments.

To support the multi-source modeling analysis for increment consumption, an inventory of the SO_2 PSD sources within 200 km of ENP and corresponding permitted emissions and stack parameters was provided by FDEP. This inventory included increment expanding sources (negative emission source) as well as increment consuming (positive emissions sources). The SO_2 PSD source inventory and corresponding stack and emissions data are provided in Appendix H.

The results of the interactive modeling are summarized in Table 7-10. Compliance for short-term averaging periods (≤ 24 hours) is based on comparison of the highest second-highest modeled concentrations with the PSD Class I increments. Table 7-10 lists the highest second-highest concentrations computed by CALPUFF over the five years of meteorological data for all PSD sources as well as the contribution of the PBEC to the total. As shown in the table, the modeled concentrations are below both the 3-hour and 24-hour Class I PSD increments thus demonstrating compliance. Note that the PBEC does not contribute at all to the maximum concentrations predicted for all PSD sources.

Table 7-9 Comparison of Maximum Modeled Refined CALPUFF Concentrations Associated with PBEC to Class I Significant Impact Levels

Pollutant	Averaging Period	Maximum Concentration ($\mu g/m^3$)*	SIL ($\mu g/m^3$)
SO_2	3-hour	1.11	1.0
	24-hour	0.22	0.2
* Maximum short-term concentrations based on maximum hourly emissions for three turbines and unlimited daily oil use to be conservative.			

Table 7-10 Interactive Modeling Results and Class I PSD Increment Compliance Demonstration

Pollutant	Averaging Period	Maximum Concentration for All PSD Sources (μg/m³)*	PBEC Contribution (μg/m³)	PSD Class I Increment (μg/m³)
SO_2	3-hour	9.60	0.00	25
	24-hour	4.01	0.00	5

* Values shown are the highest second-highest concentrations computed by CALPUFF over all years of meteorological data.

Note: Modeling based on maximum PBEC hourly emissions for three turbines and unlimited daily oil use to be conservative.

<u>Acidic Deposition</u>

Refined CALPUFF modeling provided upper limit estimates of annual (wet and dry) deposition of sulfur and nitrogen compounds (kg/ha/yr) associated with emissions of SO_2 and NO_x from the proposed PBEC facility. The maximum modeled annual sulfur deposition is 1.11×10^{-2} kg/ha/yr and the maximum modeled nitrogen deposition is 1.06×10^{-3} kg/ha/yr.

As indicated by the NPS, there are no deposition significance thresholds for ENP. Measurements of wet deposition at ENP have been taken in 1998 and 1999 as part of the NADP. Although dry deposition values are currently being taken at ENP, measurements are not yet available. Therefore, consistent with FLAG Phase I guidance, the total existing deposition is estimated by doubling the wet deposition values. Using this convention, the estimated average annual sulfur deposition at ENP is 8 kg/ha/yr and the average nitrogen deposition is 7 kg/ha/yr. Given that the predicted PBEC deposition rates of sulfur and nitrogen are only about 0.1% and 0.02 %, respectively, of the existing deposition rates at ENP, the deposition impact of the PBEC emissions can be deemed insignificant.

7.3.6 Summary of Class I Assessment

The proposed Pompano Beach Energy Center is located about 60 km to the northeast of Everglades National Park, a Federal Class I Area. Two AQRVs identified at ENP are visibility and acidic deposition. Because of the distance to the Class I area, a long-range transport model, CALPUFF, was applied as recommended by U.S. EPA and the National Park Service. Through screening and refined CALPUFF modeling it has been demonstrated that:

1) Regional haze will not be adversely impacted by the PBEC project if oil use is limited to 60 turbine hours per day;

2) Although there are no deposition significance thresholds identified for ENP, acid deposition impacts, evaluated in the form of total sulfur and nitrogen deposition, are insignificant for the PBEC when compared to existing deposition measured at the ENP; and

3) Air quality impacts of all criteria pollutant are insignificant except for 3-hour and 24-hour SO_2, but interactive modeling of all SO_2 PSD sources within 200 km of the ENP demonstrates compliance with the PSD Class I increments

As such, PBEC meets all of the requirements pertaining to the maintenance of air quality increments and air quality related values at Everglades National Park.

APPENDIX F

KEY TO MODELING FILES ON CD-ROM

02/21/01

Key to files on CDROM - Pompano Beach Energy, L.L.C. Florida

- *Directory :\PompanoBeach\models – ISCST3, CALPUFF, CALPOST , CALMET, CALSUM executable codes*

- *Directory :\PompanoBeach\GEP-BPIP - contains BPIP input and output files*

  File Naming Convention:
  Pompgep.bpi - BPIP input file
  Pompgep.sum - BPIP input summary
  Pompgep.bpo - BPIP output file

- *Directory :\PompanoBeach\ISCST3\Natural Gas - contains ISCST3 input and output files for Natural Gas* modeled with an emission rate of 1 g/sec.

  File Naming Convention:
  NG10087 - Natural Gas with turbines at 100% load with 1987 met data, repeat for '88, '89, '90 and '91
  NG7587 - Natural Gas with turbines at 75% load with 1987 met data, repeat for '88, '89, '90 and '91
  NG5087 - Natural Gas with turbines at 50% load with 1987 met data, repeat for '88, '89, '90 and '91

- *Directory :\PompanoBeach\ISCST3\Distillate Oil - contains ISCST3 input and output files for Distillate Oil modeled with an emission rate of 1 g/sec.*

  File Naming Convention:
  O10087 - Distillate Oil with turbines at 100% load with 1987 met data, repeat for '88, '89, '90 and '91
  O7587 - Distillate Oil with turbines at 75% load with 1987 met data, repeat for '88, '89, '90 and '91
  O5087 - Distillate Oil with turbines at 50% load with 1987 met data, repeat for '88, '89, '90 and '91

- *Directory :\PompanoBeach\ISC3 Metdata - contains five years ISCST3 meteorological data, 1987-1991, West Palm Beach International Airport*

  File Naming Convention:
  12844-87 - 1987 meteorological data, repeat for '88,'89,'90 and '91

- *Directory :\PompanoBeach\Calpuff\Screening\Unlimited Oil – contains Screening Level CALPUFF and CALPOST files for worst-case short-term impacts based on unlimited oil firing for the turbines*

- *Directory :\PompanoBeach\Calpuff\Screening\Unlimited Oil\Annual – contains Screening Level CALPUFF and CALPOST files for annual impacts based on the turbines firing oil for 1000 hrs/year and natural gas for 2500 hours/year*

- *Directory :\PompanoBeach\Calpuff\Screening\Limited Oil- contains Screening Level CALPUFF and CALPOST files for short-term impacts based on oil firing limited to 60 turbine-hours/day. Modeling for regional haze only.*

- *Directory :\PompanoBeach\Calpuff\Calpost\Refined – contains Refined CALPUFF and CALPOST input and list files for SO_2 air increment modeling based on turbines at 100% load and unlimited oil firing*

- *Directory :\PompanoBeach\Calpuff\Calpost\Refined\Deposition – contains CALPOST input and list files for deposition modeling*

- *Directory :\PompanoBeach\Calpuff\Calpost\Refined\Multisource– contains Refined CALPUFF, CALPOST, CALSUM input and list files for SO_2 multi-source modeling to demonstrate compliance with the short-term increments*

- *Directory :\PompanoBeach\Calmet – contains CALMET input and list files*

  Contains all CALMET input and list files as well as all SAMSOM surface data, precipitation data, and upper air data for all weather stations.

- *Directory :\PompanoBeach\Calmet\Ozone – contains hourly ozone data input to CALPUFF refined modeling*

****

APPENDIX H

EXCERPT OF ISCST3 INPUT FILE PROVIDED BY FDEP CONTAINING SO_2 PSD CLASS I INVENTORY SOURCE PARAMETERS

```
** Source Location Cards:
**          SRCID SRCTYP          XS        YS        ZS
**                               UTM (m)   UTM (m)    (m)
** US SUGAR CLEWISTON FUTURE AND PSD BASELINE SOURCES
SO LOCATION  BLR1CR  POINT     506100.  2956900     0.
SO LOCATION  BLR2CR  POINT     506100.  2956900     0.
SO LOCATION  BLR3CR  POINT     506100.  2956900     0.
SO LOCATION  BLR4CR  POINT     506100.  2956900     0.
SO LOCATION  BLR7CR  POINT     506100.  2956900     0.
SO LOCATION  BLR1OF  POINT     506100.  2956900     0.
SO LOCATION  BLR2OF  POINT     506100.  2956900     0.
SO LOCATION  BLR3OF  POINT     506100.  2956900     0.
SO LOCATION  BLR4OF  POINT     506100.  2956900     0.
SO LOCATION  BLR7OF  POINT     506100.  2956900     0.
SO LOCATION  BLR1B   POINT     506100.  2956900     0.
SO LOCATION  BLR2B   POINT     506100.  2956900     0.
SO LOCATION  BLR3B   POINT     506100.  2956900     0.
SO LOCATION  EPELLET POINT     506100.  2956900     0.
SO LOCATION  WPELLET POINT     506100.  2956900     0.
**OTHER SOURCES

SO LOCATION SGARDDRY POINT     487600.  2957600.    0.
SO LOCATION SGARDBLR POINT     487600.  2957600.    0.
SO LOCATION OKCOGEN  POINT     525000.  2939400.    0.
SO LOCATION OKBLR4B  POINT     525000.  2939400.    0.
SO LOCATION OKBLR5B  POINT     525000.  2939400.    0.
SO LOCATION OKBLR6B  POINT     525000.  2939400.    0.
SO LOCATION OKBLR10B POINT     525000.  2939400.    0.
SO LOCATION OKBLR11B POINT     525000.  2939400.    0.
SO LOCATION SUGCN12  POINT     534900.  2953300.    0.
SO LOCATION SUGCN3   POINT     534900.  2953300.    0.
SO LOCATION SUGCN4   POINT     534900.  2953300.    0.
SO LOCATION SUGCN5   POINT     534900.  2953300.    0.
SO LOCATION SUGCN8   POINT     534900.  2953300.    0.
SO LOCATION SUGCN12B POINT     534900.  2953300.    0.
SO LOCATION SUGCN3B  POINT     534900.  2953300.    0.
SO LOCATION SUGCN4B  POINT     534900.  2953300.    0.
SO LOCATION SUGCN5B  POINT     534900.  2953300.    0.
SO LOCATION SUGCN67B POINT     534900.  2953300.    0.
SO LOCATION USBRY123 POINT     538800.  2968100.    0.
SO LOCATION USSBRY1B POINT     538800.  2968100.    0.
SO LOCATION USBRY23B POINT     538800.  2968100.    0.
SO LOCATION USSBRY5  POINT     538800.  2968100.    0.
SO LOCATION OSBLR2   POINT     544200.  2968000.    0.
SO LOCATION OSBLR3   POINT     544200.  2968000.    0.
SO LOCATION OSBLR4   POINT     544200.  2968000.    0.
SO LOCATION OSBLR5   POINT     544200.  2968000.    0.
SO LOCATION OSBLR6   POINT     544200.  2968000.    0.
SO LOCATION OSBLR1B  POINT     544200.  2968000.    0.
SO LOCATION OSBLR2B  POINT     544200.  2968000.    0.
SO LOCATION OSBLR3B  POINT     544200.  2968000.    0.
SO LOCATION OSBLR4B  POINT     544200.  2968000.    0.
SO LOCATION ATLSUG1  POINT     552900.  2945200.    0.
SO LOCATION ATLSUG2  POINT     552900.  2945200.    0.
SO LOCATION ATLSUG3  POINT     552900.  2945200.    0.
SO LOCATION ATLSUG4  POINT     552900.  2945200.    0.
SO LOCATION ATLSUG5  POINT     552900.  2945200.    0.
```

```
SO LOCATION ATLSUG1B POINT    552900.  2945200.   0.
SO LOCATION ATLSUG2B POINT    552900.  2945200.   0.
SO LOCATION ATLSUG3B POINT    552900.  2945200.   0.
SO LOCATION ATLSUG4B POINT    552900.  2945200.   0.
SO LOCATION MART34   POINT    543100.  2992900.   0.
SO LOCATION MARTAUX  POINT    543100.  2992900.   0.
SO LOCATION MARTGEN  POINT    543100.  2992900.   0.
SO LOCATION MARTCTs  POINT    543100.  2992900.   0.
SO LOCATION BECHTIND POINT    545600.  2991500.   0.
SO LOCATION PRATARCH POINT    559200.  2978300.   0.
SO LOCATION PRATBO12 POINT    559200.  2978300.   0.
SO LOCATION PBCRRF   POINT    585800.  2960200.   0.
SO LOCATION LEERRF   POINT    424000.  2946000.   0.
SO LOCATION FMU1     POINT    422100.  2952900.   0.
SO LOCATION FMU2     POINT    422100.  2952900.   0.
SO LOCATION FMYHR1_6 POINT    422100.  2952900.   0.
SO LOCATION LAKWTHHR POINT    592800.  2943700.   0.
SO LOCATION NBRRF    POINT    583600.  2907600.   0.
SO LOCATION SBRRF    POINT    579600.  2883300.   0.
SO LOCATION LAUDU45  POINT    580100.  2883300.   0.
SO LOCATION FTLAU45B POINT    580100.  2883300.   0.
SO LOCATION DCRRF12  POINT    564300.  2857400.   0.
SO LOCATION DCRRF34  POINT    564300.  2857400.   0.
SO LOCATION TARMAC2P POINT    562900.  2861700.   0.
SO LOCATION TARMAC2B POINT    562900.  2861700.   0.
SO LOCATION TARMAC3P POINT    562900.  2861700.   0.
SO LOCATION TARMAC3B POINT    562900.  2861700.   0.
SO LOCATION VERBU5   POINT    567100.  3056500.   0.

** Source Parameter Cards:
** POINT:   SRCID        QS       HS          TS     VS          DS
**                     (g/s)      (m)         (K)   (m/s)        (m)
** US SUGAR CLEWISTON FUTURE CROP AND OFF-CROP PSD 0510003
SO SRCPARAM  BLR1CR   74.48      65.0        347.0        19.20        2.44
SO SRCPARAM  BLR2CR   74.12      65.0        338.7        17.31        2.44
SO SRCPARAM  BLR3CR   47.48      65.0        333.2         8.47        2.44
SO SRCPARAM  BLR4CR    4.54      45.7        344.3        24.02        2.51
SO SRCPARAM  BLR7CR   15.81      68.6        405.4        23.59        2.59
SO SRCPARAM  BLR1OF   24.29      65.0        347.0        14.05        2.44
SO SRCPARAM  BLR2OF   24.02      65.0        338.7        12.68        2.44
SO SRCPARAM  BLR3OF   30.20      65.0        333.2         6.19        2.44
SO SRCPARAM  BLR4OF    0.00      45.7        344.3        24.02        2.51
SO SRCPARAM  BLR7OF   15.81      68.6        405.4        23.59        2.59
** US Sugar Clewiston Unit 1,2,3 East, West Pellet PSD Baseline 0510003
SO SRCPARAM BLR1B     -58.21     23.1     344.0   30.20     1.86
SO SRCPARAM BLR2B     -58.21     23.1     343.0   35.70     1.86
SO SRCPARAM BLR3B     -33.20     27.4     342.0   14.70     2.29
SO SRCPARAM EPELLET   -10.30     12.2     347.0    8.54     1.52
SO SRCPARAM WPELLET   -10.30     15.7     347.0    8.54     1.52
**Southern Gardens Citrus PSD Permit Application 0510015, Peel Dryer, B 1-3
SO SRCPARAM SGARDDRY    5.29     38.1     316.0   7.45    1.73
SO SRCPARAM SGARDBLR    6.88     16.8     478.0   14.22   1.22
**Okeelanta Cogeneration Units 1,2,3 0990005
SO SRCPARAM OKCOGEN     27.0     68.6     438.7   17.46     3.05
**Okeelanta Boilers 4,5,6, 10, 11 PSD Baseline 0990005
SO SRCPARAM OKBLR4B     -10.95     22.9     333.0    7.36     2.29
SO SRCPARAM OKBLR5B     -15.64     22.9     333.0   12.07     2.29
```

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SO SRCPARAM OKBLR6B     -15.64    22.9    334.0    8.74      2.29
SO SRCPARAM OKBLR10B    -17.15    22.9    334.0   10.35      2.29
SO SRCPARAM OKBLR11B    -16.79    22.9    342.0    9.89      2.29
**  Sugar Cane Growers Blr 4 stack change, Blrs 6&7 shutdown, Blr 8 PSD
**  Boilers 1&2, 3, 4, 5,8  0990026
SO SRCPARAM SUGCN12      41.20    45.7    339.0   21.75     1.87
SO SRCPARAM SUGCN3       16.20    27.4    339.0   22.25     1.52
SO SRCPARAM SUGCN4       38.20    54.9    339.0   21.73     2.44
SO SRCPARAM SUGCN5       27.90    45.7    339.0   15.94     2.30
SO SRCPARAM SUGCN8       23.50    47.2    339.0   13.62     2.90
**  Sugar Cane Growers Boilers 1&2, 3, 4, 5, 6&7 PSD Baseline 0990026
SO SRCPARAM SUGCN12B   -24.20    24.4    344.0   11.40     1.40
SO SRCPARAM SUGCN3B     -4.40    24.4    344.0   15.60     1.60
SO SRCPARAM SUGCN4B    -24.20    25.9    344.0   11.20     1.63
SO SRCPARAM SUGCN5B    -16.20    24.4    344.0   15.20     1.40
SO SRCPARAM SUGCN67B   -51.00    12.2    606.0   11.20     1.52
**   US Sugar Bryant Boiler 5, Boilers 1&2&3 0990061
SO SRCPARAM USSBRY5     45.70    42.7    345.0   11.49     2.90
SO SRCPARAM USBRY123   109.50    19.8    342.0   36.40     1.64
**   US Sugar Bryant Boilers 1, 2&3 PSD Baseline
SO SRCPARAM USSBRY1B   -36.50    19.8    494.0   44.30     1.68
SO SRCPARAM USBRY23B   -73.00    19.8    344.0   37.90     1.68
** Osceola Farms Current Boilers 2,3, 4,5, 6  0990016
SO SRCPARAM OSBLR2      17.12    27.4    339.0   18.63     1.52
SO SRCPARAM OSBLR3      30.74    27.4    344.0   14.34     1.92
SO SRCPARAM OSBLR4      17.12    27.4    344.0   16.53     1.83
SO SRCPARAM OSBLR5      18.00    27.4    344.0   17.85     1.52
SO SRCPARAM OSBLR6      33.39    27.4    339.0   18.25     1.92
** Osceola Boiler 1,2,3,4  Baseline offsets
SO SRCPARAM OSBLR1B     -5.07    22.0    342.0    8.18     1.52
SO SRCPARAM OSBLR2B    -16.32    22.0    341.0   18.10     1.52
SO SRCPARAM OSBLR3B     -7.26    22.0    341.0   14.50     1.93
SO SRCPARAM OSBLR4B    -13.61    22.0    341.0   18.80     1.83
** Atlantic Sugar  Boilers 1, 2, 3, 4, 5  0990016
SO SRCPARAM ATLSUG1  16.28   27.4   346.0   17.97   1.83
SO SRCPARAM ATLSUG2  16.28   27.4   350.0   23.36   1.83
SO SRCPARAM ATLSUG3  16.02   27.4   350.0   21.56   1.83
SO SRCPARAM ATLSUG4  16.21   27.4   344.0   25.16   1.83
SO SRCPARAM ATLSUG5  8.04    27.4   339.0   19.24   1.68
** Atlantic Sugar Boilers 1, 2, 3, 4 PSD Baseline  0990016
SO SRCPARAM ATLSUG1B -17.24  18.9   506.0   12.70   1.92
SO SRCPARAM ATLSUG2B -22.50  18.9   511.0   10.90   1.92
SO SRCPARAM ATLSUG3B -16.88  21.9   522.0   17.50   1.83
SO SRCPARAM ATLSUG4B -10.76  18.3   344.0   15.00   1.83
** FPL Martin Aux Boil PSD, DiesGen PSD  Units 3,4 PSD, simple cy CT
** 0850001
SO SRCPARAM MARTAUX  12.90   18.3   535.4   15.24   1.10
SO SRCPARAM MARTGEN  0.51    7.6    785.9   39.62   0.30
SO SRCPARAM MART34   470.40  64.9   410.9   18.90   6.10
SO SRCPARAM MARTCTs  25.98   18.3   853.2   37.63   6.17
** Bechtel Indiantown 0850102
SO SRCPARAM BECHTIND 75.64   150.9  333.2   30.5    4.88
** Pratt and Whitney Heater, Boiler BO-12 0990021
SO SRCPARAM PRATARCH 13.99   15.2   810.9   143.73  0.91
SO SRCPARAM PRATBO12  0.51   4.6    533.2   6.92    0.76
** Palm Beach Co Resource Recovery    0990234
SO SRCPARAM PBCRRF   85.05   76.2   505.2   24.90   2.04
```

