Florida Power & Light Company, Environmental Services Dept., P.O. Box 14000, Juno Beach, FL 33408

July 1, 2004

A.A. Linero
Program Administrator, South Permitting
Department of Environmental Protection
Bureau of Air Regulation
111 S. Magnolia Drive, Suite 4
Tallahassee, FL 32399-2400

Re: Florida Power & Light Company
Turkey Point Expansion Project
DEP File No. 0250003-0060AC (PSD-FL-338)

Dear Mr. Linero:

Thank you for taking time to meet with us on Tuesday June 22, 2004. I am writing to respectfully request that you consider the following clarifications to the draft Prevention of Significant Deterioration of Air Quality (PSD) permit issued on May 28, 2004 and public noticed on June 10, 2004. Please note that none of these proposed clarifications have any impact on the air modeling performed to evaluate potential impacts.

In Section III, page 7 of 17, we request the following clarification for operational flexibility:

8. Methods of Operation

b. *Authorized Fuels*: Each gas turbine shall fire natural gas as the primary fuel, which shall contain no more than 2.0 grams of slfur per 100 standard cubic fee of natural gas. As a restricted alternate fuel, each gas turbine may fire ultra low sulfur distillate fuel oil no more than 0.0015% sulfur by weight. ~~Each gas turbine shall fire no more than 500 hours of fuel oil during any consecutive 12 months.~~ <u>The four gas turbines shall fire no more than a cumulative total of 28,028,168 gallons of fuel oil during any calendar year.</u>

In Section III, page 9 of 17, we request the following clarification to be consistent with the Table in Section IV, Appendix BD, page 1.

9. Emissions Standards

f. Each SCR system shall be designed and operated for ammonia slip limit of ~~less~~ <u>no more</u> than 5 ppmvd corrected to 15% oxygen based on the average of three test runs. Compliance with the ammonia slip standard shall be demonstrated by conducting tests in accordance with EPA Method CTM-027.

In Section III, pages 14-15 of 17, we request the clarifications below. Recognizing that quarterly reports contain all NSPS and State requirements, this clarification combines the quarterly and semiannual reports. The proposed language below also makes condition 27 consistent with condition 25a regarding the monitoring period.

27. ~~Semiannual NSPS Excess Emissions Report.~~ Quarterly Excess Emission Report: ~~In accordance with 40 CFR 60.7(d), the permittee shall submit a report to the Compliance Authority summarizing any emissions in excess of the NSPS standards w~~ Within 30 days following the end of each calendar-quarter, the permittee shall submit a report to the Compliance Authority summarizing periods of CO and NOX emissions in excess of the permit standards following the NSPS format provided in Appendix XS of this permit. For purposes of reporting emissions in excess of NSPS Subpart GG, excess emissions from the gas turbine are defined as: any CEMS hourly average value exceeding the NSPS NOX emission standard identified in Appendix GG; and any ~~daily~~ monitoring period during which the sulfur content of the fuel being fired in the gas turbine exceeds the NSPS standard identified in Appendix GG. For purposes of reporting emissions in excess of NSPS Subpart Da, excess emissions from duct firing are defined as: NOX or PM emissions in excess of the NSPS standards except during periods of startup, shutdown, or malfunction; and SO2 emissions in excess of the NSPS standards except during startup or shutdown. ~~An example of the report is provided on Appendix XS.~~ Such information shall be summarized for all exceedances including startups, shutdowns, malfunctions, and major tuning sessions. In addition, the report shall summarize the CEMS systems monitor availability for the previous quarter. [Rules 62-4.130, 62-204.800, 62-210.700(6), F.A.C.; and 40 CFR 60.7]

28. ~~Quarterly Permit Excess Emissions Report~~ Semiannual NSPS Excess Emissions Report: ~~Within 30 days following the end of each quarter, the permittee shall submit a report to the Compliance Authority summarizing periods of CO and NOX emissions in excess of the permit standards. Such information shall be summarized for all exceedances including startups, shutdowns, malfunctions, and major tuning sessions. In addition, the report shall summarize the CEMS systems monitor availability for the previous quarter.[Rules 62-4.130, 62-204.800, 62-210.700(6), F.A.C.; and 40 CFR 60.7]~~ The submittal of the Quarterly Excess Emission Reports shall constitute compliance with the requirements of 40 CFR 60.7(d) for the submittal of Semiannual Excess Emissions Report.