```
** Lee County RRF  0360119
SO SRCPARAM LEERRF   14.00    83.8    388.5   19.81   1.88
** FPL  Fort Myers Unit1PSD, Unit2 PSD, HRSGs1-6  0710002
SO SRCPARAM FMU1     -585.50 91.8     422.0   29.90   2.90
SO SRCPARAM FMU2     -1334.0 121.2    408.0   19.20   5.52
SO SRCPARAM FMYHR1_6 3.86    38.1     377.6   14.20   5.79
** Lake Worth Utilies HRSG 0500045
SO SRCPARAM LAKWTHHR 12.79   45.7     377.6   13.74   5.49
** North Broward RRF PSD 112120
SO SRCPARAM NBRRF    35.400  58.50    381.0   18.01   3.96
** South Broward RRF PSD
SO SRCPARAM SBRRF    37.910  59.44    381.0   17.98   3.96
** FPL Ft. Lauderdale CT's 1-4 PSD, 4&5 Baseline
SO SRCPARAM LAUDU45  271.15  45.7     438.7   14.60   5.49
SO SRCPARAM FTLAU45B -457.4  46.00    422.0   14.63   4.27
** Dade County RRF PSD Units 1&2, Units 3&4
SO SRCPARAM DCRRF12  12.320  76.2     405.4   15.86   3.66
SO SRCPARAM DCRRF34  12.320  76.2     405.4   15.86   3.66
** Tarmac Kiln 2, 3 PSD Baseline
SO SRCPARAM TARMAC2B -5.71   60.96    465.0   12.84   2.44
SO SRCPARAM TARMAC3B -2.76   60.96    472.0   10.78   4.57
** Tarmac Kiln 2, 3 PSD
SO SRCPARAM TARMAC2P 24.57   60.96    422.0    9.10   2.44
SO SRCPARAM TARMAC3P 51.43   60.96    450.0   11.03   4.57
** Vero Beach Power Unit 5 Simple Cycle CT
SO SRCPARAM VERBU5   15.50   38.1     416.5   19.56   3.35


** Monthly Emission Factors for Sugar Mill Sources
SO EMISFACT BLR1CR-BLR7CR      MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT BLR1OF-BLR7OF      MONTH 0 0 0 0 1 1 1 1 1 0 0 0
SO EMISFACT BLR1B-BLR3B        MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT EPELLET            MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT WPELLET            MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT ATLSUG1-ATLSUG4    MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT ATLSUG1B-ATLSUG4B  MONTH 1 1 1 1 1 0 0 0 0 0 1 1
SO EMISFACT OKBLR4B-OKBLR11B   MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT OSBLR2-OSBLR6      MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT OSBLR1B-OSBLR4B    MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT SUGCN3-SUGCN8      MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT SUGCN12            MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT SUGCN3B-SUGCN5B    MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT SUGCN12B           MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT SUGCN67B           MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT USSBRY5            MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT USBRY123           MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT USSBRY1B           MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT USBRY23B           MONTH 1 1 1 1 0 0 0 0 0 1 1 1
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Pompano Beach Energy, L.L.C.

Houston, TX

PSD Permit Application for the Pompano Beach Energy Center

ENSR International
Revised February 2001
Document Number 6792-140-100R

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CONTENTS (Cont'd)

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4. Professional Engineer Statement:

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

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

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

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

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

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

2/20/01

Signature EMBOSSED METALLIC

(seal)

Date 2/20/01

* Attach any exception to certification statement.

Revision Sheet
PSD Permit Application – Pompano Beach Energy Center, LLC
ENSR Document 6792-140-100R
February 21, 2001

Section	Page Number	Modification
7.0	Entire section	Revised Section 7.3 (Class I Area Impact Analysis) to address comments from the National Park Service on the Class I Modeling Protocol
App. F	Entire appendix	Updated key to files on CD-ROM containing new CALPUFF modeling results
App. H	Entire appendix	New appendix containing PSD source inventory used in Class I cumulative increment analysis for SO_2 .
Cover Page		Updated document date to reflect this February 2000 revision
T of C	Pages I to vi	Updated table of contents

7.0 ADDITIONAL IMPACTS

The preceding sections of this permit application have focused on demonstrating the proposed action will incorporate Best Available Control Technology and will not have a significant impact on air quality. Beyond consideration of these basic air quality concerns, PSD regulations require a review of some of the more subtle effects a project may induce. The following section discusses the potential impacts which may result from the proposed project with respect to the following:

- Vegetation and Soils
- Associated Growth
- PSD Class I Area Impacts – Air Quality Increments, Regional Haze, and Deposition

7.1 Vegetation and Soils

The project lies in an area of primarily agricultural use. No significant off-site impacts are expected from the proposed action. Therefore, the potential for adverse impacts to either soils or vegetation is minimal. The following discussion reviews the project's potential to impact its surroundings, based on the facility's PTE and the model-predictions of maximum ground level concentrations of SO_2, NO_x and CO, the PSD-applicable pollutants of concern for potential impact to soils and vegetation.

The criteria for evaluating impacts on soils and vegetation is taken from U.S. EPA's A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils and Animals (U.S. EPA 1980). Table 7-1 lists the U.S. EPA suggested criteria for the gaseous pollutants emitted directly from the proposed facility and the predicted facility impacts. These criteria are established for sensitive vegetation and crops exposed to the effects of the gaseous pollutants through direct exposure. Adverse impacts on soil systems result more readily from the secondary effects of these pollutants' impacts on the stability of the soil system. These impacts could include increased soil temperature and moisture stress and/or increased runoff and erosion resulting from damage to vegetative cover. Thus, the Table 7-1 criteria have been applied to the proposed facility to evaluate impacts on both soils and vegetation. As shown in Table 7-1, the results clearly indicate that no adverse impacts will occur to sensitive vegetation, crops, or soil systems as a result of operation of the proposed facility.

Table 7-1 Comparison to U.S. EPA Criteria for Gaseous Pollutant Impacts on Natural Vegetation and Crops

Pollutant	Averaging Time*	Minimum Impact Level for Affects On Sensitive Plants ($\mu g/m^3$)	Maximum Impact of Proposed Facility ($\mu g/m^3$)
SO_2	1 hour	917	10.27
	3 hours	786	3.94
	Annual	18	0.009
NO_x	4 hours	3760	12.40
	8 hours	3760	7.53
	1 month	564	2.72
	Annual	94	0.034
CO	1 week	1,800,000	2.88

*** 24-hour average used to conservatively represent 1-week and 1-month average impacts and 3-hour average used to conservatively represent 4-hour average impact.**

7.2 Associated Growth

The proposed project will employ approximately 200 personnel during the construction phase. The project will employ approximately 10 personnel on a permanent basis. It is a goal of the project to hire from the local community when possible. There should be no substantial increase in community growth, or need for additional infrastructure. It is not anticipated that the proposed action will result in an increase in secondary emissions associated with non-project related activities. Therefore, in accordance with PSD guidelines, the analysis of ambient air quality impacts need consider only emissions from the facility itself.

7.3 Class I Area Impact Analysis

The nearest PSD Class I area to the proposed facility is the Everglades National Park (ENP) located about 60 km to the southwest (see Figure 7-1). Given that the Class I area is greater than 50 km from the proposed facility, long-range transport modeling is required for the Class I impact assessment. The analysis used the CALPUFF model to evaluate the potential impact of the proposed facility emissions in terms of air quality increments and two Air Quality Related Values (AQRVs), regional haze and deposition of sulfur and nitrogen compounds. Unlike PSD Increments that are numerical values of ambient concentration of criteria pollutants that cannot be exceeded, AQRVs and the determination of significance are established by the designated FLM. Class I area modeling for ENP is based on a protocol (ENSR Document 6792-140-101) that was submitted to John Notar of the National Park Service in October 2000. Comments on the protocol provided by John Notar in December 2000 have been incorporated in the analysis. In addition, the analysis incorporates recommendations from Mr. Notar based on his later review of sample CALPUFF model input files prepared for the PBEC.

Figure 7-1 Location of Pompano Beach Energy with Respect to Everglades National Park

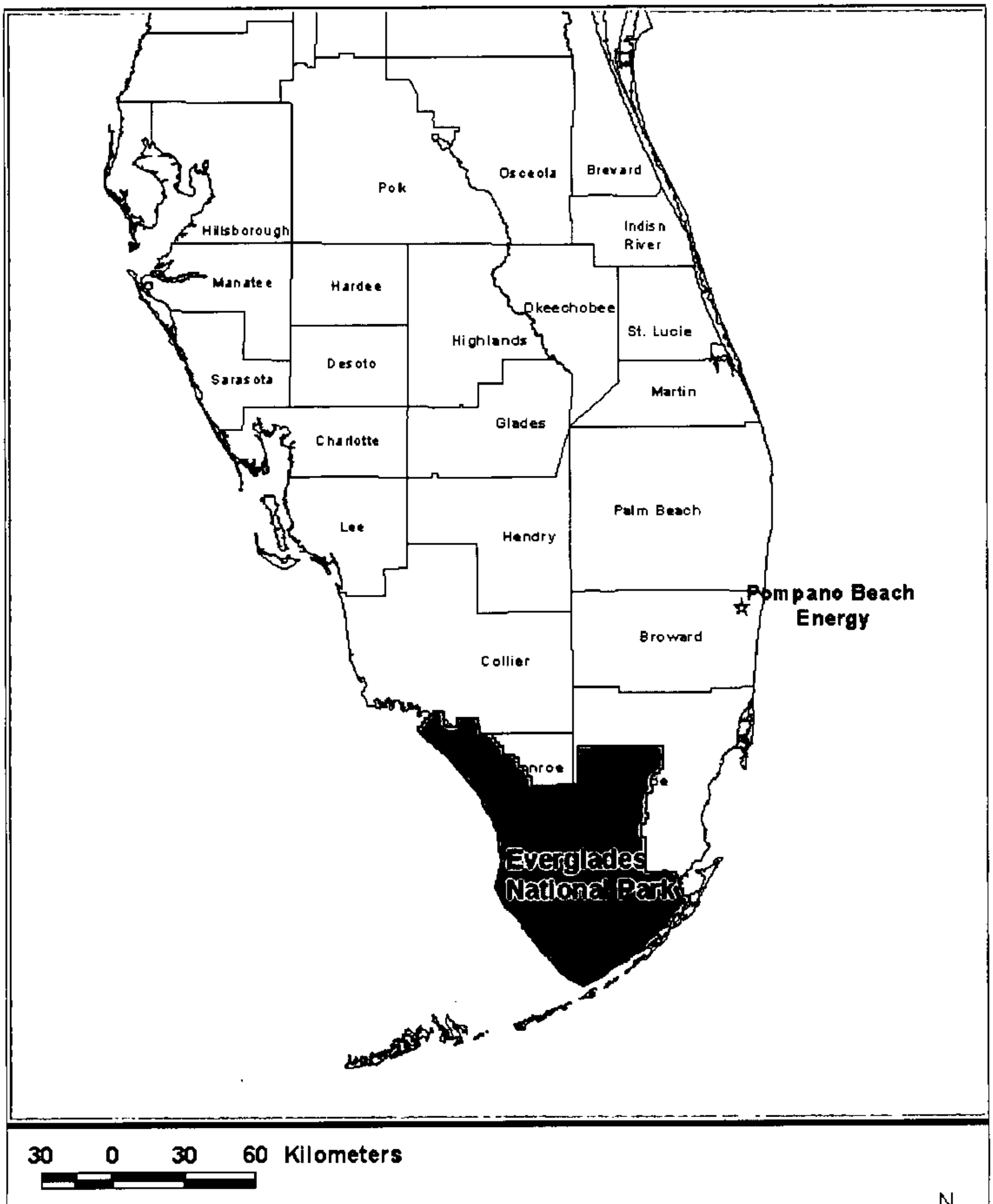

Figure 7-1
Location of Pompano Beach Energy with Respect to Everglades National Park

The air quality dispersion model that was used to address the project's impacts is CALPUFF version 5.4 (level 000602; see Earth Tech web site). The first step was to run CALPUFF in a conservative screening mode. Because the screening level modeling indicated the potential for SO_2 concentrations to exceed the Class I significant impact levels, a refined application of CALPUFF was also conducted.

7.3.1 Class I Area Impact Criteria

7.3.1.1 Significant Impact Levels

Class I Significant Impact Levels were compared to the modeled impacts of the PBEC project to determine the need for a cumulative analysis of air quality impacts on the Class I area. Class I Significant Impact Levels, as proposed by EPA in the NSR reform (Federal Register, July 23, 1996), are listed in Table 7-2.

Table 7-2 PSD Class I Significant Impact Levels (μg/m^3)

Pollutant	3-Hr*	24-Hr*	Annual*
SO_2	1.0	0.2	0.1
NO_2	NA	NA	0.1
PM_{10}	NA	0.3	0.2

* Maximum modeled concentration for the respective averaging period

7.3.1.2 PSD Increments

If the PBEC project impacts exceed the PSD Significant Impact levels for any pollutant, a cumulative impact assessment for that pollutant will be triggered. Class I PSD Increments are provided in Table 7-3.

Table 7-3 PSD Class I Area Increments (μg/m3)

Pollutant	3-Hr*	24–Hr*	Annual**
SO_2	25	5	2
NO_2	NA	NA	2.5
PM_{10}	NA	8	4

* highest of the second-highest modeled concentrations at any receptor

**highest arithmetic mean concentration at any receptor

7.3.1.3 Air Quality Related Values

For Air Quality Related Values (AQRVs), there are no uniform criteria or standards upon which a modeled impact is determined to be acceptable. For each Class I area the Federal Land Manager applies judgement based on site-specific conditions and established guidelines. The AQRV guidelines that are understood to apply to ENP are discussed below.

Regional Haze

The visibility (regional haze) analysis computes the maximum 24-hour average light extinction associated with modeled sources and compares it to the background extinction. The background extinction values (supplied by John Notar of the National Park Service) correspond to periods of good visibility, representing the 90th percentile visual range in ENP.

The interpretation as to whether, or the extent to which, a modeled extinction value represents visibility impairment is at the discretion of the Federal Land Manager (FLM). Recent PSD interpretations by the National Park Service indicate that a project-related change in extinction is determined to be insignificant if it is less than 5% of the background extinction or if the number of days in a year that modeled values exceed 5% are limited. If this is not the case, the FLM may request a more refined assessment be conducted.

Acidic Deposition

CALPUFF was applied to obtain upper limit estimates of annual wet and dry deposition of sulfur and nitrogen compounds (kg/ha/yr) associated with emissions of SO_2 and NO_x from the proposed facility. Specifically, CALPUFF was used to model both wet and dry deposition of SO_2, SO_4, NO_3 and HNO_3 as well as dry deposition of NO_x to estimate the maximum annual wet and dry deposition of sulfur (S) and nitrogen (N).

Measurements of wet deposition at ENP have been taken in 1998 and 1999 as part of the National Acidic Deposition Program (NADP). Although dry deposition values are currently being taken at ENP, measurements are not yet available. However, consistent with FLAG Phase I guidance, the total existing deposition can be estimated by doubling the wet deposition values. Using this convention, the estimated average annual sulfur deposition at EVP is 8 kg/ha/yr and the average nitrogen deposition is 7 kg/ha/yr.

Dee Morse of the NPS has indicated that critical load guidelines for acidic deposition have not been established for ENP. However, it can be reasonably expected that if modeled sulfur and nitrogen deposition values associated with facility emissions are small in comparison to background deposition the NPS will determine the contribution of PBEC to acidic deposition at ENP to be insignificant. Given that refined modeling was required for the SO_2 increment analysis, a screening level deposition analysis was bypassed and refined CALPUFF deposition modeling for deposition was conducted to provide a more accurate estimate of deposition.

7.3.2 PBEC Emission Parameters

For the Class I area air quality increment assessment of pollutants with short-term average criteria (≤ 24-hour) and regional haze analysis (24-hour criteria), CALPUFF was applied with the maximum short-term emission rates for the PBEC turbine stacks. Maximum hourly emissions are associated with 100% load operation and distillate oil firing. For the annual air quality increment analysis and the deposition analysis, modeling was conducted with the maximum short-term emission limits for natural gas and oil weighted by the corresponding annual capacity factors for the worst-case operating schedule (i.e., 1000 hours/year on oil and 2500 hours/year on gas). In addition, note that for the CALPUFF modeling it will be assumed that 100% of the primary particulate are in the fine particulate size category.

7.3.3 CALPUFF Screening Modeling

7.3.3.1 Dispersion Model

CALPUFF Version 5.4, Level 000602 in Screen mode was applied using ISCST3 meteorological input data to ascertain the impacts on ENP. As recommended by John Notar, the partial plume penetration option in CALPUFF was used. The only exception to the IWAQM Phase II default technical options, as previously recommended by the NPS for other CALPUFF screening applications (Colorado Department of Public Health and Environment document entitled "Long-range Transport Model Selection and Application") was the option for no transitional plume rise. Note that the modeling is not sensitive to the plume rise option given the relatively large distance from the PBEC to the Class I area.

7.3.3.2 Meteorological Data

Five years of regionally representative meteorological data were used as input to CALPUFF screening mode. The source of the surface data was the Solar and Meteorological Surface Observation Network (SAMSON) data set that has been produced by National Data Climatic Center. Hourly SAMSON surface data for Miami International Airport supplemented with precipitation data (obtained from NCDC in TD3240 format) for the 5-year period 1986-1990 was used along with concurrent upper data from West Palm Beach.

The PCRAMMET program was used to process the meteorological data into a format that the CALPUFF model accepts for the screening runs, including both wet and dry deposition parameters, as well as additional records such as potential temperature lapse rate, wind speed power law exponent, short-wave solar radiation, and relative humidity.

7.3.3.3 Receptors

Four rings of receptors were centered on PBEC at distances bracketing ENP as shown in Figure 7-2. These distances represent the nearest boundary, the central portion, and the farthest boundary of the ENP with respect to the proposed project. As recommended in the IWAQM Phase II report, receptors were placed at 1-degree intervals over a 360 degree arc along each ring. This conservative receptor array is required to account for the potential short-comings of the use one meteorological data station in the screening level analysis versus the wind-field generated for the refined analysis from many meteorological stations. Given that the terrain is flat, the all receptors were at the same height as the base of the source.

7.3.3.4 Screening Model Results

<u>Air Impacts Analysis</u>

CALFUFF in the screening mode was used to model the maximum ambient concentrations to compare to Class I Area SILs. The CALPOST program was used to obtain pollutant specific impacts for the pertinent averaging periods. The screening results are summarized in Table 7-4. As shown in the table, the maximum 3-hour and 24-hour SO_2 impacts are greater than the SILs while the maximum impacts for annual SO_2, 24-hour and annual PM_{10}, and annual NO_x are less than the SILs. Therefore, refined CALPUFF modeling was conducted to further refine the 3-hour and 24-hour SO_2 impacts.