We appreciate your consideration of these proposed clarifications. If you have any questions or require additional information, please contact me at (561) 691-7518.

Sincerely,

Barbara P. Linkiewicz
Environmental Licensing Manager

cc: Stephen Palmer, DEP Siting Coordination Office
Ken Kosky, Golder Associates

Linero, Alvaro

From: Kosky, Ken [KKosky@GOLDER.com]
Sent: Wednesday, May 19, 2004 3:31 PM
To: Linero, Alvaro
Cc: Barbara_P_Linkiewicz@fpl.com; John_Gnecco@fpl.com
Subject: Turkey Point - May 17th Meeting

Al: I went through my notes from the meeting and I am lising the comments and the information discussed. I listed the lb/hr; see if they are the same as you have. For CO when firing oil, my understanding from him was that GE was going to guarantee the 8 ppmvd at 15% O_2 when the load is from 75% to 100%. For gas firing and peak operation with duct firing, the CO emission rate is 10.1 ppmvd at 15% O_2 based on the 9 ppmvd expected by GE. Note that for power augmentation, GE only provided information for 75 and 95 degrees F. Regards, Ken

Description: Eliminate "simple cycle from description and any other reference in document. Gas Heat Input 1,608 MMBtu/hour and 1,023,872 ACFM; Oil - 1,830 MMBtu/hr and 1,224,407 ACFM

Condition 6: Maximum heat input is 1,608 MMBtu/hr for gas and 1,830 MMBtu/hr for oil firing.

Condition 9: (note: All lb/hr at ISO except CO DB & PA which is 75 degrees F)

CO: Oil - 8 ppmvd at 15% O_2 and 37.8 lb/hr
Gas Normal – 4.14 ppmvd at 15% O_2 and 16.3 lb/hr
Gas DB & PA – 14.0 ppmvd at 15% O_2 and 75 lb/hr

NOx: Oil – 8 ppmvd at 15% O_2 and 62.1 lb/hr

VOC: Oil – 2.8 ppmvd at 15% O_2 and 7.5 lb/hr;
Gas CT & PK – 1.3 ppmvd at 15% O_2 and 2.9 lb/hr
Gas & DB – 2.2ppmvd at 15% O_2 and 5.7 lb/hr

Condition 15. b: Change "steam turbine system" to "combined cycle operation", which would be more descriptive.

Condition 21. f.: Conditions cited should be "15 and 16" and not "16 and 18" as stated.

Condition 22: Omit condition since Condition 23 includes this requirement when CEMs is out of service.

Table 2-3. Proposed Pollutant Gaseous Emission Concentrations and PM_{10} Emission Rates For Each CT/HRSG Unit

Pollutant	Fuel	Method of Operation	Emisssion Rate			
			Maximum		59 °F	
			(ppmvd @15% O_2)	lb/hour	(ppmvd @15% O_2)	lb/hour
Nitrogen Oxides	Gas	Combined Cycle (CC)	2	13.64	2	12.98
	Gas	CC - w/Duct Firing	2	19.39	2	18.79
	Gas	CC - w/Duct Firing, Power Aug.	2	21.15	2	21.15
	Oil	CC	8	64.59	8	62.09
Carbon Monoxide	Gas	CC	4.14	17.19	4.13	16.33
	Gas	CC - w/Duct Firing	7.78	39.19	7.56	38.33
	Gas	CC - w/Duct Firing, Power Aug.	14.05	74.97	NA	NA
	Oil	CC	14.14	69.49	13.97	65.98
Volatile Organic Compounds	Gas	CC	1.27	2.98	1.26	2.85
	Gas	CC - w/Duct Firing	2.03	5.18	1.94	5.05
	Gas	CC - w/Duct Firing, Power Aug.	2.23	5.70	NA	NA
	Oil	CC	2.79	7.82	2.77	7.47
Particulate Matter	Gas	CC	NA	11.09	NA	10.99
	Gas	CC - w/Duct Firing	NA	14.45	NA	14.35
	Gas	CC - w/Duct Firing, Power Aug.	NA	14.40	NA	NA
	Oil	CC	NA	17.63	NA	17.60
Sulfur Dioxide	Gas	CC	NA	10.33	NA	9.84
	Gas	CC - w/Duct Firing	NA	13.37	NA	12.88
	Gas	CC - w/Duct Firing, Power Aug.	NA	13.13	NA	NA
	Oil	CC	NA	3.11	NA	2.98
Sulfuic Acid Mist (SAM)	Gas	CC	NA	1.03	NA	0.98
	Gas	CC - w/Duct Firing	NA	1.34	NA	1.29
	Gas	CC - w/Duct Firing, Power Aug.	NA	1.31	NA	NA
	Oil	CC	NA	0.62	NA	0.60

Source: GE, 2004 - CT Performance Data; Golder Associates, 2004

Note: Based on maximum emission rates over turbine inlet operating conditions for all operating loads.

Nelson, Deborah

From: Linero, Alvaro
Sent: Wednesday, May 05, 2004 5:02 PM
To: Nelson, Deborah
Subject: FW: Turkey Point Emission Tables

Debbie: FYI.

Can you help me find places where I need to change stuff?

Al.

-----Original Message-----
From: Kosky, Ken [mailto:KKosky@GOLDER.com]
Sent: Wednesday, May 05, 2004 5:27 PM
To: Linero, Alvaro
Cc: John_Gnecco@fpl.com; Barbara_P_Linkiewicz@fpl.com; Larocca, David
Subject: Turkey Point Emission Tables

Al: Attached are the final versions of the Turkey Point emission tables that included all the latest updated information from GE, CO emissions at 5 ppmvd when firing natural gas at baseload, and NOx emissions at 2 ppmvd corrected to 15% oxygen when firing natural gas and 10 ppmvd corrected to 15% oxygen when firing oil. These emissions tables replaced the original version. The changes are relatively minor (a few percent) based on the latest GE performance enhancements. Not with standing future discussions on some of the emission limits with John and Barbara, these tables should be used for heat input and mass emissions in the permit. A few items related to the draft permit:

- On Page 5 of 5, description of Emission Units 005, 006, 007 and 008: The heat input is 1608 MMBtu/hr and the flow rate is 1,023,872 acfm for gas firing at a turbine inlet of 59 degrees F. For oil firing, the heat input is 1830 MMBtu/hr and the flow rate is 1,224,407 acfm.
- Page 6 of 6, Condition 6. Permitted Capacity: As noted above the heat inputs are 1608 and 1830 MMBtu/hr for gas and oil firing ,respectively.
- Page 8 of 8: Condition 9: I will provide the mass emissions in the tables after discussion on the emission limits for CO and VOC. I assume that the mass emissions are based on the worst case conditions, i.e., the lowest turbine inlet temperature which is 32 degrees F. Please confirm since the lb/hour are slightly different at 59 degree F.

The slight emission changes will not affect our previous air modeling analyses since we use such large range in load (50%, 75% and 100%) and turbine inlet temperatures (32 degrees F, 59 degrees F and 95 degrees F) when we modeled. These large ranges would envelope small changes in performance (i.e., a few percent). Moreover, if there is a slight increase in emissions, mass flow increases, which would result in better dispersion. Also, the latest Regional Haze analyses used information developed from these tables, so it is the latest. Let me know if you have any questions. Regards, Ken

Dated: March 26, 2004.

Charles S. Hamilton,

Senior Permit Biologist, Branch of Permits, Division of Management Authority.