Table 7-4 Comparison of Maximum Modeled Refined CALPUFF Concentrations Associated with PBEC to Class I Significant Impact Levels

Pollutant	Averaging Period	Maximum Concentration (μg/m³)*	Class I SIL (μg/m³)
NO_2	Annual	0.021	0.1
PM_{10}	24-hour	0.187	0.3
	Annual	0.004	0.2
SO_2	3-hour	1.64	1.0
	24-hour	0.517	0.2
	Annual	0.007	0.1

* Maximum short-term concentrations based on maximum hourly emissions for three turbines operating on oil and annual concentrations based on a worst-case operating schedule of 2500 hours/year on natural gas and 1000 hours/year on oil.

Regional Haze

CALPUFF and CALPOST processing were used for the regional haze analysis. The CALPUFF screening modeling was conducted with a background ozone concentration of 23.5 ppb (provided by John Notar) and a background concentration of ammonia of 10 ppb (representative of grasslands as listed in the IWAQM Phase II report). The computation of incremental background light extinction due to the proposed project used the option to calculate extinction from speciated particulate matter measurements. In CALPOST, the maximum relative humidity value for the particle growth curve was capped at 95% (RHMAX = 95.0). Additionally, annual background values of the extinction coefficients for ENP provided by John Notar of the NPS (corresponding to 90th percentile of measured values) were used. Annual averages of the dry hygroscopic (divided by 3) and non-hygroscopic components of the background extinction coefficient were input to CALPOST as ammonium sulfate and soil, respectively. Those annual averages are 5.59 for the dry hygroscopic background extinction and 14.91 for the non-hygroscopic, in units of inverse megameters. The Rayleigh scattering extinction coefficient was specified as the default 10 inverse megameters.

Initially, CALPUFF modeling of regional haze impacts was conducted with the maximum short-term emission rates for the combustion turbines (i.e., unlimited operation of 3 turbines on oil for 24-hours). These results are summarized in Table 7-5. As shown in the table, the maximum extinction change from the background never exceeds 10% but is greater than 5% for each year modeled for up to 8 days per year. In order to mitigate the potential for an adverse regional haze impact, the PBEC will accept an enforceable permit condition to limit the number of hours that oil can be fired in all three units in a 24-hour period. That is, oil use will be limited to a total of 60 turbine-hours/day. To simulate this in CALPUFF, an additional modeling iteration for regional haze was performed with the maximum hourly oil emission rates for three turbines scaled by 60/72 (i.e., a maximum of 60 turbine-hours on oil out of a possible 72 turbine-hours in a 24-hour period). Therefore, the scaled maximum hourly emissions rates for SO_2, PM_{10}, and NO_x, are representative of a daily maximum limit of 60 turbine-hours on oil. The results for limited daily oil use are summarized in Table 7-6. The table shows that the maximum change in extinction associated with the PBEC project is 7.0% and the 5% change threshold is exceeded no more than 3 days in any year modeled. Thus in limiting oil use in the turbines to a total of 60 turbine-hours/day, the PBEC project will not have an adverse regional haze impact and no further modeling is necessary.

Table 7-5 Maximum 24-Hour Average Regional Haze Impacts of PBEC for Unlimited Daily Oil Use

Model Year	Maximum Extinction Change from Background (%)	Number of Days Maximum Change from Background is > 5%
1986	5.37	4
1987	7.44	8
1988	8.40	7
1989	5.81	3
1990	8.00	6
Note: Results based on maximum hourly emissions for three turbines firing oil.		

Table 7-6 Maximum 24-Hour Average Regional Haze Impacts of PBEC for Limited Daily Oil Use

Model Year	Maximum Extinction Change from Background (%)	Number of Days Maximum Change from Background is > 5%
1986	4.48	0
1987	6.20	3
1988	7.01	3
1989	4.84	0
1990	6.66	3
Note: Results based on maximum hourly emissions for three turbines firing oil but oil firing limited to a total of 60 turbine-hours in a 24-hour period.		

Figure 7-2 Receptors Used in the CALPUFF Screening Analysis

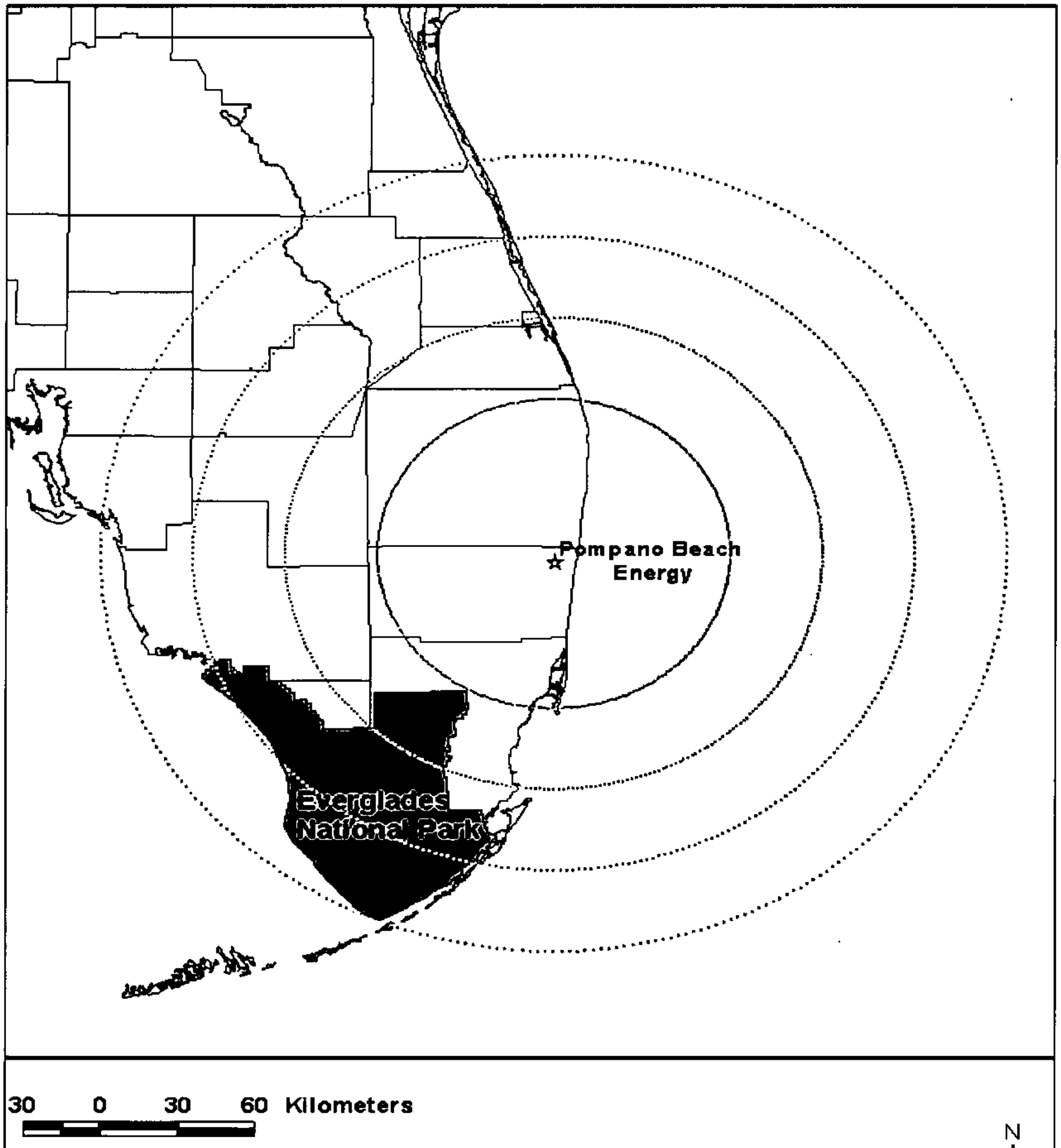

Figure 7-2
Receptors Used in the
CALPUFF Screening analysis

7.3.4 Refined CALPUFF Modeling

Given that CALPUFF screening predicted SO_2 concentrations greater than the SILs for the 3-hour and 24-hour averaging periods, refined CALPUFF modeling was performed to further resolve the PBEC impacts. In addition, deposition modeling for total sulfur and nitrogen was also conducted to obtain refined results.

7.3.4.1 Meteorological Wind Field Processing

As described in the IWAQM Phase II report, the major difference between CALPUFF screening and refined modeling applications is the incorporation of three dimensional meteorological wind fields. Five years of surface and upper air meteorological data (1986-1990) were obtained to generate a three-dimensional wind field grid over the modeling domain (500 km x 500 km) centered on the northern boundary of ENP, using CALMET. The grid spacing was 10 km. Figure 7-3 shows the stations that were used to generate the wind field and define the precipitation pattern. Surface stations included Key West, Miami, Tampa, and West Palm Beach and upper air stations used were Key West, Tampa, and West Palm Beach. Hourly precipitation data was obtained from Miami, Moorehaven, Key West, Tampa, West Palm Beach, Venice, Fort Meyers, Melbourne, and Homestead. The CALMET model parameter settings followed the recommendations in Appendix A of the IWAQM Phase II report.

7.3.4.2 Refined Receptors

Receptors were placed at 1 kilometer intervals along the boundary of the ENP and were supplemented with the portions of the model receptor rings used in the screening-level analysis that are within ENP. The refined receptor grid is provided in Figure 7-4.

7.3.4.3 Model Options and Parameters

CALGRID/CALPUFF modeling followed the input parameters recommended in Appendix B of the IWAQM Phase II report. Table 7-7 and Table 7-8 provide the discretionary user-specified CALGRID and CALPUFF control file variables, respectively. In addition, consistent with the CALPUFF screening analysis, the partial plume penetration option was used and transitional plume rise was not used. Hourly ozone data, concurrent with the meteorological data, from six FDEP monitoring sites and the ENP monitor were also used. The locations of the monitors are shown in Figure 7-5.

Figure 7-3 Meteorological Stations in South Florida

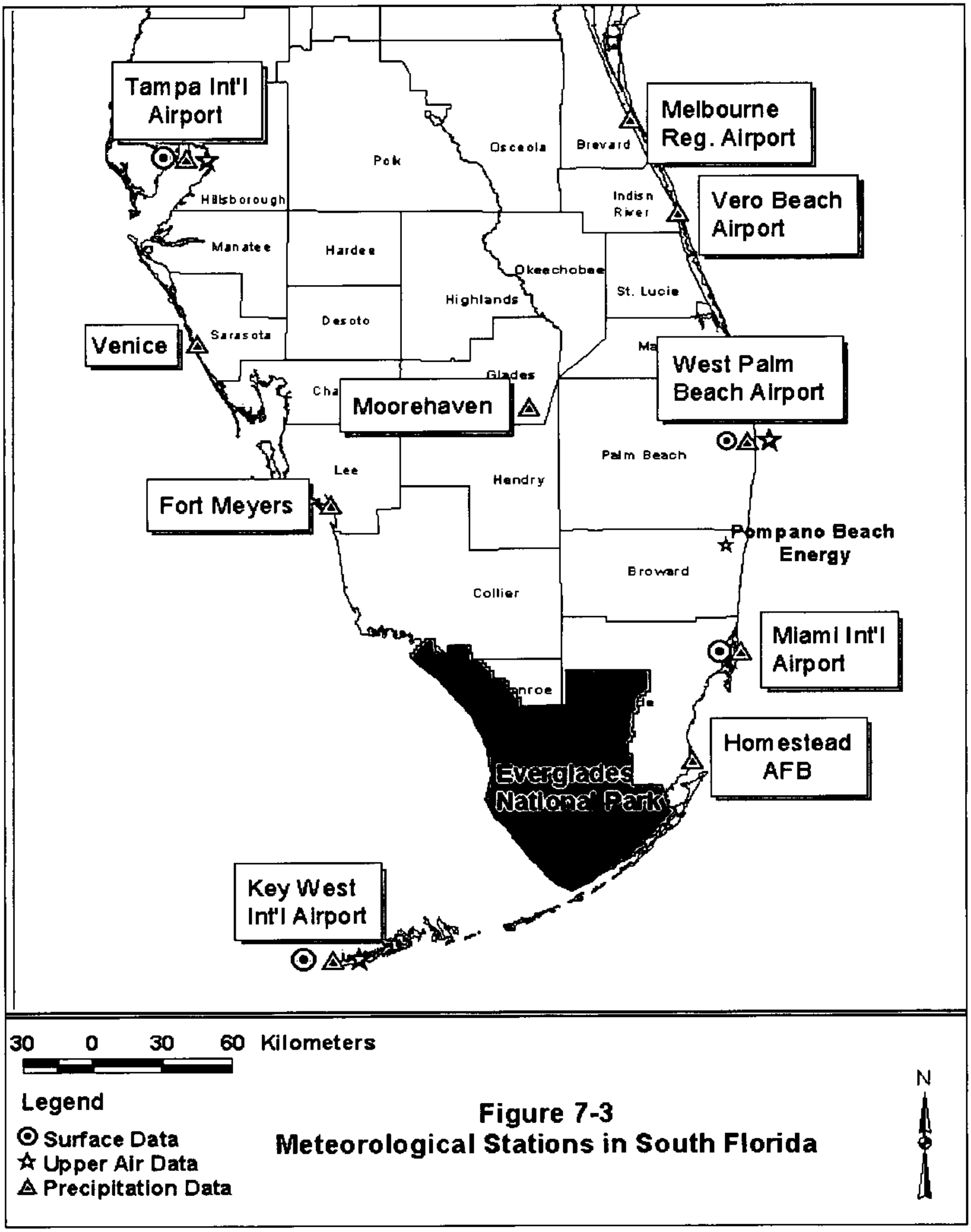

Figure 7-4 Refined Receptor Grid Covering The Everglades National Park

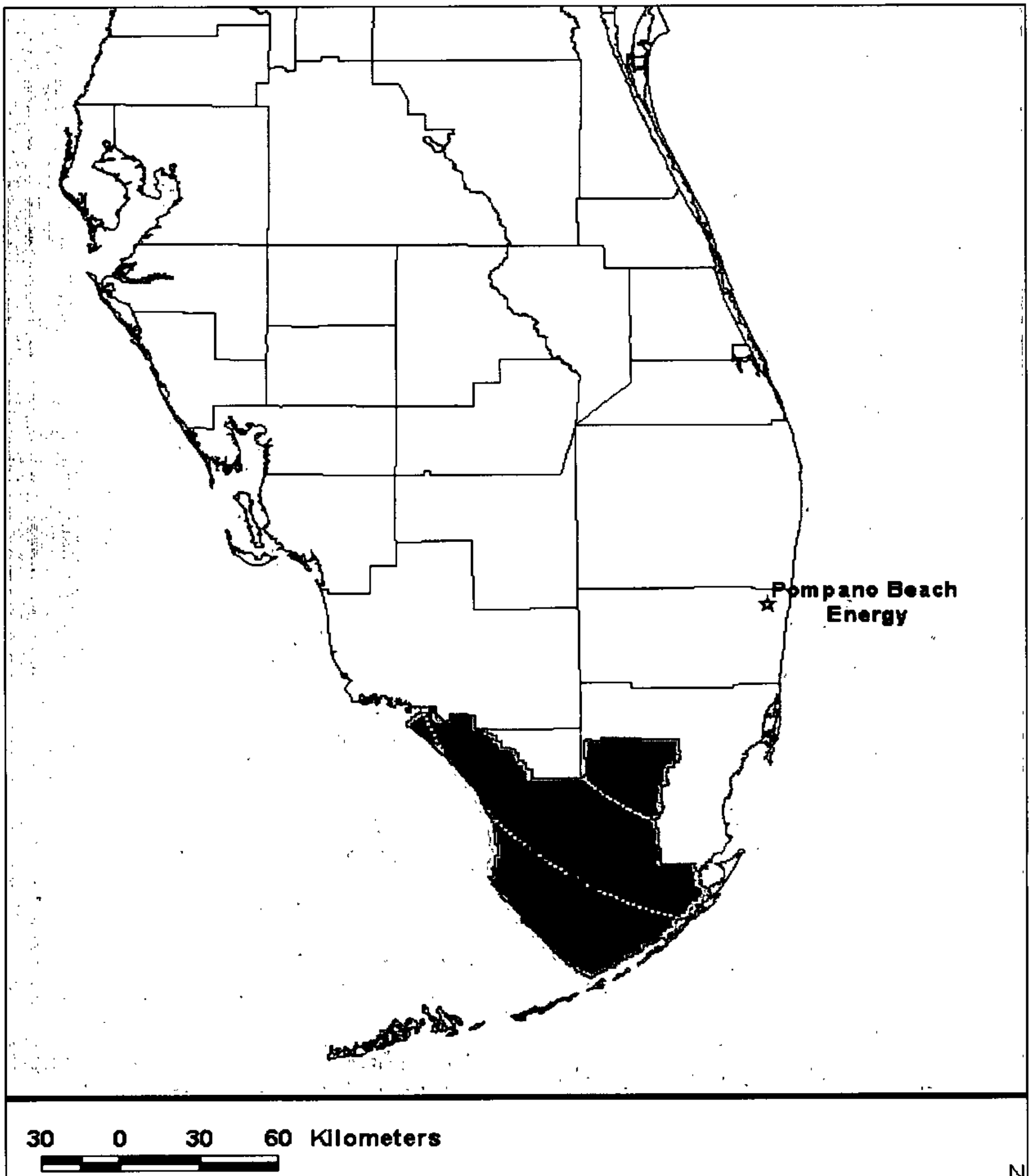

Figure 7-4
Refined Receptor Grid Covering The Everglades National Park

Table 7-7 CALMET User-Defined Fields not Specified in IWAQM Appendix A

Variable	Description	Value
NZ	Number of vertical layers	9
ZFACE	Vertical cell face heights (m)	20, 50, 100, 200, 400 800,1500, 2500, 4000
RMAX1	Max surface over-land extrapolation radius (km)	30
RMAX2	Max aloft over-land extrapolation radius (km)	30
RMAX3	Maximum over-water extrapolation radius (km)	50
RMIN	Min radius of influence for the wind field interpolation (km)	50
TERRAD	Radius of influence of terrain features (km)	10
R1	Relative weight at surface of Step 1 field and obs	1
R2	Relative weight aloft of Step 1 field and obs	1
ISURFT	Surface Station to use for surface temperature	West Palm Beach
IUPT	Station for lapse rates	West Palm Beach

Table 7-8 CALPUFF User-Defined Fields not Specified in IWAQM Appendix B

Variable	Description	Value
CSPECn	Names of Species	SO2, SO4, NOX, HNO3, NO3, PM10
NX	Number of east-west grids of input meteorology	50
NY	Number of north-south grids of input meteorology	50
NZ	Number of Vertical layers of input meteorology	9
DGRIDKM	Meteorology grid spacing (km)	10
IBCOMP	Southwest X-index of computational domain	1
JBCOMP	Southwest J-index of computational domain	1
IECOMP	Northeast X-index of computational domain	50
JECOMP	Northeast Y-index of computational domain	50
Dry Gas Dep	Chemical parameters of gaseous deposition	CALPUFF default
Dry Part. Dep	Chemical parameters of particle deposition	CALPUFF default
Wet Dep	Wet deposition parameters	CALPUFF default
MOZ	Ozone background (0 = constant background)	1
BCKO3	Ozone background (ppb)	Hourly Data Base Used
BCKNH3	Ammonia background	10
IRESPLIT	Hours when puff are eligible to split	17*0, 1, 6*0
NPT1	Number of point sources	1 (for project)
NREC	Number of user-defined receptors	830
Receptors	Location (see Figure 7-4)	boundary receptors at 1 km interval and 1 deg spacing along two arcs within ENP

Figure 7-5 Ozone Monitor Locations

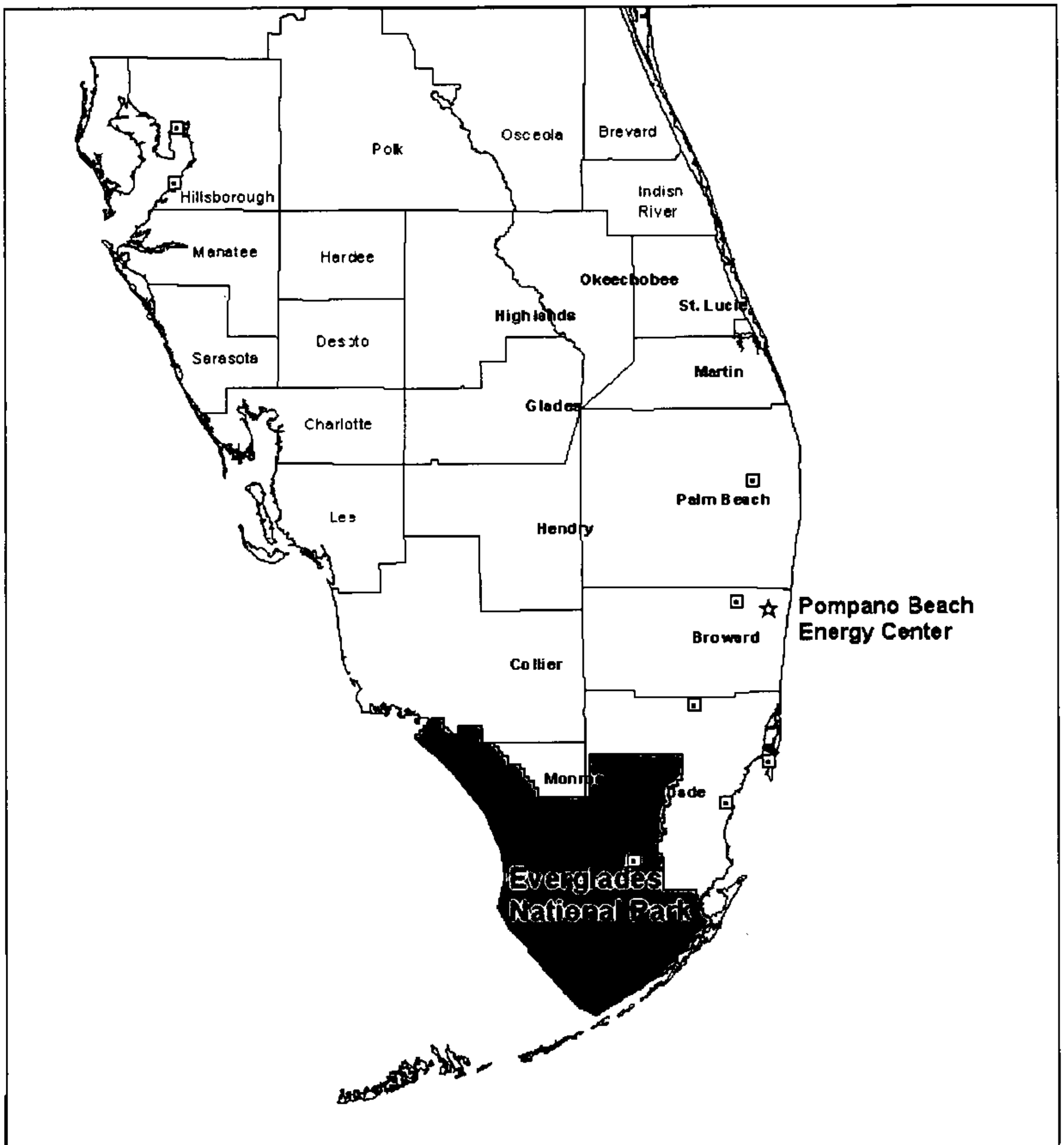

Figure 7-5
Ozone Monitor Locations

7.3.5 Refined modeling results

Air Impact Analysis

The results of the CALPUFF refined modeling for 3-hour and 24-hour SO_2 are summarized in Table 7-9. The table lists the maximum modeled concentrations over the 5-year period. These results are for the three turbine stacks and are based on the maximum hourly SO_2 emissions for oil use. The refined modeled concentrations are still above the SILs. Note that when the restriction limiting daily oil usage to 60 turbine-hours per day is used (the same assumption applied to show insignificant regional haze impacts in the screening modeling), the maximum 24-hour impact is less than the 0.2 $\mu g/m^3$ SIL (i.e. 0.22 $\mu g/m^3$ x 60/72 = 0.18 $\mu g/m^3$). However, this restriction on daily oil usage has no affect on the 3-hour average impact of 1.11 $\mu g/m^3$ which is greater than the 1.0 $\mu g/m^3$ SIL. Therefore, interactive modeling of all PSD sources within 200 km of ENP was required to demonstrate compliance with the 3-hour and 24-hour SO_2 Class I increments.

To support the multi-source modeling analysis for increment consumption, an inventory of the SO_2 PSD sources within 200 km of ENP and corresponding permitted emissions and stack parameters was provided by FDEP. This inventory included increment expanding sources (negative emission source) as well as increment consuming (positive emissions sources). The SO_2 PSD source inventory and corresponding stack and emissions data are provided in Appendix H.

The results of the interactive modeling are summarized in Table 7-10. Compliance for short-term averaging periods (≤ 24 hours) is based on comparison of the highest second-highest modeled concentrations with the PSD Class I increments. Table 7-10 lists the highest second-highest concentrations computed by CALPUFF over the five years of meteorological data for all PSD sources as well as the contribution of the PBEC to the total. As shown in the table, the modeled concentrations are below both the 3-hour and 24-hour Class I PSD increments thus demonstrating compliance. Note that the PBEC does not contribute at all to the maximum concentrations predicted for all PSD sources.

Table 7-9 Comparison of Maximum Modeled Refined CALPUFF Concentrations Associated with PBEC to Class I Significant Impact Levels

Pollutant	Averaging Period	Maximum Concentration ($\mu g/m^3$)*	SIL ($\mu g/m^3$)
SO_2	3-hour	1.11	1.0
	24-hour	0.22	0.2
* Maximum short-term concentrations based on maximum hourly emissions for three turbines and unlimited daily oil use to be conservative.			

Table 7-10 Interactive Modeling Results and Class I PSD Increment Compliance Demonstration

Pollutant	Averaging Period	Maximum Concentration for All PSD Sources ($\mu g/m^3$)*	PBEC Contribution ($\mu g/m^3$)	PSD Class I Increment ($\mu g/m^3$)
SO_2	3-hour	9.60	0.00	25
	24-hour	4.01	0.00	5

* Values shown are the highest second-highest concentrations computed by CALPUFF over all years of meteorological data.

Note: Modeling based on maximum PBEC hourly emissions for three turbines and unlimited daily oil use to be conservative.

Acidic Deposition

Refined CALPUFF modeling provided upper limit estimates of annual (wet and dry) deposition of sulfur and nitrogen compounds (kg/ha/yr) associated with emissions of SO_2 and NO_x from the proposed PBEC facility. The maximum modeled annual sulfur deposition is 1.11×10^{-2} kg/ha/yr and the maximum modeled nitrogen deposition is 1.06×10^{-3} kg/ha/yr.

As indicated by the NPS, there are no deposition significance thresholds for ENP. Measurements of wet deposition at ENP have been taken in 1998 and 1999 as part of the NADP. Although dry deposition values are currently being taken at ENP, measurements are not yet available. Therefore, consistent with FLAG Phase I guidance, the total existing deposition is estimated by doubling the wet deposition values. Using this convention, the estimated average annual sulfur deposition at ENP is 8 kg/ha/yr and the average nitrogen deposition is 7 kg/ha/yr. Given that the predicted PBEC deposition rates of sulfur and nitrogen are only about 0.1% and 0.02 %, respectively, of the existing deposition rates at ENP, the deposition impact of the PBEC emissions can be deemed insignificant.

7.3.6 Summary of Class I Assessment

The proposed Pompano Beach Energy Center is located about 60 km to the northeast of Everglades National Park, a Federal Class I Area. Two AQRVs identified at ENP are visibility and acidic deposition. Because of the distance to the Class I area, a long-range transport model, CALPUFF, was applied as recommended by U.S. EPA and the National Park Service. Through screening and refined CALPUFF modeling it has been demonstrated that:

1) Regional haze will not be adversely impacted by the PBEC project if oil use is limited to 60 turbine hours per day;

2) Although there are no deposition significance thresholds identified for ENP, acid deposition impacts, evaluated in the form of total sulfur and nitrogen deposition, are insignificant for the PBEC when compared to existing deposition measured at the ENP; and

3) Air quality impacts of all criteria pollutant are insignificant except for 3-hour and 24-hour SO_2, but interactive modeling of all SO_2 PSD sources within 200 km of the ENP demonstrates compliance with the PSD Class I increments

As such, PBEC meets all of the requirements pertaining to the maintenance of air quality increments and air quality related values at Everglades National Park.

APPENDIX F

KEY TO MODELING FILES ON CD-ROM

02/21/01

Key to files on CDROM - Pompano Beach Energy, L.L.C. Florida

- *Directory :\PompanoBeach\models – ISCST3, CALPUFF, CALPOST, CALMET, CALSUM executable codes*

- *Directory :\PompanoBeach\GEP-BPIP - contains BPIP input and output files*

  File Naming Convention:
  Pompgep.bpi - BPIP input file
  Pompgep.sum - BPIP input summary
  Pompgep.bpo - BPIP output file

- *Directory :\PompanoBeach\ISCST3\Natural Gas - contains ISCST3 input and output files for Natural Gas* modeled with an emission rate of 1 g/sec.

  File Naming Convention:
  NG10087 - Natural Gas with turbines at 100% load with 1987 met data, repeat for '88, '89, '90 and '91
  NG7587 - Natural Gas with turbines at 75% load with 1987 met data, repeat for '88, '89, '90 and '91
  NG5087 - Natural Gas with turbines at 50% load with 1987 met data, repeat for '88, '89, '90 and '91

- *Directory :\PompanoBeach\ISCST3\Distillate Oil - contains ISCST3 input and output files for Distillate Oil modeled with an emission rate of 1 g/sec.*

  File Naming Convention:
  O10087 - Distillate Oil with turbines at 100% load with 1987 met data, repeat for '88, '89, '90 and '91
  O7587 - Distillate Oil with turbines at 75% load with 1987 met data, repeat for '88, '89, '90 and '91
  O5087 - Distillate Oil with turbines at 50% load with 1987 met data, repeat for '88, '89, '90 and '91

- *Directory :\PompanoBeach\ISC3 Metdata - contains five years ISCST3 meteorological data, 1987-1991, West Palm Beach International Airport*

  File Naming Convention:
  12844-87 - 1987 meteorological data, repeat for '88,'89,'90 and '91

- *Directory :\PompanoBeach\Calpuff\Screening\Unlimited Oil – contains Screening Level CALPUFF and CALPOST files for worst-case short-term impacts based on unlimited oil firing for the turbines*

- *Directory :\PompanoBeach\Calpuff\Screening\Unlimited Oil\Annual – contains Screening Level CALPUFF and CALPOST files for annual impacts based on the turbines firing oil for 1000 hrs/year and natural gas for 2500 hours/year*

- *Directory :\PompanoBeach\Calpuff\Screening\Limited Oil- contains Screening Level CALPUFF and CALPOST files for short-term impacts based on oil firing limited to 60 turbine-hours/day. Modeling for regional haze only.*

- *Directory :\PompanoBeach\Calpuff\Calpost\Refined – contains Refined CALPUFF and CALPOST input and list files for SO_2 air increment modeling based on turbines at 100% load and unlimited oil firing*

- *Directory :\PompanoBeach\Calpuff\Calpost\Refined\Deposition – contains CALPOST input and list files for deposition modeling*

- *Directory :\PompanoBeach\Calpuff\Calpost\Refined\Multisource– contains Refined CALPUFF, CALPOST, CALSUM input and list files for SO_2 multi-source modeling to demonstrate compliance with the short-term increments*

- *Directory :\PompanoBeach\Calmet – contains CALMET input and list files*

  Contains all CALMET input and list files as well as all SAMSOM surface data, precipitation data, and upper air data for all weather stations.

- *Directory :\PompanoBeach\Calmet\Ozone – contains hourly ozone data input to CALPUFF refined modeling*

****

APPENDIX H

EXCERPT OF ISCST3 INPUT FILE PROVIDED BY FDEP CONTAINING SO_2 PSD CLASS I INVENTORY SOURCE PARAMETERS

```
** Source Location Cards:
**          SRCID SRCTYP          XS         YS          ZS
**                               UTM (m)   UTM (m)      (m)
** US SUGAR CLEWISTON FUTURE AND PSD BASELINE SOURCES
SO LOCATION  BLR1CR  POINT    506100.  2956900     0.
SO LOCATION  BLR2CR  POINT    506100.  2956900     0.
SO LOCATION  BLR3CR  POINT    506100.  2956900     0.
SO LOCATION  BLR4CR  POINT    506100.  2956900     0.
SO LOCATION  BLR7CR  POINT    506100.  2956900     0.
SO LOCATION  BLR1OF  POINT    506100.  2956900     0.
SO LOCATION  BLR2OF  POINT    506100.  2956900     0.
SO LOCATION  BLR3OF  POINT    506100.  2956900     0.
SO LOCATION  BLR4OF  POINT    506100.  2956900     0.
SO LOCATION  BLR7OF  POINT    506100.  2956900     0.
SO LOCATION  BLR1B   POINT    506100.  2956900     0.
SO LOCATION  BLR2B   POINT    506100.  2956900     0.
SO LOCATION  BLR3B   POINT    506100.  2956900     0.
SO LOCATION  EPELLET POINT    506100.  2956900     0.
SO LOCATION  WPELLET POINT    506100.  2956900     0.
**OTHER SOURCES

SO LOCATION SGARDDRY POINT    487600.  2957600.    0.
SO LOCATION SGARDBLR POINT    487600.  2957600.    0.
SO LOCATION OKCOGEN  POINT    525000.  2939400.    0.
SO LOCATION OKBLR4B  POINT    525000.  2939400.    0.
SO LOCATION OKBLR5B  POINT    525000.  2939400.    0.
SO LOCATION OKBLR6B  POINT    525000.  2939400.    0.
SO LOCATION OKBLR10B POINT    525000.  2939400.    0.
SO LOCATION OKBLR11B POINT    525000.  2939400.    0.
SO LOCATION SUGCN12  POINT    534900.  2953300.    0.
SO LOCATION SUGCN3   POINT    534900.  2953300.    0.
SO LOCATION SUGCN4   POINT    534900.  2953300.    0.
SO LOCATION SUGCN5   POINT    534900.  2953300.    0.
SO LOCATION SUGCN8   POINT    534900.  2953300.    0.
SO LOCATION SUGCN12B POINT    534900.  2953300.    0.
SO LOCATION SUGCN3B  POINT    534900.  2953300.    0.
SO LOCATION SUGCN4B  POINT    534900.  2953300.    0.
SO LOCATION SUGCN5B  POINT    534900.  2953300.    0.
SO LOCATION SUGCN67B POINT    534900.  2953300.    0.
SO LOCATION USBRY123 POINT    538800.  2968100.    0.
SO LOCATION USSBRY1B POINT    538800.  2968100.    0.
SO LOCATION USBRY23B POINT    538800.  2968100.    0.
SO LOCATION USSBRY5  POINT    538800.  2968100.    0.
SO LOCATION OSBLR2   POINT    544200.  2968000.    0.
SO LOCATION OSBLR3   POINT    544200.  2968000.    0.
SO LOCATION OSBLR4   POINT    544200.  2968000.    0.
SO LOCATION OSBLR5   POINT    544200.  2968000.    0.
SO LOCATION OSBLR6   POINT    544200.  2968000.    0.
SO LOCATION OSBLR1B  POINT    544200.  2968000.    0.
SO LOCATION OSBLR2B  POINT    544200.  2968000.    0.
SO LOCATION OSBLR3B  POINT    544200.  2968000.    0.
SO LOCATION OSBLR4B  POINT    544200.  2968000.    0.
SO LOCATION ATLSUG1  POINT    552900.  2945200.    0.
SO LOCATION ATLSUG2  POINT    552900.  2945200.    0.
SO LOCATION ATLSUG3  POINT    552900.  2945200.    0.
SO LOCATION ATLSUG4  POINT    552900.  2945200.    0.
SO LOCATION ATLSUG5  POINT    552900.  2945200.    0.
```

```
SO LOCATION ATLSUG1B POINT     552900.  2945200.   0.
SO LOCATION ATLSUG2B POINT     552900.  2945200.   0.
SO LOCATION ATLSUG3B POINT     552900.  2945200.   0.
SO LOCATION ATLSUG4B POINT     552900.  2945200.   0.
SO LOCATION MART34   POINT     543100.  2992900.   0.
SO LOCATION MARTAUX  POINT     543100.  2992900.   0.
SO LOCATION MARTGEN  POINT     543100.  2992900.   0.
SO LOCATION MARTCTs  POINT     543100.  2992900.   0.
SO LOCATION BECHTIND POINT     545600.  2991500.   0.
SO LOCATION PRATARCH POINT     559200.  2978300.   0.
SO LOCATION PRATBO12 POINT     559200.  2978300.   0.
SO LOCATION PBCRRF   POINT     585800.  2960200.   0.
SO LOCATION LEERRF   POINT     424000.  2946000.   0.
SO LOCATION FMU1     POINT     422100.  2952900.   0.
SO LOCATION FMU2     POINT     422100.  2952900.   0.
SO LOCATION FMYHR1_6 POINT     422100.  2952900.   0.
SO LOCATION LAKWTHHR POINT     592800.  2943700.   0.
SO LOCATION NBRRF    POINT     583600.  2907600.   0.
SO LOCATION SBRRF    POINT     579600.  2883300.   0.
SO LOCATION LAUDU45  POINT     580100.  2883300.   0.
SO LOCATION FTLAU45B POINT     580100.  2883300.   0.
SO LOCATION DCRRF12  POINT     564300.  2857400.   0.
SO LOCATION DCRRF34  POINT     564300.  2857400.   0.
SO LOCATION TARMAC2P POINT     562900.  2861700.   0.
SO LOCATION TARMAC2B POINT     562900.  2861700.   0.
SO LOCATION TARMAC3P POINT     562900.  2861700.   0.
SO LOCATION TARMAC3B POINT     562900.  2861700.   0.
SO LOCATION VERBU5   POINT     567100.  3056500.   0.

** Source Parameter Cards:
** POINT:   SRCID         QS       HS          TS     VS           DS
**                      (g/s)     (m)         (K)   (m/s)         (m)
** US SUGAR CLEWISTON FUTURE CROP AND OFF-CROP PSD 0510003
SO SRCPARAM  BLR1CR   74.48        65.0        347.0         19.20        2.44
SO SRCPARAM  BLR2CR   74.12        65.0        338.7         17.31        2.44
SO SRCPARAM  BLR3CR   47.48        65.0        333.2          8.47        2.44
SO SRCPARAM  BLR4CR    4.54        45.7        344.3         24.02        2.51
SO SRCPARAM  BLR7CR   15.81        68.6        405.4         23.59        2.59
SO SRCPARAM  BLR1OF   24.29        65.0        347.0         14.05        2.44
SO SRCPARAM  BLR2OF   24.02        65.0        338.7         12.68        2.44
SO SRCPARAM  BLR3OF   30.20        65.0        333.2          6.19        2.44
SO SRCPARAM  BLR4OF    0.00        45.7        344.3         24.02        2.51
SO SRCPARAM  BLR7OF   15.81        68.6        405.4         23.59        2.59
** US Sugar Clewiston Unit 1,2,3 East, West Pellet PSD Baseline 0510003
SO SRCPARAM BLR1B    -58.21     23.1     344.0  30.20      1.86
SO SRCPARAM BLR2B    -58.21     23.1     343.0  35.70      1.86
SO SRCPARAM BLR3B    -33.20     27.4     342.0  14.70      2.29
SO SRCPARAM EPELLET  -10.30     12.2     347.0   8.54      1.52
SO SRCPARAM WPELLET  -10.30     15.7     347.0   8.54      1.52
**Southern Gardens Citrus PSD Permit Application 0510015, Peel Dryer, B 1-3
SO SRCPARAM SGARDDRY    5.29    38.1     316.0  7.45     1.73
SO SRCPARAM SGARDBLR    6.88    16.8     478.0  14.22    1.22
**Okeelanta Cogeneration Units 1,2,3 0990005
SO SRCPARAM OKCOGEN     27.0    68.6     438.7  17.46      3.05
**Okeelanta Boilers 4,5,6, 10, 11 PSD Baseline 0990005
SO SRCPARAM OKBLR4B     -10.95     22.9     333.0    7.36      2.29
SO SRCPARAM OKBLR5B     -15.64     22.9     333.0   12.07      2.29
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SO SRCPARAM OKBLR6B     -15.64    22.9    334.0    8.74     2.29
SO SRCPARAM OKBLR10B    -17.15    22.9    334.0   10.35     2.29
SO SRCPARAM OKBLR11B    -16.79    22.9    342.0    9.89     2.29
**  Sugar Cane Growers Blr 4 stack change, Blrs 6&7 shutdown, Blr 8 PSD
**  Boilers 1&2, 3, 4, 5,8  0990026
SO SRCPARAM SUGCN12     41.20    45.7    339.0   21.75     1.87
SO SRCPARAM SUGCN3      16.20    27.4    339.0   22.25     1.52
SO SRCPARAM SUGCN4      38.20    54.9    339.0   21.73     2.44
SO SRCPARAM SUGCN5      27.90    45.7    339.0   15.94     2.30
SO SRCPARAM SUGCN8      23.50    47.2    339.0   13.62     2.90
**  Sugar Cane Growers Boilers 1&2, 3, 4, 5, 6&7 PSD Baseline 0990026
SO SRCPARAM SUGCN12B   -24.20    24.4    344.0   11.40     1.40
SO SRCPARAM SUGCN3B     -4.40    24.4    344.0   15.60     1.60
SO SRCPARAM SUGCN4B    -24.20    25.9    344.0   11.20     1.63
SO SRCPARAM SUGCN5B    -16.20    24.4    344.0   15.20     1.40
SO SRCPARAM SUGCN67B   -51.00    12.2    606.0   11.20     1.52
**   US Sugar Bryant Boiler 5, Boilers 1&2&3 0990061
SO SRCPARAM USSBRY5     45.70    42.7    345.0   11.49     2.90
SO SRCPARAM USBRY123   109.50    19.8    342.0   36.40     1.64
**   US Sugar Bryant Boilers 1, 2&3 PSD Baseline
SO SRCPARAM USSBRY1B   -36.50    19.8    494.0   44.30     1.68
SO SRCPARAM USBRY23B   -73.00    19.8    344.0   37.90     1.68
** Osceola Farms Current Boilers 2,3, 4,5, 6  0990016
SO SRCPARAM OSBLR2      17.12    27.4    339.0   18.63     1.52
SO SRCPARAM OSBLR3      30.74    27.4    344.0   14.34     1.92
SO SRCPARAM OSBLR4      17.12    27.4    344.0   16.53     1.83
SO SRCPARAM OSBLR5      18.00    27.4    344.0   17.85     1.52
SO SRCPARAM OSBLR6      33.39    27.4    339.0   18.25     1.92
** Osceola Boiler 1,2,3,4  Baseline offsets
SO SRCPARAM OSBLR1B     -5.07    22.0    342.0    8.18     1.52
SO SRCPARAM OSBLR2B    -16.32    22.0    341.0   18.10     1.52
SO SRCPARAM OSBLR3B     -7.26    22.0    341.0   14.50     1.93
SO SRCPARAM OSBLR4B    -13.61    22.0    341.0   18.80     1.83
** Atlantic Sugar  Boilers 1, 2, 3, 4, 5  0990016
SO SRCPARAM ATLSUG1  16.28   27.4    346.0   17.97   1.83
SO SRCPARAM ATLSUG2  16.28   27.4    350.0   23.36   1.83
SO SRCPARAM ATLSUG3  16.02   27.4    350.0   21.56   1.83
SO SRCPARAM ATLSUG4  16.21   27.4    344.0   25.16   1.83
SO SRCPARAM ATLSUG5  8.04    27.4    339.0   19.24   1.68
** Atlantic Sugar Boilers 1, 2, 3, 4 PSD Baseline  0990016
SO SRCPARAM ATLSUG1B -17.24  18.9    506.0   12.70   1.92
SO SRCPARAM ATLSUG2B -22.50  18.9    511.0   10.90   1.92
SO SRCPARAM ATLSUG3B -16.88  21.9    522.0   17.50   1.83
SO SRCPARAM ATLSUG4B -10.76  18.3    344.0   15.00   1.83
** FPL Martin Aux Boil PSD, DiesGen PSD  Units 3,4 PSD, simple cy CT
** 0850001
SO SRCPARAM MARTAUX  12.90   18.3    535.4   15.24   1.10
SO SRCPARAM MARTGEN  0.51    7.6     785.9   39.62   0.30
SO SRCPARAM MART34   470.40  64.9    410.9   18.90   6.10
SO SRCPARAM MARTCTs  25.98   18.3    853.2   37.63   6.17
** Bechtel Indiantown 0850102
SO SRCPARAM BECHTIND 75.64   150.9   333.2   30.5    4.88
** Pratt and Whitney Heater, Boiler BO-12 0990021
SO SRCPARAM PRATARCH 13.99   15.2    810.9   143.73  0.91
SO SRCPARAM PRATBO12  0.51   4.6     533.2   6.92    0.76
** Palm Beach Co Resource Recovery   0990234
SO SRCPARAM PBCRRF   85.05   76.2    505.2   24.90   2.04
```