[FR Doc. 04–7459 Filed 4–1–04; 8:45 am]

BILLING CODE 4310–55–P

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

Notice of Availability of a Technical/ Agency Draft Implementation Schedule for the South Florida Multi-Species Recovery Plan

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of document availability and public comment period.

SUMMARY: The U.S. Fish and Wildlife Service ("we," "our," or "Service") announces the availability of the implementation schedule for the South Florida Multi-Species Recovery Plan (MSRP) for public review. The MSRP, as approved in 1999, included a discussion of the need for a coordinated effort to develop an implementation schedule. This implementation schedule was prepared with the assistance of the South Florida Multi-species/Ecosystem Recovery Implementation Team (MERIT). The implementation schedule prioritizes the recovery tasks as described in the MSRP on a community level, and identifies the associated participating parties, time frame, and costs necessary to accomplish those tasks. We are asking for the public's review and comment on the recovery plan implementation schedule.

DATES: Comments on the draft implementation schedule must be received on or before June 1, 2004 to ensure consideration by the Service.

ADDRESSES: Copies of the draft implementation schedule can be obtained by contacting the U.S. Fish and Wildlife Service, South Florida Ecological Services Office, 1339 20th Street, Vero Beach, Florida 32960. We encourage requests for the CD–ROM version of the implementation schedule, as the hard (paper) copies encompasses approximately 221 pages. Written comments and materials regarding the implementation schedule should be addressed to Cindy Schulz at the address above. Comments and materials received are available on request for public inspection, by appointment, during normal business hours at the South Florida Ecological Services Office.

FOR FURTHER INFORMATION CONTACT: Cindy Schulz at the South Florida Ecological Services Office, (772) 562–3909, ext. 305.

SUPPLEMENTARY INFORMATION:

Public Comments Solicited

We are asking for written comments on the MSRP implementation schedule as described above. All comments received by the date identified above will be considered. We particularly seek comments concerning: (1) Recommended changes to the Priority Number for recovery tasks; (2) recommendations for additions or deletions to the participants identified for each recovery task; and (3) additional information to assist us with determining costs for accomplishing recovery tasks.

Please note that these recovery tasks are taken directly from the MSRP. Any changes needed to update the language of the tasks themselves would be addressed in a future revision of the MSRP rather than at this time. These changes, if any, would be subject to public comment only during such future revision.

We will take into account all comments and any additional information we receive. Such communications may lead to a final version of this implementation schedule that differs from this Technical/Agency draft.

Background

Restoring endangered or threatened animals and plants to the point where they are again secure, self-sustaining components of their ecosystems is a primary goal of our threatened and endangered species program. To help guide the recovery effort, we prepare recovery plans for listed species native to the United States, pursuant to section 4(f) of the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. *et seq.*), which requires the development of recovery plans for listed species unless such a plan would not promote the conservation of a particular species. Recovery plans describe actions that may be necessary for conservation of these species, establish criteria for reclassification from endangered to threatened status or removal from the list, and estimate the time and cost for implementing the needed recovery measures.

Section 4(f) of the Act also requires that a public notice and an opportunity for public review and comment be provided during recovery plan development. Accordingly, the MSRP was made available for public review and comment, before its approval in May 1999. The MSRP identifies the recovery needs of the 68 threatened and endangered species and 23 natural communities in the South Florida ecosystem, which encompasses 67,346 square kilometers (26,002 square miles), covering the 19 southernmost counties in Florida.

The final chapter of the MSRP describes the process for developing an implementation schedule. This process involved the collaborative effort of a team appointed by the Service to focus specifically on recovery implementation efforts. This team, known as MERIT, is comprised of 36 members representing Federal, State and local government agencies; Tribal governments; academia; industry; and the private sector. MERIT members assisted in assigning priorities to recovery tasks, and estimating the expected duration and cost to complete each task. They also identified the organizations or agencies that would likely be involved in accomplishing each task.