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** Lee County RRF  0360119
SO SRCPARAM LEERRF  14.00    83.8    388.5   19.81   1.88
** FPL  Fort Myers Unit1PSD, Unit2 PSD, HRSGs1-6  0710002
SO SRCPARAM FMU1      -585.50 91.8    422.0   29.90   2.90
SO SRCPARAM FMU2      -1334.0 121.2   408.0   19.20   5.52
SO SRCPARAM FMYHR1_6 3.86     38.1    377.6   14.20   5.79
** Lake Worth Utilies HRSG 0500045
SO SRCPARAM LAKWTHHR 12.79    45.7    377.6   13.74   5.49
** North Broward RRF PSD 112120
SO SRCPARAM NBRRF    35.400  58.50   381.0   18.01   3.96
** South Broward RRF PSD
SO SRCPARAM SBRRF    37.910  59.44   381.0   17.98   3.96
** FPL Ft. Lauderdale CT's 1-4 PSD, 4&5 Baseline
SO SRCPARAM LAUDU45  271.15  45.7    438.7   14.60   5.49
SO SRCPARAM FTLAU45B -457.4  46.00   422.0   14.63   4.27
** Dade County RRF PSD Units 1&2, Units 3&4
SO SRCPARAM DCRRF12  12.320  76.2    405.4   15.86   3.66
SO SRCPARAM DCRRF34  12.320  76.2    405.4   15.86   3.66
** Tarmac Kiln 2, 3 PSD Baseline
SO SRCPARAM TARMAC2B -5.71    60.96   465.0   12.84   2.44
SO SRCPARAM TARMAC3B -2.76    60.96   472.0   10.78   4.57
** Tarmac Kiln 2, 3 PSD
SO SRCPARAM TARMAC2P 24.57    60.96   422.0    9.10   2.44
SO SRCPARAM TARMAC3P 51.43    60.96   450.0   11.03   4.57
** Vero Beach Power Unit 5 Simple Cycle CT
SO SRCPARAM VERBU5   15.50    38.1    416.5   19.56   3.35


** Monthly Emission Factors for Sugar Mill Sources
SO EMISFACT BLR1CR-BLR7CR      MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT BLR1OF-BLR7OF      MONTH 0 0 0 0 1 1 1 1 1 0 0 0
SO EMISFACT BLR1B-BLR3B        MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT EPELLET            MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT WPELLET            MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT ATLSUG1-ATLSUG4    MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT ATLSUG1B-ATLSUG4B MONTH 1 1 1 1 1 0 0 0 0 0 1 1
SO EMISFACT OKBLR4B-OKBLR11B   MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT OSBLR2-OSBLR6      MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT OSBLR1B-OSBLR4B    MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT SUGCN3-SUGCN8      MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT SUGCN12            MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT SUGCN3B-SUGCN5B    MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT SUGCN12B           MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT SUGCN67B           MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT USSBRY5            MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT USBRY123           MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT USSBRY1B           MONTH 1 1 1 1 0 0 0 0 0 1 1 1
SO EMISFACT USBRY23B           MONTH 1 1 1 1 0 0 0 0 0 1 1 1
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Pompano Beach Energy, L.L.C.

Houston, TX

PSD Permit Application for the Pompano Beach Energy Center

ENSR International
Revised February 2001
Document Number 6792-140-100R

CONTENTS

CONTENTS (Cont'd)

CONTENTS (Cont'd)

LIST OF TABLES

LIST OF TABLES (Cont'd)

LIST OF FIGURES

4. Professional Engineer Statement:

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

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

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

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

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

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

2/20/01

Signature ______________________ Date 2/20/01

EMBOSSED METALLIC

(seal)

* Attach any exception to certification statement.

BROWARD COUNTY
FLORIDA

Department of Planning and Environmental Protection
Air Quality Division
218 S.W. 1st Avenue
Fort Lauderdale, FL 33301
(954) 519-1220 • Fax (954) 519-1495

RECEIVED
FEB 14 2001
BUREAU OF AIR REGULATION

February 8, 2001

Mr. Ben Jacoby, Director
Enron Corporation
1400 Smith Street
Houston, Texas 77002-7631

RE: Pompano Beach Energy Center
Deerfield Beach Energy Center

Dear Mr. Jacoby:

The Department is aware of Enron Corporations' intent to construct merchant power plants within Broward County, namely the Pompano Beach Energy Center, to be located at 3300 N.W. 27th Avenue, Pompano Beach, Florida, and the Deerfield Beach Energy Center, to be located at 48th Street and East of the Turnpike, Deerfield Beach, Florida. We have received a copy of the PSD applications submitted to the Florida Department of Environmental Protection (FDEP).

Under Chapter 27, Broward County Code, and under Chapter 403, Florida Statutes, the Department of Planning and Environmental Protection (DPEP) has the authority and duty to control and regulate pollution of air and water in Broward County, in accordance with the rules and regulations duly promulgated thereunder.

The Department has determined that DPEP air pollution licenses will be required for construction/operation of the proposed merchant power plants.

Enclosed please find the application form for an air pollution license for the proposed facilities. Please submit complete applications, along with the licensing fee of $1520.00 for each of the proposed facilities, to the DPEP - Air Quality Division, 218 S.W. 1st Avenue, Fort Lauderdale, Florida, 33301.

Should you desire, the air pollution application recently submitted to the FDEP for the proposed Pompano Beach Energy Center and Deerfield Beach Energy Center may be referenced for the specific technical information requested in the DPEP air license applications. Please be advised that, in addition to satisfying Chapter 27, Broward County Code requirements, issuance of an air pollution license for the proposed merchant power plants will be contingent upon zoning approval from appropriate municipal authorities, as well as issuance of the final FDEP PSD permit.

Should you have any questions, please let me know.

Sincerely,

Jarrett A. Mack
Manager, Licensing and Compliance Section

cc: Alvaro Linero, PSD Section, FDEP- Tallahassee
David Kelleymeyer - PBEC, DBEC - Director

Enron North America Corp.
P.O. Box 1188
Houston, TX 77251-1188

January 18, 2001

RECEIVED
JAN 19 2001
BUREAU OF AIR REGULATION

Mr. Al Linero, P.E.
Administrator, New Source Review Section
Bureau of Air Regulation, Division of Air Resource Management
Florida Department of Environmental Protection
2600 Blair Stone Rd.
Tallahassee, FL 32399-2400

Re: Corrections/Replacement Pages
PSD Permit Application
Pompano Beach Energy Center
DEP File No. 0112515-001-AC (PSD-FL-304)

Dear Mr. Linero:

On behalf of Pompano Beach Energy Center, LLC (PBEC), I am submitting four copies of replacement pages for our PSD permit application. None of these changes are particularly substantial, but we did want to correct certain minor errors and inconsistencies in the document. Also submitted with the replacement pages is an errata sheet that identifies the reason for each of the modifications.

Please contact me at (713) 853-3161 if you have any questions.

Sincerely,
Enron North America

David A. Kellermeyer

David A. Kellermeyer
Director

Enclosure

cc: Mr. Lennon Anderson, Southeast District
Mr. Jarrett Mack, Air Quality Division, Broward County
C. Holladay
NPS
EPA

Errata Sheet
PSD Permit Application – Pompano Beach Energy Center, LLC
ENSR Document 6792-140-100R
January 9, 2001

Section	Page Number	Modification
1.0	1-1; entire section	Added new paragraph on Page 1-1 providing rationale for fuel oil backup; this change affected page numbering for remainder of section
1.2.2	Page 1-3	Updated addresses of Environmental Contact and Permitting Consultant
2.0	Page 2-1	Added new paragraph on Page 2-1 providing rationale for fuel oil backup; this change affected page numbering for remainder of section
3.1.2	Page 3-4	Table 3-3 revised to correct individual numbers; facility HAP totals were correct
3.2	Page 3-4	Table 3-4 revised to correct annual PM_{10} emissions from fuel heater
3.5	Page 3-6	Table 3-5 updated to give total sulfuric acid mist emissions
3.5	Page 3-6	Table 3-6 revised to correct annual PM_{10} emissions from fuel heater
4.3	Page 4-4	Table 4-2 HAP emissions revised
5.3.3	Page 5-11	In second full paragraph, 3rd sentence beginning "High temperature SCR..." was rewritten.
5.3.4.1	Page 5-18	Fixed sentence by deleting "combustion technology" at end of sentence.
6.5	Page 6-13	First paragraph in Section 6.5, second sentence: changed "1500" to "1000" hours/year/turbine
6.6	Pages 6-16 to 6-18	Updated Section 6.6 to address Broward County DPEP concern regarding ozone impacts; added new Table 6-9.
App. B	Pages 28 to 32	Headers in HAP tables corrected. Calculations were not affected.
T of C	Pages I to vi	Updated table of contents

1.0 INTRODUCTION

1.1 Application Summary

Pompano Beach Energy Center, LLC is proposing to construct and operate a 510 MW (nominal) simple-cycle combustion turbine peaking electric generating facility in Broward County. The facility, to be known as the Pompano Beach Energy Center (PBEC), will be located on approximately 30 acres of property in Pompano Beach, Florida. From an air emissions perspective, the key elements of the proposed action include:

- Three (3) combustion turbines;
- Natural gas fuel heater;
- Two distillate oil storage tanks; and
- Four (4) chiller units, each with a two (2) cell wet mechanical draft cooling tower

Pompano Beach Energy Center, LLC desires to commence construction in April 2001 and begin commercial operation no later than May 1, 2002 (pending receipt of all necessary local and environmental approvals).

As part of its application, the PBEC is requesting increased flexibility regarding the ability to burn 1,000 hours per year of oil. While the intention is to burn natural gas at every opportunity, near term constraints on the Florida Gas Transmission ("FGT") pipeline may impede the ability to burn natural gas during periods of peak demand often associated with the summer season. In general, the FGT natural gas transmission line flows near its maximum pipeline capacity of 1.5 Bcf/day during the summer season. In order to accommodate the demand for incremental generation within the state of Florida, FGT plans to expand its pipeline capacity by approximately 600,000 MMbtu/day before the summer of 2002. Additionally, FGT is in active discussions with potential shippers to perform another expansion of its pipeline in 2003. The addition of this capacity should reduce periods of pipeline constraint and will result in an increased availability of natural gas to the proposed site. The request for oil burning flexibility is necessitated by near term FGT capacity constraints and is not due to deficient gas supplies received by FGT. Moreover, operational guidelines dictate that natural gas be the primary fuel source and oil will be used only to the extent transmission capacity constraints on FGT preclude the delivery of natural gas to the site.

Since the proposed action will be a major stationary source under the Part C of the Clean Air Act, PBEC is applying to the Florida Department of Environmental Protection (FDEP) for a Prevention of Significant Deterioration (PSD) permit and for a State Air Construction Permit. This application provides technical analyses and supporting data for a permit to construct the facility under the federal PSD program, as well as the state construction permit program. The federal PSD program in Florida is administered by the FDEP under a State Implementation Plan program approved by U.S. EPA under 40 CFR 51.166.

This application addresses the air construction permitting requirements specified under the provision of Florida Administrative Code (F.A.C.) Chapters 62-4, 62-210, and 62-212. The application is divided into seven additional sections. Section 2.0 presents an overview of the proposed action and processes covered by this permit application. Section 3.0 describes the methods used to calculate facility emissions and provides a summary of expected emissions. Section 4.0 reviews the regulatory requirements with which the facility must comply. Section 5.0 presents a control technology evaluation for those pollutants subject to PSD review. Section 6.0 presents the air dispersion modeling analysis required by PSD and FDEP regulations. Finally, Section 7.0 provides the additional impacts analysis required by PSD regulations.

FDEP application forms are located in Appendix A. Supporting emission calculations are presented in Appendix B. Information supporting the control technology review is presented in Appendix C. BPIP output data for establishing modeling downwash parameters is presented in Appendix D. Appendix E provides a description of the dispersion modeling input data and output files, which have been submitted to FDEP on CD-ROM.

General information about the applicant and the location of the project site, are presented below. A more detailed discussion on the organization of this document is also presented. To facilitate FDEP's review of this document, individuals familiar with both the facility and the preparation of this application have been identified in the following section. FDEP should contact these individuals if additional information or clarification is required during the review process.

1.2 General Applicant Information

Listed below are the applicant's primary points of contact, and the address and phone number where they can be contacted. Since this permit application has been prepared by a third party under the direction of Pompano Beach Energy Center, L.L.C., a contact has been included for the permitting consultant.