The implementation schedule for the MSRP contains recovery tasks for those species that occur only in South Florida, and for which the South Florida Ecological Services Office has recovery lead. Other Service field offices have recovery responsibility for those species that occur in South Florida but also occur elsewhere. Implementation schedules for those species can be found in the approved individual recovery plans for those species. Recovery tasks are provided in this implementation schedule for the following species:

Status/species	Scientific name
Mammals:	
E Key deer	*Odocoileus virginianus clavium*
E Key Largo cotton mouse	*Peromyscus gossypinus allapaticola*
E Key Largo woodrat	*Neotoma floridana smalli*
E Silver rice rat	*Oryzomys palustris natator* (= *O. argentatus*)
E Lower Keys marsh rabbit	*Sylvilagus palustris hefneri*

Status/species	Scientific name
Birds:	
T Audubon's crested caracara	*Polyborus plancus audubonii*
E Cape Sable seaside sparrow	*Ammodramus* (= *Ammospiza*) *maritimus mirabilis*
E Snail kite	*Rostrhamus sociabilis plumbeus*
E Florida grasshopper sparrow	*Ammodramus savannarum floridanus*
Reptiles:	
E American crocodile	*Crocodylus acutus*
T Bluetail (blue-tailed) mole skink	*Eumeces egregius lividus*
T Sand skink	*Neoseps reynoldsi*
Invertebrates:	
E Schaus swallowtail butterfly	*Heraclides* (= *Papilio*) *aristodemus ponceanus*
T Stock Island tree snail	*Orthalicus reses*
Plants:	
E Avon Park harebells	*Crotalaria avonensis*
E Beach jacquemontia	*Jacquemontia reclinata*
E Beautiful pawpaw	*Deeringothamnus pulchellus*
E Carter's mustard	*Warea carteri*
E Crenulate lead-plant	*Amorpha crenulata*
E Deltoid spurge	*Chamaesyce* (= *Euphorbia*) *deltoidea*
E Florida perforate cladonia	*Cladonia perforata*
E Florida ziziphus	*Ziziphus celata*
E Four-petal pawpaw	*Asimina tetramera*
E Fragrant prickly-apple	*Cereus eriophorus* var. *fragrans*
T Garber's spurge	*Chamaesyce* (= *Euphorbia*) *garberi*
E Garrett's mint	*Dicerandra christmanii*
E Highlands scrub hypericum	*Hypericum cumulicola*
E Key tree-cactus	*Pilosocereus* (= *Cereus*) *robinii*
E Lakela's mint	*Dicerandra immaculata*
E Lewton's polygala	*Polygala lewtonii*
E Okeechobee gourd	*Cucurbita okeechobeensis* ssp. *okeechobeensis*
T Papery whitlow-wort	*Paronychia chartacea* (= *Nyachia pulvinata*)
T Pigeon wings	*Clitoria fragrans*
E Pygmy fringe-tree	*Chionanthus pygmaeus*
E Sandlace	*Polygonella myriophylla*
E Scrub blazing star	*Liatris ohlingerae*
E Scrub mint	*Dicerandra frutescens*
E Short-leaved rosemary	*Conradina brevifolia*
E Small's milkpea	*Galactia smallii*
E Snakeroot	*Eryngium cuneifolium*
E Tiny polygala	*Polygala smallii*
E Wireweed	*Polygonella basiramia* (= *ciliata* var. *b.*)

We will consider all information presented during this 60-day public comment period prior to approval of this implementation schedule.