1.2.1 Applicant's Address

Corporate Office	Pompano Beach Energy Center, LLC 1400 Smith Street Houston, TX 77002-7631
Project Site	Pompano Beach Energy Center 3300 N.W. 27th Avenue Pompano Beach, FL 33069

1.2.2 Applicant's Contacts

Corporate Officer	Ben Jacoby Director 1400 Smith Street Houston, TX 77002-7631
Environmental Contact	Dave Kellermeyer Director 1400 Smith Street, EB-3146 C Houston, TX 77002-7631 Telephone: (713) 853-3161 Fax: (713) 646-3037
Permitting Consultant	Robert Iwanchuk Project Manager ENSR 2 Technology Park Drive Westford, MA 01886 Telephone (978) 589-3265 Fax (978) 589-3100

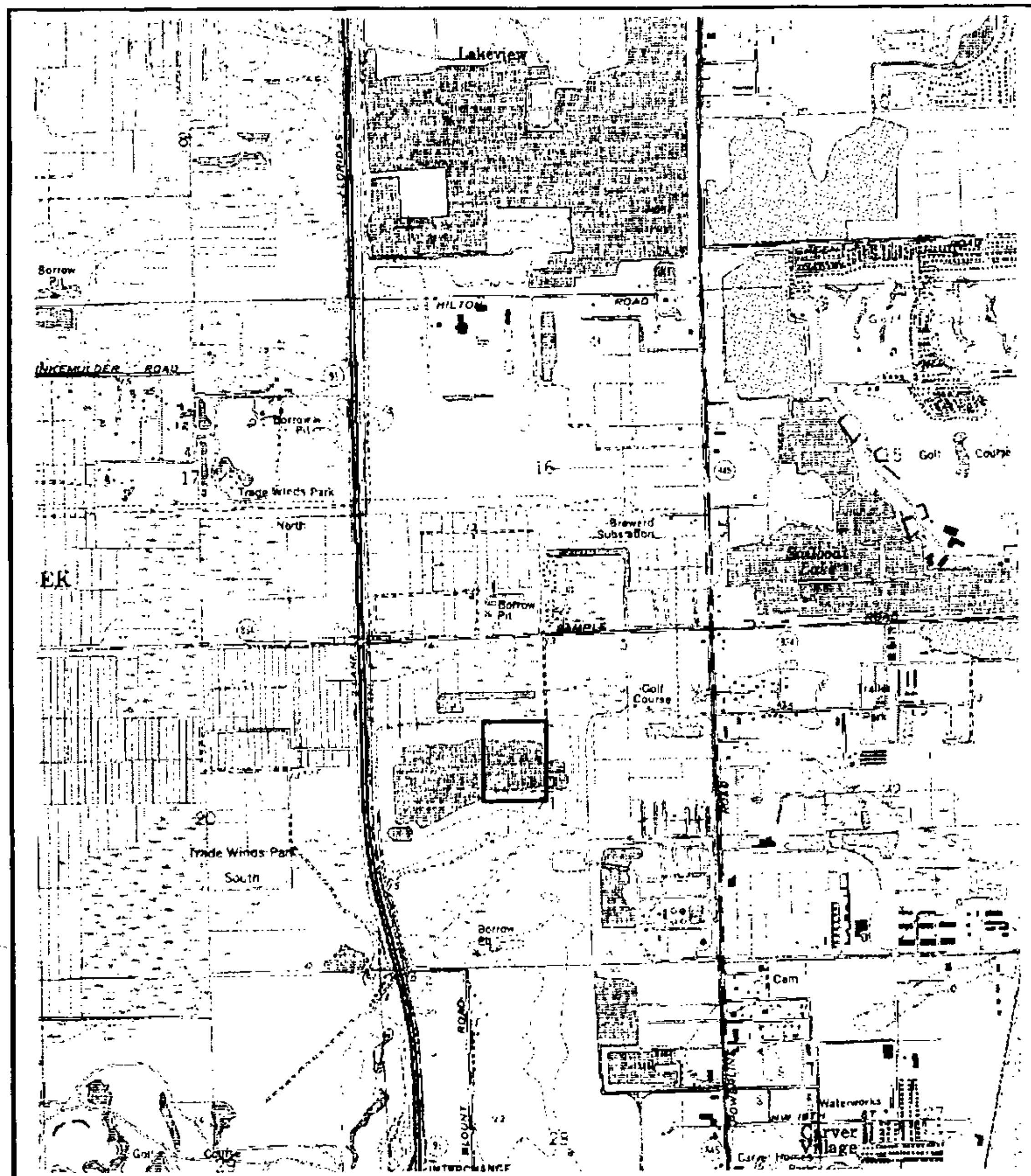
1.3 Project Location

The Pompano Beach Energy Center will be located on an approximately 30-acre parcel of land located in Pompano Beach, Broward County, Florida. The site is located at 3300 N.W. 27th Avenue and the proposed Blount Road extension. The facility will be connected to electrical transmission lines and a natural gas pipeline located in close proximity to the site. The approximate project property boundary and local road network is shown on Figure 1-1. A detailed representation of the property boundary is shown on the plot plan drawing contained in Figure 1-2. The site is clear and contains low topographic relief, with a portion of the property utilized by various commercial tenants. Stormwater will be handled by the facility's storage water management system, which includes three stormwater detention ponds.

Benchmark Universal Transverse Mercator (UTM) coordinates for the plant, corresponding to the middle combustion turbine stack location shown in Figure 1-2 and the power island grade elevation are as follows:

Zone Number	17
Northing (m)	2905436
Easting (m)	583673
Site Elevation (ft msl)	13

Figure 1-1 Site Plan



Locus Map	Legend:	ENRON	ENSR
	Site Boundary USGS QUADRANGLES: West Dixie Bend 1:24,000	Figure 1-1 Pompano Beach Energy Center Site	
	Scale 1:25,000		Project Number 6792-140-100

Figure 1-2 Plot Plan

1.4 Document Organization

The balance of this document is divided into sections which address the major issues of a preconstruction air quality permit review. The outline below provides an overview of the contents of each of the remaining sections.

- **Section 2.0 - Project Description** provides an overview of the facility including major facility components. A general description of the Simple-Cycle process by which power will be produced at this site is presented.
- **Section 3.0 - Emissions Summary** presents a detailed review of the emissions which will be generated at the project site subsequent to the completion of project development, under normal operating conditions. The basis and methods used to calculate emissions from the project are presented.
- **Section 4.0 - Applicable Regulations and Standards** presents a detailed review of both Federal and State regulations. The focus of this section will be on establishing which regulations are directly applicable to the proposed project and for which compliance must be demonstrated.
- **Section 5.0 - Control Technology Evaluation** is a substantial requirement for the PSD application. Since the proposed project will result in a significant increase in the emission of certain criteria pollutants, as defined under PSD regulations, a detailed review of control technologies is provided. Annual "Potential-to-Emit" (PTE) emissions, as defined by FDEP, are expected to be significant for Carbon Monoxide (CO), Particulate Matter ($PM\backslash PM_{10}$), Sulfur Dioxide (SO_2) Nitrogen Oxides (NO_x) and Sulfuric Acid Mist (H2SO4). Therefore, control technology analyses for these pollutants have been prepared. The review conforms to the EPA's Top-Down protocol.
- **Section 6.0 - Air Dispersion Modeling Analysis** provides the results of the air quality impact assessment required under the PSD regulations to demonstrate compliance with National Ambient Air Quality Standards (NAAQS), PSD Class II Increments, and the significant impact levels defined for them. The air quality impact analysis predicted no significant impacts; therefore no further modeling for compliance with the NAAQS and PSD increments was required. The air dispersion modeling was done in conformance with EPA modeling guidelines. This section also includes cumulative modeling analysis required by the Broward County Department of Planning and Environmental Protection.
- **Section 7.0 – Additional Impacts** contains supplemental information regarding the potential impacts of the project. Specifically this section discusses the potential for impacts on local soils, vegetation, visibility, and growth related air quality impacts. PSD Class I area assessments of regional haze, increment and deposition impacts using the CALPUFF dispersion model will be submitted as a supplement to this permit application.

- **Section 8.0 - References** include a list of the documents relied upon during the preparation of this document.

Appendix - Permit application forms, emission calculations, and supplemental materials supporting the information presented herein are contained in the appendices to this document. Modeling results, both input and output files, are provided on the enclosed CD-ROM. A draft of the pollution prevention plan required by the Broward County Department of Planning and Environmental Protection, under the provisions of Broward County Code, Sec.27-178, is also presented in the appendix.

2.0 PROJECT DESCRIPTION

The following section provides an overview of the facility addressed by this permit application. The facility will be owned and operated by Pompano Beach Energy Center, LLC. The proposed project is a dual fuel Simple-Cycle merchant power plant to be located in Pompano Beach, Florida. A merchant power plant is a non-utility generation facility designed to produce power within the emerging deregulated electricity market. The Pompano Beach Energy Center is designed to have a nominal generating capacity in the range of 510 MW. Commercial operation is scheduled to commence by May 1, 2002. As a merchant plant in a deregulated electricity market, the PBEC is being designed to convert fuel to useful power quickly, cleanly, and reliably.

As part of its application, the PBEC is requesting increased flexibility regarding the ability to burn 1,000 hours per year of oil. While the intention is to burn natural gas at every opportunity, near term constraints on the Florida Gas Transmission ("FGT") pipeline may impede the ability to burn natural gas during periods of peak demand often associated with the summer season. In general, the FGT natural gas transmission line flows near its maximum pipeline capacity of 1.5 Bcf/day during the summer season. In order to accommodate the demand for incremental generation within the state of Florida, FGT plans to expand its pipeline capacity by approximately 600,000 MMbtu/day before the summer of 2002. Additionally, FGT is in active discussions with potential shippers to perform another expansion of its pipeline in 2003. The addition of this capacity should reduce periods of pipeline constraint and will result in an increased availability of natural gas to the proposed site. The request for oil burning flexibility is necessitated by near term FGT capacity constraints and is not due to deficient gas supplies received by FGT. Moreover, operational guidelines dictate that natural gas be the primary fuel source and oil will be used only to the extent transmission capacity constraints on FGT preclude the delivery of natural gas to the site.

2.1 Power Generation Facility

The PBEC will include three (3) General Electric 7FA combustion turbine generators (CTGs) operating in Simple-Cycle mode. The CTGs will be designed to operate on both natural gas and low-sulfur diesel oil. Dry, low NO_X combustors will be used to minimize NO_X formation during combustion, and water injection will be employed during diesel oil-firing to reduce NO_X emissions. Each turbine will be equipped with its own exhaust stack.

The proposed generation facility will utilize the Best Available Control Technology (BACT), as defined by U.S. EPA, for NO_X, CO, SO_2, Sulfuric Acid Mist, and PM/PM_{10} to minimize air emissions. The project will not be a major source of hazardous air pollutants.

2.2 Major Facility Components

The primary source of criteria pollutants associated with the PBEC are the three combustion turbine generators which exhaust through three separate stacks. A process flow diagram for a simple-cycle combustion turbine is shown in Figure 2-1. There will be a minor amount of emissions associated with the plant's ancillary facilities, including the two diesel fuel storage tanks, a fuel gas heater, and a chiller system with four small mechanical draft cooling towers for cooling the inlet air to the turbines during high ambient temperature conditions. A brief description of the major components of the facility is provided in the following sections.

Operating parameters for the combustion turbine at three loads (100%, 75%, 50%), and four ambient temperatures (30°F, 42°F, 50°F, 91°F), are presented in Appendix B. This covers the expected operating range of the facility.

2.2.1 Gas Turbines

PBEC proposes to install three (3) General Electric combustion turbine generators in Simple-Cycle mode with independent exhaust stacks. Each turbine will include an advanced firing combustion turbine air compressor, gas combustion system (dry, low NO_X combustors), power turbine, and a 60-hertz (Hz), 13.8 kilovolt (kV) generator. The turbines will run predominantly on pipeline-quality natural gas, but will have the capability to operate on diesel oil. Each turbine is designed to produce a nominal 170 MW of electrical power.

The power output from a combustion turbine generator (CTG) is proportional to the mass flow rate of air and fuel through the expansion (power) turbine. Thus at high ambient temperatures the power available from a CTG is significantly reduced due to the lower density of the inlet air. As the CTG's proposed are intended to provide peak power generation, in an area where ambient temperatures frequently rise above 80°F, the CTG's have been equipped with inlet air chilling equipment. At high ambient temperatures, inlet air chillers will be operated to cool the inlet air to the turbines in order to compensate for the loss of power output due to lower compressor inlet density. At an ambient temperature of 91°F, chilling will reduce the compressor inlet temperature to 50°F resulting in an approximately 24 MW increase in gross power output per CTG unit.

The gas turbine is the heart of a Simple-Cycle power system. First, air is filtered and compressed in a multiple-stage axial flow compressor. Compressed air and natural gas are mixed and combusted in the turbine combustion chamber. Dry, low NO_X combustors and water injection are used to minimize NO_X formation during combustion, depending on which fuel is fired. Exhaust gas from the combustion chamber is expanded through a multi-stage power turbine which drives both the air compressor and electric generator. The exhaust exits the power turbine at atmospheric pressure and approximately 1,100°F.

Figure 2-1 Process Flow Diagram - Simple Cycle Combustion Turbines – Pompano Beach Energy Center

2.2.2 Simple-Cycle

The PBEC will use Simple-Cycle power generation technology to deliver electrical peaking power during periods when short-term demand exceeds base load requirements. Peaking power units are able to be brought on and off-line quickly, in response to nearly instantaneous fluctuations in electricity demand.

2.2.2.1 The Brayton "Simple" Cycle

The production of electricity using a combustion turbine engine coupled to a shaft driven generator is referred to as the Brayton Cycle. This power generation cycle has a thermodynamic efficiency which generally approaches 40%. This is also referred to as "Simple-Cycle" and has been traditionally utilized for electricity peaking generation since the turbine(s) and subsequent electrical output can be brought on line very quickly. The largest energy loss from this cycle is from the turbine exhaust in which heat is discarded to the atmosphere at about 1,100°F.

2.2.3 Fuel Gas System

Pipeline-quality natural gas is delivered to the plant boundary at a sufficient pressure so that no additional fuel compression will normally be required. If gas compression is required, it will be accomplished using an electrically-driven compression system. The gas is first sent through a knockout drum for removal of any large slugs of liquid which may have been carried through from the pipeline. Only one knockout drum is provided.

The natural gas then passes through a filter/separator to remove particulate matter and entrained liquids. The gas flows through the filter/separator's first chamber, the filtration section, where entrained liquid is coalesced on the filter cartridges, drops to the bottom of the chamber and either vaporizes and returns to the main gas stream or drains to the sump below. The gas then flows through the coalescing filters which remove any particulate matter. Next, the gas passes to the second chamber, the separation section, where any entrained liquid remaining in the stream is further separated by impingement on a net or labyrinth and drains to the bottom sump.

The gas is then heated by a natural gas-fired heater, prior to being split for distribution to the three GE turbines. The fuel gas heater is designed for use as a means to prevent condensation of moisture and hydrates in the natural gas used in the CTGs. Each stream is sent through one last knockout drum to protect against the presence of liquid in the fuel. Finally, the gas is delivered to the turbines and combusted as part of the power generation cycle.

2.2.4 Distillate Oil Storage

Diesel fuel will be provided by tanker trucks and stored in two, above-ground storage tanks made of steel. These tanks will also supply fuel to the combustion turbines during diesel oil-firing. On site oil storage requirements have been estimated to be a maximum of 2.5 million gallons, with a maximum day storage tank requirement of 0.6 million gallons.

2.2.5 Cooling Towers

To dissipate the heat extracted from the CTG inlet air a closed loop chilling system will be used. This closed loop chilling system will lower the inlet air temperature from ambient conditions to approximately 50°F. The heat extracted by the closed loop chilling system will discard this waste heat to the atmosphere through the use of four (4) chiller units, each with a 2-cell wet mechanical draft cooling tower.

2.2.6 Ancillary Facilities

Other systems supporting plant operations and safety include:

- Auxiliary Cooling Water System
- Fire Protection System
- Service Water System
- Process Waste Water System
- Potable Water and Sanitary Waste Water System
- Storm Water System
- Plant and Instrument Air System
- Continuous Emissions Monitoring System (CEMS)
- Maintenance Lifting System
- Unit Control System

Table 3-2 Annual Emission Summary for the PBECCombustion Turbines

Turbine	NO_x	CO	VOC	SO_2	H_2SO_4	PM	PM_{10}	Pb
	Emissions for One Combustion Turbine (tons/year) [1]							
GE 7FA	235.0	70.3	5.1	63.4	9.7	39.5	39.5	0.01
	Emissions for All Combustion Turbines (tons/year) [1]							
3 x GE7FA	705.0	210.9	15.3	190.2	29.1	118.5	118.5	0.04

Notes:
[1] **Based on worst case hourly emission rate over the load range (50% - 100% base load), at the effective Annual Average Temperature of 50°F, and the following operation schedule:**
NG Annual Operation 2,500 hrs/year/turbine
Oil Annual Operation 1,000 hrs/year/turbine
Total Annual Operation 3,500 hrs/year/turbine

Table 3-3 Facility HAP Emission Summary

		3500 hrs Natural Gas	2500 hrs NG	1000 hrs Oil [1]	2500 hrs NG & 1000 hrs Oil	CTGs All Cases	Fuel Heater	Facility Total
Total HAPs	tpy	5.0	3.6	3.9	7.5	7.5	0.04	7.6
Max Single HAP	tpy	2.6	1.8	2.4	2.4	2.6	4.01E-02	2.6
Max HAP Compound		Formaldehyde	Formaldehyde	Manganese	Formaldehyde	Formaldehyde	Hexane	
							Major Total HAPs	No
							Major Single HAP	No

[1] An error in the calculation of HAPs from distillate oil operation made in the original permit application was discovered and corrected during the revision process.

3.2 Natural Gas Fuel Heater

Emission calculations for this unit are presented in Appendix B and summarized in Table 3-4 for criteria pollutants.

Table 3-4 Criteria Pollutant Emissions Summary for the Fuel Heater

Criteria Pollutants	Emission Rate - per Unit: Hourly (Lbs/Hr)	Emission Rate - per Unit: Annual (Tons/Year)
Nitrogen Oxides	1.3	2.3
Carbon Monoxide	1.2	2.1
Volatile Organic Carbon	0.78	1.37
Sulfur Oxides	0.07	0.13
Particulate	0.13	0.23

Table 3-5 Project Hourly Emissions (lb/hr) Summary, Criteria Pollutants, PBEC

Source Name	Source	NO_x	CO	VOC	SO_2	H_2SO_4	PM/PM_{10}	Pb
	Hourly Emission Rates (lb/hr)							
Combustion Turbine No. 1	GE 7FA	332.1	78.3	3.1	103.6	15.9	34.0	0.03
Combustion Turbine No. 2	GE 7FA	332.1	78.3	3.1	103.6	15.9	34.0	0.03
Combustion Turbine No. 3	GE 7FA	332.1	78.3	3.1	103.6	15.9	34.0	0.03
Fuel Heater No. 1		1.3	1.2	0.78	0.07		0.13	
Cooling Tower							0.17	
Fuel Tanks				3.19				
Total		**997.6**	**236.1**	**13.3**	**310.9**	**47.6**	**102.3**	**<0.1**

Note: This table presents the maximum emission rate over the potential operating range (50% to 100% load and 30 to 91°F) for all operating conditions (Natural Gas or Oil).

Table 3-6 Project Annual Emissions (tons/yr) Summary, Criteria Pollutants, PBEC

Source Name	Source	NO_x	CO	VOC	SO_2	H_2SO_4	PM/PM_{10}	Pb
Combustion Turbine No. 1	GE 7FA	235.0	70.3	5.1	63.4	9.7	39.5	0.01
Combustion Turbine No. 2	GE 7FA	235.0	70.3	5.1	63.4	9.7	39.5	0.01
Combustion Turbine No. 3	GE 7FA	235.0	70.3	5.1	63.4	9.7	39.5	0.01
Fuel Heater No. 1		2.3	2.1	1.37	0.07		0.23	
Cooling Tower							0.29	
Fuel Tanks				1.3				
Total		**707.3**	**213.0**	**18.0**	**190.3**	**29.1**	**119.0**	**<0.1**

Note: This table presents the annual potential emissions based on maximum hourly emissions over 50% to 100% load range at the effective annual average temperature of 50 °F for all operating conditions (Natural Gas or Oil)

and associated procedures, and reporting and record keeping requirements. For this project, the distillate oil storage vessels will be subject to Subpart Kb based upon their maximum storage capacity. Due to the low vapor pressure of No. 2 distillate oil, these tanks will only be required to maintain records of the dimensions and maximum capacity of the tanks. No control requirements will apply.

4.3 NESHAPS

There is currently no NESHAPs for stationary gas turbines, although this is a source category scheduled for a determination of Maximum Achievable Control Technology (MACT) under 40 CFR Part 63. However, 40 CFR Part 63, Subpart B governs the construction or reconstruction of major sources of Hazardous Air Pollutants (HAPs) for which a NESHAP has not been promulgated. The rule requires new major sources of HAPs to install MACT for HAPs. MACT must be determined as a condition of pre-construction approval. A major source of HAPs is any stationary source that has the potential to emit 10 tons/year or more of a single HAP or 25 tons/year of combined HAPs.

Table 4-2 summarizes the project PTE for non-criteria pollutants. The project is not a major HAP source, and, therefore, 40 CFR Part 63 Subpart B does not apply.

Table 4-2 Project PTE Non-Criteria Pollutant Emissions Summary

Emission Source	HAP Emission Rate		Maximum HAP Emission Rate	
	Lbs/Hr	tons/year	Lbs/Hr	tons/year
Combustion Turbines[a]	8.1	7.6	5.0	2.6
Fuel Heater[b]	2.5×10^{-2}	0.04	2.3×10^{-2}	0.04
Total	8.1	7.6	5.0	2.6

(a) Formaldehyde is the single HAP, which has the greatest contribution to the Total HAP Potential to Emit from the combustion turbines.

(b) Hexane is the single HAP which has the greatest contribution to the Total HAP Potential to Emit from the fuel heater.

4.4 Acid Rain

The proposed facility meets the definition of "utility unit" and will be an affected Phase II unit under the Acid Rain Deposition Control Program pursuant to Title IV of the Clean Air Act. Title IV requirements for the proposed facility will be included in the Title V permit. Title IV requires that the facility hold calendar-year allowances for each ton of SO_2 that is emitted and conduct emissions monitoring for SO_2 and NO_x pursuant to the requirements in 40 CFR Parts 72, 73, and 75.

4.5 CAA Operating Permit Program

FDEP administers the CAA Operating Permit Program under Rule 62-213 which has been approved by EPA under 40 CFR Part 70. A new major source must submit a Title V operating permit application

EPA has indicated that they consider high temperature SCR to be "demonstrated in practice" for natural gas fired peaking turbines.

One of the high temperature SCR installations is the Puerto Rico Electric Power Authority (PREPA) Cambalache Electric Generating Facility, located in Puerto Rico. This project consists of three (3) ABB GT 11N1 combustion turbines operated in simple cycle mode, using distillate oil. The original permit issued for these turbines required the use of SCR to achieve NO_x emissions of 10 ppm, with a limit of 10 ppm on ammonia emissions. This plant has been operating since 1997 with very poor results for the operation of the SCR system. This project has not been able to operate for any extended period of time while staying within the NO_x and NH_3 limits and has been issued a Notice of Violation by EPA for exceedances of both NO_x and NH_3. Several attempts have been made to regenerate, or clean the catalyst, with no significant improvement in the performance of the system. EPA has been working with PREPA to solve the difficulties that have resulted from installation of hot SCR at the Cambalache facility, in January of 2000, US EPA Region 2 issued a press release stating: "...on oil-fired turbines, SCR cannot consistently achieve the expected reductions in nitrogen oxide emissions. As a result, EPA is removing the SCR requirement..." (US EPA Region 2 Press Release, the complete press release is included in Appendix C).

As a result of this experience, Englehard is no longer offering this technology for oil-fired turbine applications. The Pompano Beach Energy Center Facility is a dual fuel peaking project that must have the flexibility to burn liquid fuel as backup to natural gas. High temperature SCR is not technically feasible for oil fired combustion turbines, and has not been demonstrated in practice on dual fuel peaking turbines. However, at the request of FDEP, a cost effectiveness calculation for high temperature SCR has been performed for the proposed turbines, disregarding costs associated with a control technology that would represent a first of a kind application. Also not included in this cost evaluation is the impact of the catalyst on the operating strategies that would require an extended startup sequence to protect the catalyst bed. The results of this analysis clearly indicate that high temperature SCR would not be cost effective. As shown in Appendix C, high temperature SCR controlling NO_x emissions to the LAER levels of 3.5 ppmvd @ 15% O_2 while firing natural gas and 16 ppmvd @ 15% O_2 while firing distillate oil would cost over $15,000/ton of NO_x removed. If the lost revenue to the fundamental changes in operation were incorporated into this analysis, primarily resulting from extended startup duration, the overall cost effectiveness would exceed $20,000/ton.

On August 4, 2000 US EPA issued draft combustion turbine BACT guidance for public review (Appendix C). While this draft document is only being circulated for comment and does not represent official EPA policy, it does contain useful information relative to the application of SCR to GE's 9 ppm DLN generation turbines. Note that the discussion by EPA identifies several negative collateral environmental impacts associated with application of SCR to 9 ppm base load, combined cycle turbines. These negative impacts are exacerbated for simple cycle peaking applications, as discussed below:

Peaking turbines start and stop quickly, and may only operate a few hours at a time. Until the SCR catalyst reaches temperature, ammonia (NH_3) may not be introduced (resulting in less relative NO_x

The GE 7FA turbines proposed for the Pompano Beach Energy Facility will employ General Electric's state-of-the-art 9 ppm NO_x Dry low-NO_x (DLN) Combustion technology. EPA acknowledges that 9 ppm is the lowest Dry low- NO_x emission level that has been demonstrated for any combined cycle, base load turbine. Since add-on controls have previously been shown to be not technically feasible for application to the proposed dual fuel fired simple cycle peakers (and would not be cost effective in any case), the lowest emission rate continuously achievable using Dry low- NO_x combustors represents the next candidate for BACT. The Pompano Beach Energy Facility will utilize the lowest emitting DLN turbine technology on the market today to achieve a NO_x emission limit of 9 ppmvd @ 15% O_2 while firing natural gas, which therefore represents Best Available Control Technology (BACT).

While most of the discussion has been dealing with achievable NO_x emissions limits for natural gas fired operation, Pompano Beach Energy Center L.L.C. proposes a NO_x emission limit of 42 pmvd @ 15% O_2 achieved using water injection. Similar to other permits issued in Florida Pompano Beach Energy Center L.L.C. proposes that within 18 months after the initial compliance test, an engineering report will be prepared regarding the lowest NO_x emission rate that can be consistently achieved while firing distillate oil. This lowest NO_x emission rate would account for long-term performance expectations and reasonable operating margins. Based on the results of this report, the NO_x emission limit for distillate oil fired operation could be lowered.

5.3.4.1 Summary of Gas Turbine NO_x BACT

Pompano Beach Energy Center L.L.C. proposes to implement NO_x BACT through the application of state-of-the-art GE 7FA turbines with 9 ppmvd @ 15% O_2 while firing natural gas, and 42 ppmvd @ 15% O_2 while firing distillate oil.

5.3.5 Natural Gas Fuel Heater

Based on a review of the RACT/BACT/LAER Clearinghouse the top NO_x control technology for heaters which fire less than 20 MMBtu/hr is the use of Low-NO_x burners. For a heater of this size, with limited hours of operation add-on control technology would not be cost effective. Pompano Beach Energy Facility will install a natural gas fired fuel heater equipped with Low-NO_x burner technology which will achieve a NO_x emission rate of less than 0.10 lb/MMBtu which will result in annual NO_x emissions of less than 2.3 tons/year. It should also be noted that the natural gas fuel heater is incorporated into this project to ensure that the natural gas fuel being used in the three combustion turbines is at the appropriate temperature for effective operation of GE's advanced DLN system.

Florida with the exception of the designated PSD Class I areas. PSD Class I areas are National Parks and Wilderness Areas designated by U.S. EPA for special protection, including tighter PSD increments. The nearest PSD Class I area to the proposed facility is the Everglades National Park located about 60 kilometers to the southwest. New sources are presumed to have an insignificant impact on a PSD Class I area if maximum modeled impacts are less than the levels shown in Table 6-4. Since long range transport modeling involving the use of the CALPUFF dispersion model is required for the Class I impact assessment, a separate analysis was completed for this assessment in coordination with the National Park Service Air Quality Division. The results of the PSD Class I area assessment are provided in Section 7.3.

PSD Significant Monitoring Concentrations

PSD applicants can be granted a discretionary waiver from PSD pre-construction air quality monitoring requirements if the modeled impacts of the new source are below these concentrations.

PSD Significant Impact Levels

As can be seen from the concentrations representing these levels, the Significant Impact Levels (SILs) are small fractions of the NAAQS and PSD increments. The U.S. EPA guidelines require these levels to be used to determine the extent of the area surrounding a proposed source within which the source could significantly add to ambient air quality concentrations. For proposed sources whose impacts are above these levels, an analysis of the combined impacts of the proposed source with other existing sources is required. If a proposed source's impacts are below these levels it is considered to be unable to either cause or contribute to violations of the NAAQS, PSD Class II, or Class I increments. Therefore, a cumulative impact assessment is not required.

6.5 Results of Ambient Air Quality Impact Analysis

The emissions from the turbine stacks (3) were modeled with ISCST3 to estimate the maximum concentrations for the criteria pollutants including NO_x, PM/PM_{10}, SO_2, CO, and lead for each year of meteorological data. Note that the modeling of annual impacts reflects limited operation of the combustion turbines (3500 hours/year/turbine including up to 1000 hours/year/turbine of distillate fuel oil usage).

Class II Area Receptors

Tables 6-5 and 6-6 provide summaries of the ISCST3 modeling results for NO_x, PM/PM_{10}, SO_2, CO, and lead for the Class II cartesian grid and fence-line receptors for natural gas and oil firing, respectively. The maximum air concentrations over the five years modeled and corresponding receptor locations are listed for each turbine load case (100%, 75% and 50%). The modeling results for all years of modeling are provided in Appendix E. Note that in Table 6-5 (results for natural gas), the maximum annual concentrations are based on a maximum of 3500 hours/year of natural gas firing (i.e., the results have been scaled by a factor of 3500/8760). Similarly, in Table 6-6 (results for oil), the maximum annual concentrations are based on a maximum of 1000 hours/year of oil firing (i.e., the results have been scaled by a factor of 1000/8760).

A comparison of the overall maximum pollutant impacts with the Class II Significant Impact Levels is presented in Table 6-7. For each pollutant and averaging period, the table lists the maximum predicted concentration for all fuels, years of meteorology, and worst-case turbine operating load. All of the modeled concentrations are below the SILs. Based on these results it can be concluded that the proposed facility will neither cause nor contribute to a violation of the NAAQS or PSD Class II increments. It is also pointed out that these impacts are below the relevant PSD significant monitoring concentrations as well. Thus, the facility is eligible for a waiver from pre-construction monitoring.

Table 6-7 Comparison of Maximum ISCST3 Concentrations to Class II Significant Impact Levels

Pollutant	Averaging Period	Maximum Concentration ($\mu g/m^3$)*	SIL ($\mu g/m^3$)
NO_X	Annual	0.034	1
PM-10	24-hour	0.422	5
	Annual	0.007	1
SO_2	3-hour	3.944	25
	24-hour	0.847	5
	Annual	0.009	1
CO	1-hour	11.213	2,000
	8-hour	2.884	500
Lead**	Quarterly	2.22E-4	1.5

*** Annual concentrations based on a worst-case composite of maximum natural gas concentration scaled by 2500 hours/year plus maximum oil concentration scaled by 1000 hours/year.**

**** Lead concentration is conservatively represented by the maximum 24-hour value. There is no SIL for Lead. The lead concentration is compared to the NAAQS.**

6.6 Broward County Air Modeling Requirement

The Broward County Code Sec. 27-175 and 27-176(c)(2)b prohibits major sources from allowing emissions of criteria pollutants in quantities that would reduce by more than one half the margin between the existing ambient concentrations and the applicable NAAQS. This section provides the modeling analysis to demonstrate compliance with this local requirement.

The Broward County Department of Planning and Environmental Protection (DPEP) was contacted to obtain air monitoring data to establish a baseline of existing ambient concentrations in Broward County. The DPEP provided 1999 ambient monitoring data from sites operated by the Broward County Air Quality Division. These data consisted of eight monitoring sites for PM_{10}, one for SO_2, one for NO_2, three for ozone and five for CO. To be conservative, ENSR selected the highest measured concentrations for each averaging period from among all the sites for use in this analysis.

Table 6-8 shows that the PBEC will consume substantially less than one-half of the margin between the maximum baseline concentration and the NAAQS. In fact, the project impact is less than one percent of this margin for all criteria pollutants modeled.

Table 6-8 Compliance Demonstration for Broward County Code Section 27.176(c)(2)(b)

Pollutant	Averaging Period	Baseline Conc.[(1)] ($\mu g/m^3$)	Site No.	NAAQS ($\mu g/m^3$)	½ [NAAQS-Baseline] ($\mu g/m^3$)	Maximum Predicted Impact of Facility ($\mu g/m^3$)
PM_{10}	24 hr	38	3	150	56	0.4
	Annual	18	28,29	50	16	0.01
SO_2	3-hr	272	28	1300	514	3.9
	24-hr	47	28	365	159	0.8
	Annual	9	28	80	35.5	0.01
NO_2	Annual	20	31	100	40	0.05
CO	1-hr	10,877	18	40,000	14,563	11.2
	8-hr	6,298	28	10,000	1,851	2.9

[(1)]Highest measured concentration in 1999 from Broward Co. Air Quality Division Monitoring Stations

Although ambient ozone data is available and was provided by the county, the above table did not provide a comparison for ozone for several reasons. Ozone is a regional phenomenon and it's not feasible to model the impact of a single source on resultant ambient ozone levels. Typically, such analyses are resource intensive, and are conducted as multi-source regional studies. Further, utilizing the EPA Urban Airshed Model (UAM) for ozone requires various databases that are not yet available for southeast Florida.

However, for the purpose of addressing the Broward County requirement, the potential for the PBEC to impact regional ozone levels can be addressed in a reasonable, yet simplistic way. Ozone is a secondary pollutant formed primarily from photochemical reactions involving the precursors NOx, VOCs and CO, that are emitted from a variety of sources distributed throughout the airshed. Therefore, ozone concentrations will be materially affected only if there is a substantial change in the emissions burden throughout the airshed. Thus, if one were to compare the project's estimated emissions of these precursors to the countywide total, a rough estimate could be made of the resultant increase in ozone levels. Although the change in ozone can be highly non-linear in response to changes in ozone emissions, there is simply no easy way to quantitatively address this issue, short of an actual multi-source regional study.

Table 6-9 illustrates that the maximum percent increase of ozone precursors associated with the PBEC is 1.09 percent. The highest second high ozone measured in 1999 in Broward was 0.084 ppm. The halfway point between this measurement and the standard of 0.12 ppm is 0.102 ppm, an increase of 21.4 percent above current levels. Although the change in ozone can be highly nonlinear in response to changes in precursor emissions, it is extremely unlikely that such a small increase (approximately one percent) in precursor emissions could result in such a magnitude of increase (>20 percent) in ozone levels.

Table 6-9 Ozone Compliance Demonstration for Broward County Code Section 27.176(c)(2)(b)

Broward County 1997 Ozone Precursor Emission Inventory			
Source Type	**NOx (tons/year)**	**VOC (tons/year)**	**CO (tons/year)**
Total 1997 Emissions in Broward	**63,916**	**124,733**	**343,772**

Pompano Beach Energy Center (PBEC)			
Proposed PBEC Emissions Compared to Total Emissions Inventoried in Broward County In 1997			
Source Type	**NOx (tons/year)**	**VOC (tons/year)**	**CO (tons/year)**
Pompano Beach Energy Center (PBEC) 3 ng fired turbines - 0 hrs oil	326	18	165.1
Percent of Total PBEC Emissions in Broward County - 0 hrs oil	***0.51***	***0.03***	***0.05***
Pompano Beach Energy Center (PBEC) Worst Case 2500 hours gas - 1000 hours oil	705	15.3	210.9
Percent of Total PBEC Emissions in Broward County - 1000 hrs oil	***1.09***	***0.01***	***0.06***

Calculations and Computations

HAP Emissions from Simple Cycle CTG Facility

Project:	Florida GE 7FA Turbine			
Project Number:	6792-140	Computed by: M. Behnke	Date:	9/21/00
Subject:	Natural Gas Turbine Non-Criteria Regulated Pollutant Emissions	Checked by: M. Griffin	Date:	12/6/00

Pollutant	Type[a]	Emission Factor AP-42 Section 3.1 04/00 - Combustion Turbine Natural Gas			CTG Natural Gas Combustion		Natural Gas Fired CTG Emissions		Facility		Facility
					Maximum Heat Input, per turbine	Average Heat Input, per turbine	Emission Rate, Per Turbine		Emission Rate All CTGs		Major Source
		($lb/10^6 scf$)	(lb/MMBtu)[d]	Rating	(MMBtu/Hr)[b]	(MMBtu/Hr)[c]	Hourly[e] (lb/hr)	Annual[f] (tpy)	Hourly[e] (lb/hr)	Annual[f] (tpy)	(Y/N)
1,3-Butadiene	HAP		4.30E-07	D	1,892.6	1,830.4	8.14E-04	1.38E-03	2.44E-03	4.13E-03	No
Acetaldehyde	HAP		4.00E-05	C	1,892.6	1,830.4	7.57E-02	1.28E-01	2.27E-01	3.84E-01	No
Acrolein	HAP		6.40E-06	C	1,892.6	1,830.4	1.21E-02	2.05E-02	3.63E-02	6.15E-02	No
Benzene [g]	HAP	1.36E-02	1.33E-05	B	1,892.6	1,830.4	2.52E-02	4.27E-02	7.57E-02	1.28E-01	No
Ethylbenzene	HAP		3.20E-05	C	1,892.6	1,830.4	6.06E-02	1.03E-01	1.82E-01	3.08E-01	No
Formaldehyde [h]	HAP	2.72E-01	2.66E-04		1,892.6	1,830.4	5.04E-01	8.53E-01	1.51E+00	2.56E+00	No
Naphthalene	HAP		1.30E-06	C	1,892.6	1,830.4	2.46E-03	4.16E-03	7.38E-03	1.25E-02	No
PAHs	HAP		2.20E-06	C	1,892.6	1,830.4	4.16E-03	7.05E-03	1.25E-02	2.11E-02	No
Propylene Oxide	HAP		2.90E-05	D	1,892.6	1,830.4	5.49E-02	9.29E-02	1.65E-01	2.79E-01	No
Toluene [g]	HAP	7.10E-02	6.96E-05	B	1,892.6	1,830.4	1.32E-01	2.23E-01	3.95E-01	6.69E-01	No
Xylene	HAP		6.40E-05	C	1,892.6	1,830.4	1.21E-01	2.05E-01	3.63E-01	6.15E-01	No

	Hours of Operation
Natural Gas CTG	3,500
Number of Turbines	3

Total HAPs	5.0	No
Maximum Individual HAP	2.6	No

Natural Gas Heating Value [i] 1020 Btu/SCF (HHV)
908 Btu/SCF (LHV)

Notes:

(a) Type = NC for Non-Criteria Pollutants, HAP/POM for compounds included as polycyclic organic matter or HAP for Hazardous Air Pollutant.
(b) Maximum heat input rate for turbine is based on HHV data at ambient temperature of -15°F and 100% load operating conditions.
(c) Average heat input rate is based on HHV data at an average ambient temperature of 47.1°F and 100% load operating conditions.
(d) Emission Factor (lb/MMBtu) = (Emission Factor, $lb/10^6 scf$) / (1040 Btu/scf)
(e) Hourly Emission Rate (lb/hr) = [Heat Input Rate (MMBtu/Hr) * Emission Factor (lb/MMBtu)]
(f) Annual Emission Rate (tpy) = (Average Hourly Emission Rate, lb/hr) * (2,500 hr/yr) / (2,000 lb/ton)
(g) Emission Factors from CARB CATEF emission factor database for natural gas fired combustion turbines.
(h) Modified from AP-42 Section 3.1 emissions database for large turbines.
(i) Natural gas heating value is taken from a gas analysis report provided by Duke Energy.

Calculations and Computations

HAP Emissions from Simple Cycle CTG Facility

Project: Florida GE 7FA Turbine
Project Number: 6792-140
Subject: Natural Gas Turbine Non-Criteria Regulated Pollutant Emissions

Computed by: M. Behnke **Date:** 9/21/00
Checked by: M. Griffin **Date:** 12/6/00

Pollutant	Type[a]	Emission Factor AP-42 Section 3.1 04/00 - Combustion Turbine Natural Gas (lb/10^6scf)	Emission Factor (lb/MMBtu)[d]	Rating	CTG Natural Gas Combustion: Maximum Heat Input, per turbine (MMBtu/Hr)[b]	CTG Natural Gas Combustion: Average Heat Input, per turbine (MMBtu/Hr)[c]	Natural Gas Fired CTG Emissions: Emission Rate, Per Turbine: Hourly[e] (lb/hr)	Natural Gas Fired CTG Emissions: Emission Rate, Per Turbine: Annual[f] (tpy)	Facility Emission Rate All CTGs: Hourly[e] (lb/hr)	Facility Emission Rate All CTGs: Annual[f] (tpy)	Facility Major Source (Y/N)
1,3-Butadiene	HAP		4.30E-07	D	1,892.6	1,830.4	8.14E-04	9.84E-04	2.44E-03	2.95E-03	No
Acetaldehyde	HAP		4.00E-05	C	1,892.6	1,830.4	7.57E-02	9.15E-02	2.27E-01	2.75E-01	No
Acrolein	HAP		6.40E-06	C	1,892.6	1,830.4	1.21E-02	1.46E-02	3.63E-02	4.39E-02	No
Benzene [g]	HAP	1.36E-02	1.33E-05	B	1,892.6	1,830.4	2.52E-02	3.05E-02	7.57E-02	9.15E-02	No
Ethylbenzene	HAP		3.20E-05	C	1,892.6	1,830.4	6.06E-02	7.32E-02	1.82E-01	2.20E-01	No
Formaldehyde [h]	HAP	2.72E-01	2.66E-04		1,892.6	1,830.4	5.04E-01	6.09E-01	1.51E+00	1.83E+00	No
Naphthalene	HAP		1.30E-06	C	1,892.6	1,830.4	2.46E-03	2.97E-03	7.38E-03	8.92E-03	No
PAHs	HAP		2.20E-06	C	1,892.6	1,830.4	4.16E-03	5.03E-03	1.25E-02	1.51E-02	No
Propylene Oxide	HAP		2.90E-05	D	1,892.6	1,830.4	5.49E-02	6.64E-02	1.65E-01	1.99E-01	No
Toluene [g]	HAP	7.10E-02	6.96E-05	B	1,892.6	1,830.4	1.32E-01	1.59E-01	3.95E-01	4.78E-01	No
Xylene	HAP		6.40E-05	C	1,892.6	1,830.4	1.21E-01	1.46E-01	3.63E-01	4.39E-01	No

	Hours of Operation
Natural Gas CTG	2,500
Number of Turbines	3

Total HAPs	3.6	No
Maximum Individual HAP	1.8	No

Natural Gas Heating Value [i] 1020 Btu/SCF (HHV)
908 Btu/SCF (LHV)

Notes:
(a) Type = NC for Non-Criteria Pollutants, HAP/POM for compounds included as polycyclic organic matter or HAP for Hazardous Air Pollutant.
(b) Maximum heat input rate for turbine is based on HHV data at ambient temperature of -15°F and 100% load operating conditions.
(c) Average heat input rate is based on HHV data at an average ambient temperature of 47.1°F and 100% load operating conditions.
(d) Emission Factor (lb/MMBtu) = (Emission Factor, lb/10^6 scf) / (1040 Btu/scf)
(e) Hourly Emission Rate (lb/hr) = [Heat Input Rate (MMBtu/Hr) * Emission Factor (lb/MMBtu)]
(f) Annual Emission Rate (tpy) = (Average Hourly Emission Rate, lb/hr) * (2,000 hr/yr) / (2,000 lb/ton)
(g) Emission Factors from CARB CATEF emission factor database for natural gas fired combustion turbines.
(h) Modified from AP-42 Section 3.1 emissions database for large turbines.
(i) Natural gas heating value is taken from a gas analysis report provided Duke Energy.

Calculations and Computations

HAP Emissions from Simple Cycle CTG Facility

Project: Florida GE 7FA Turbine
Project Number: 6792-140
Subject: Distillate Oil-Fired Turbine Non-Criteria Regulated Pollutant Emissions

Computed by: M. Behnke — Date: 9/21/00
Checked by: M. Griffin — Date: 12/6/00

Pollutant	Type[a]	Emission Factor AP-42 Section 3.1 04/00 - Combustion Turbine - Distillate Oil (lb/10^3gal)	Emission Factor (lb/MMBtu)[d]	Rating	CTG Distillate Oil Combustion: Maximum Heat Input, per turbine (MMBtu/Hr)[b]	CTG Distillate Oil Combustion: Average Heat Input, per turbine (MMBtu/Hr)[c]	Distillate Oil-Fired CTG Emissions: Emission Rate, Per Turbine Hourly[e] (lb/hr)	Distillate Oil-Fired CTG Emissions: Emission Rate, Per Turbine Annual[f] (tpy)	Facility Emission Rate All CTGs Hourly[e] (lb/hr)	Facility Emission Rate All CTGs Annual[f] (tpy)	Facility Major Source (Y/N)
1,3-Butadiene	HAP		1.60E-05	D	2,094.1	2,025.0	3.35E-02	1.62E-02	1.01E-01	4.86E-02	No
Benzene	HAP		5.50E-05	C	2,094.1	2,025.0	1.15E-01	5.57E-02	3.46E-01	1.67E-01	No
Formaldehyde	HAP		2.80E-04	B	2,094.1	2,025.0	5.86E-01	2.83E-01	1.76E+00	8.50E-01	No
Naphthalene	HAP		3.50E-05	C	2,094.1	2,025.0	7.33E-02	3.54E-02	2.20E-01	1.06E-01	No
PAHs	HAP		4.00E-05	C	2,094.1	2,025.0	8.38E-02	4.05E-02	2.51E-01	1.21E-01	No
Arsenic	HAP		1.10E-05	D	2,094.1	2,025.0	2.30E-02	1.11E-02	6.91E-02	3.34E-02	No
Beryllium	HAP		3.10E-07	D	2,094.1	2,025.0	6.49E-04	3.14E-04	1.95E-03	9.42E-04	No
Cadmium	HAP		4.80E-06	D	2,094.1	2,025.0	1.01E-02	4.86E-03	3.02E-02	1.46E-02	No
Chromium	HAP		1.10E-05	D	2,094.1	2,025.0	2.30E-02	1.11E-02	6.91E-02	3.34E-02	No
Lead	HAP		1.40E-05	D	2,094.1	2,025.0	2.93E-02	1.42E-02	8.80E-02	4.25E-02	No
Manganese	HAP		7.90E-04	D	2,094.1	2,025.0	1.65E+00	8.00E-01	4.96E+00	2.40E+00	No
Mercury	HAP		1.20E-06	D	2,094.1	2,025.0	2.51E-03	1.21E-03	7.54E-03	3.64E-03	No
Nickel	HAP		4.60E-06	D	2,094.1	2,025.0	9.63E-03	4.66E-03	2.89E-02	1.40E-02	No
Selenium	HAP		2.50E-05	D	2,094.1	2,025.0	5.24E-02	2.53E-02	1.57E-01	7.59E-02	No

	Hours of Operation
Distillate Oil CTG	1,000
Number of Turbines	3

Total HAPs	3.9	No
Maximum Individual HAP	2.4	No

Distillate Oil Heating Value: 139 MMBtu/10^3 gal (HHV); 125 MMBtu/10^3 gal (LHV)

Notes:
(a) Type = NC for Non-Criteria Pollutants, HAP/POM for compounds included as polycyclic organic matter or HAP for Hazardous Air Pollutant.
(b) Maximum heat input rate for turbine is based on HHV data at ambient temperature of -15°F and 100% load operating conditions.
(c) Average heat input rate is based on HHV data at an average ambient temperature of 47.1°F and 100% load operating conditions.
(d) Emission factors from AP-42, Section 3.1, Tables 3.1-4 and 3.1-5.
(e) Hourly Emission Rate (lb/hr) = [Heat Input Rate (MMBtu/Hr) * Emission Factor (lb/MMBtu)]
(f) Annual Emission Rate (tpy) = (Average Hourly Emission Rate, lb/hr) * (500 hr/yr) / (2,000 lb/ton)

Calculations and Computations

HAP Emissions

Project: Florida GE 7FA Turbine
Project Number: 6792-140
Subject: Natural Gas Fuel Heater Non-Criteria Regulated Pollutant Emissions

Computed by: M. Griffin
Checked by:

Pollutant	Type[a]	Emission Factor AP-42 Section 1.4 03/98 - Natural Gas Combustion (lb/10⁶scf)	(lb/MMBtu)[b]	Rating	Auxiliary Boiler Natural Gas Combustion: Maximum Heat Input, per boiler (MMBtu/Hr)	Averge Heat Input, per boiler (MMBtu/Hr)	Auxiliary Boiler Emissions: Emission Rate, Hourly[c] (lb/hr)	Annual[d] (tpy)	Facility Emission Rate: Hourly[c] (lb/hr)	Annual[d] (tpy)	Facility Major Source (Y/N)
1,3-Butadiene	HAP				13	13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No
2-Methylnaphthalene	HAP	2.40E-05	2.35E-08	D	13	13	3.06E-07	5.35E-07	3.06E-07	5.35E-07	No
3-Methylchloranthrene	HAP	1.80E-06	1.76E-09	E	13	13	2.29E-08	4.01E-08	2.29E-08	4.01E-08	No
7,12-Dimethylbenz(a)anthracene	HAP	1.60E-05	1.57E-08	E	13	13	2.04E-07	3.57E-07	2.04E-07	3.57E-07	No
Acenaphthene	HAP	1.80E-06	1.76E-09	E	13	13	2.29E-08	4.01E-08	2.29E-08	4.01E-08	No
Acenaphthylene	HAP	1.80E-06	1.76E-09	E	13	13	2.29E-08	4.01E-08	2.29E-08	4.01E-08	No
Anthracene	HAP	2.40E-06	2.35E-09	E	13	13	3.06E-08	5.35E-08	3.06E-08	5.35E-08	No
Benz(a)anthracene	HAP	1.80E-06	1.76E-09		13	13	2.29E-08	4.01E-08	2.29E-08	4.01E-08	No
Benzene	HAP	2.10E-03	2.06E-06	B	13	13	2.68E-05	4.68E-05	2.68E-05	4.68E-05	No
Benzo(a)pyrene	HAP	1.20E-06	1.18E-09	E	13	13	1.53E-08	2.68E-08	1.53E-08	2.68E-08	No
Benzo(b)flouoranthene	HAP	1.80E-06	1.76E-09	E	13	13	2.29E-08	4.01E-08	2.29E-08	4.01E-08	No
Benzo(g,h,i)perylene	HAP	1.20E-06	1.18E-09	E	13	13	1.53E-08	2.68E-08	1.53E-08	2.68E-08	No
Benzo(k)fluoranthene	HAP	1.80E-06	1.76E-09	E	13	13	2.29E-08	4.01E-08	2.29E-08	4.01E-08	No
Chrysene	HAP	1.80E-06	1.76E-09	E	13	13	2.29E-08	4.01E-08	2.29E-08	4.01E-08	No
Dibenzo(a,h)anthracene	HAP	1.20E-06	1.18E-09	E	13	13	1.53E-08	2.68E-08	1.53E-08	2.68E-08	No
Dichlorobenzene	HAP	1.20E-03	1.18E-06	E	13	13	1.53E-05	2.68E-05	1.53E-05	2.68E-05	No
Fluoranthene	HAP	3.00E-06	2.94E-09	E	13	13	3.82E-08	6.69E-08	3.82E-08	6.69E-08	No
Fluorene	HAP	2.80E-06	2.75E-09	E	13	13	3.57E-08	6.25E-08	3.57E-08	6.25E-08	No
Formaldehyde	HAP	7.50E-02	7.35E-05	B	13	13	9.56E-04	1.67E-03	9.56E-04	1.67E-03	No
Hexane	HAP	1.80E+00	1.76E-03		13	13	2.29E-02	4.01E-02	2.29E-02	4.01E-02	No
Indeno(1,2,3-cd)pyrene	HAP	1.80E-06	1.76E-09	E	13	13	2.29E-08	4.01E-08	2.29E-08	4.01E-08	No
Naphthalene	HAP	6.10E-04	5.98E-07	E	13	13	7.77E-06	1.36E-05	7.77E-06	1.36E-05	No
Phenanathrene	HAP	1.70E-05	1.67E-08	D	13	13	2.17E-07	3.79E-07	2.17E-07	3.79E-07	No
Pyrene	HAP	5.00E-06	4.90E-09	E	13	13	6.37E-08	1.12E-07	6.37E-08	1.12E-07	No
Toluene	HAP	3.40E-03	3.33E-06	C	13	13	4.33E-05	7.58E-05	4.33E-05	7.58E-05	No
Arsenic	HAP	2.00E-04	1.96E-07	E	13	13	2.55E-06	4.46E-06	2.55E-06	4.46E-06	No
Barium	HAP	4.40E-03	4.31E-06	D	13	13	5.61E-05	9.81E-05	5.61E-05	9.81E-05	No
Beryllium	HAP	1.20E-05	1.18E-08	E	13	13	1.53E-07	2.68E-07	1.53E-07	2.68E-07	No
Cadmium	HAP	1.10E-03	1.08E-06	D	13	13	1.40E-05	2.45E-05	1.40E-05	2.45E-05	No
Chromium	HAP	1.40E-03	1.37E-06	D	13	13	1.78E-05	3.12E-05	1.78E-05	3.12E-05	No
Cobalt	HAP	8.40E-05	8.24E-08	D	13	13	1.07E-06	1.87E-06	1.07E-06	1.87E-06	No
Copper	HAP	8.50E-04	8.33E-07	C	13	13	1.08E-05	1.90E-05	1.08E-05	1.90E-05	No
Lead	HAP	5.00E-04	4.90E-07	D	13	13	6.37E-06	1.12E-05	6.37E-06	1.12E-05	No
Manganese	HAP	3.80E-04	3.73E-07	D	13	13	4.84E-06	8.48E-06	4.84E-06	8.48E-06	No
Mercury	HAP	2.60E-04	2.55E-07	D	13	13	3.31E-06	5.80E-06	3.31E-06	5.80E-06	No
Molybdenum	HAP	1.10E-03	1.08E-06	D	13	13	1.40E-05	2.45E-05	1.40E-05	2.45E-05	No
Nickel	HAP	2.10E-03	2.06E-06	C	13	13	2.68E-05	4.68E-05	2.68E-05	4.68E-05	No
Selenium	HAP	2.40E-05	2.35E-08	E	13	13	3.06E-07	5.35E-07	3.06E-07	5.35E-07	No
Vanadium	HAP	2.30E-03	2.25E-06	D	13	13	2.93E-05	5.13E-05	2.93E-05	5.13E-05	No
Zinc	HAP	2.90E-02	2.84E-05	E	13	13	3.70E-04	6.47E-04	3.70E-04	6.47E-04	No

Hours of Operation
Auxiliary Boiler 3,500
Number of Auxiliary Boilers per Facility 1

Natural Gas Heating Value 1020 Btu/SCF (HHV)

Facility Total HAPs 0.04 **No**

Maximum Individual HAP 0.04 **No**

Notes:
(a) Type = NC for Non-Criteria Pollutants, HAP/POM for compounds included as polycyclic organic matter or HAP for Hazardous Air Pollutant.
(b) Emission Factor (lb/MMBtu) = (Emission Factor, lb/10⁶ scf) / (1,020 Btu/scf)
(c) Hourly Emission Rate (lb/hr) = [Heat Input (MMBtu/Hr) * Emission Factor (lb/MMBtu)]
(d) Annual Emission Rate (tpy) = (Hourly Emission Rate, lb/hr) * (8,760 hr/yr) / (2,000 lb/ton)

Calculations and Computations

Project: Florida GE 7FA Turbine
Project Number: 6792-140
Subject: Formaldehyde Emission Factor

Computed by: L. Sherburne **Date:** 7/19/00
Checked by: M. Griffin **Date:** 9/21/00

Facility	Manufacturer	Model	Rating (MW)	AP-42 1998 Draft (lb/Mmcuft)	Large Turbines (>70 MW) (lb/Mmcuft)
Gilroy Energy Co./Gilroy, CA	General Electric	Frame 7	87	0.722160	0.722160
Sithe Energies, 32nd St. Naval S/San Diego, CA	General Electric	MS6000	44	0.110160	
SD Gas & Electric Co./San Diego, CA	General Electric	5221	17	0.483480	
Modesto Irrigation District/Mclure/Modesto, CA	General Electric	Frame 7B	50	0.135660	
Willamette Industries, Inc./Oxnard, CA	General Electric	LM2500-PE	67.4	0.044982	
Sycamore Cogen. Co./Bakersfield, CA	General Electric	Frame 7	75	0.085884	0.085884
Calpine / Agnews Cogen./San Jose, CA	General Electric	LM5000	23.33	0.063036	
Dexzel Inc./Bakersfield, CA	General Electric	LM2500	29.1	0.026520	
Procter & Gamble Manufacturing/Sacramento, CA	General Electric	LM2500	20.5	0.088434	
Chevron Inc./Gaviota, CA	Allison	K501	2.5	3.570000	
Ell / Stewart & Stevenson/Berkeley, CA	General Electric	LM2500	25	0.480420	
Calpine Corp./Sumas, WA	General Electric	MS7001EA	87.83	0.006834	0.006834
Sargent Canyon Cogen/Bakersfield, CA	General Electric	Frame 6	42.5	0.059568	
Watsonville Cogen, Partnership/Watsonville, CA	General Electric	LM 2500	24	0.091596	
Southern Cal. Edison Co./Long Beach, CA	Brown-Boveri-Sulzer	11-D	61.75	1.326000	
NR/NR	General Electric	Frame 3	7.7	0.265200	
NR/NR	General Electric	Frame 3	7.7	0.427380	
NR/NR	Solar	T12000	9.4	0.015810	
NR/NR	Solar	T12000	9.4	9.618600	
NR/NR	General Electric	LM1500	10.6	4.273800	
NR/NR	General Electric	LM1500	10.6	25.908000	
Southern Cal. Edison Co./Coolwater, CA	Westinghouse	PACE520	63	38.964000	
Southern Cal. Edison Co./Coolwater, CA	Westinghouse	PACE520	63	0.350880	
Imperial Irrigation D / Choachella/Imperial, CA	General Electric	NS5000P	46.3	0.306000	
Bonneville Pacific Corp./Somis, CA	Solar	Mars	9	0.743580	
WSPA/SWEPI GT/Bakersfield, CA	Allison	501 KB5	4	0.013872	
		Mean (lb/Mmcuft)		3.39	0.27

Note: The AP-42 1998 Draft document calculates the proposed Formaldehyde Emission factor as an average of all of the test data present in the data base. For the purposes of calculating an appropriate emission factor for the Big Cajun One Expansion Project only the data presented for large turbines has been used.

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ENSR INTERNATIONAL

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Linero, Alvaro

From: JARRETT MACK [JMACK@broward.org]
Sent: Thursday, January 04, 2001 1:24 PM
To: Linero, Alvaro
Cc: DANIELA BANU
Subject: Enron completeness review...

Al,

We have reviewed the response to your incompleteness letter as well as the revised application dated December, 2000. Our review indicates that the application, as amended, adequately addresses Broward County ordinances 27-176(c)(2)(b) and 27-178. Should you have any questions, please let me know.

Jarrett