See **ADDRESSES** section above to request copies of the draft implementation schedule. Note that paper copies of both the MSRP and the draft implementation schedule are available for public inspection at the following locations:

U.S. Fish and Wildlife Service South Florida Ecological Services Office, 1339 20th Street, Vero Beach, Florida 32960, (772) 562–3909;

U.S. Fish and Wildlife Service, Merritt Island National Wildlife Refuge, 4 miles east of Titusville, State Road 402, Titusville, Florida 32782, (321) 861–0667;

U.S. Fish and Wildlife Service, J.N. "Ding" Darling National Wildlife Refuge, 1 Wildlife Drive, Sanibel, Florida 33957, (239) 472–1100;

U.S. Fish and Wildlife Service, Florida Panther National Wildlife Refuge, 3860 Tollgate Boulevard, Suite 300, Naples, Florida 34114, (239) 353–8442;

U.S. Fish and Wildlife Service, National Key Deer Refuge, Winn Dixie Shopping Plaza, Big Pine Key, Florida 33043–1510, (305) 872–2239;

U.S. Fish and Wildlife Service, Loxahatchee National Wildlife Refuge, 10216 Lee Road, Boynton Beach, Florida 33437–4796, (561) 732–3684.

Authority

The authority for this action is section 4(f) of the Endangered Species Act, 16 U.S.C. 1533(f).

Dated: February 24, 2004.

J. Mitch King,

Acting Regional Director.

[FR Doc. 04–7480 Filed 4–1–04; 8:45 am]

BILLING CODE 4310–55–P

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[WO–320–1330–PB–24 1A]

Extension of Approved Information Collection, OMB Control Number 1004–0103

AGENCY: Bureau of Land Management, Interior.

ACTION: Notice and request for comments.

SUMMARY: In accordance with the Paperwork Reduction Act of 1995, the Bureau of Land Management (BLM) is requesting the Office of Management and Budget (OMB) to extend an existing approval to collect information from applicants who apply to purchase mineral materials from public lands under regulations 43 CFR 3600 and 3610. BLM uses Form 3600–9 (Contract for the Sale of Mineral Materials) to collect information so that we can

Table 2-1. Stack, Operating, and Emission Data for the Combustion Turbines/HRSGs and Duct Burners for Combined Cycle Operation-Natural Gas Combustion

		Operating and Emission Data [a] for Ambient Temperarure									
		Combustion Turbine/ HRSG					Combustion Turbine/ HRSG/ Duct Burner				
					w/Paug					w/Paug	
Parameter		35 °F	59 °F	75 °F	80 °F [b]	95 °F	35 °F	59 °F	75 °F	80 °F [b]	95 °F
CT/HRSG Stack Data (ft)											
Height		131	131	131	131	131	131	131	131	131	131
Diameter		19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0
100 Percent Load											
Temperature (°F)		203	202	204	204	201	189	188	189	188	190
Velocity (ft/sec)		63.0	60.2	58.3	62.5	55.2	62.3	59.6	57.7	61.6	54.9
Maximum Hourly Emissions per Unit											
SO_2	lb/hr	10.3	9.8	9.5	10.1	9.0	13.4	12.9	12.5	13.1	12.0
PM/PM_{10}	lb/hr	11.1	11.0	10.9	11.0	10.8	14.5	14.4	14.3	14.4	14.2
NO_x	lb/hr	13.6	13.0	12.5	13.3	11.8	19.4	18.8	18.4	21.1	17.9
CO	lb/hr	17.2	16.3	15.7	47.5	14.7	39.2	38.3	37.7	75.0	36.7
VOC (as methane)	lb/hr	3.0	2.8	2.8	2.9	2.6	5.2	5.0	5.0	5.7	4.8
Sulfuric Acid Mist	lb/hr	1.03	0.98	0.95	1.01	0.90	1.34	1.29	1.25	1.31	1.20
75 Percent Load											
Temperature (°F)		187	188	189	NA	190	NA	NA	NA	NA	NA
Velocity (ft/sec)		48.8	47.4	46.6	NA	44.9	NA	NA	NA	NA	NA
Maximum Hourly Emissions per Unit											
SO_2	lb/hr	8.4	8.0	7.8	NA	7.4	NA	NA	NA	NA	NA
PM/PM_{10}	lb/hr	10.7	10.6	10.6	NA	10.5	NA	NA	NA	NA	NA
NO_x	lb/hr	10.9	10.5	10.2	NA	9.7	NA	NA	NA	NA	NA
CO	lb/hr	13.6	13.1	12.8	NA	12.2	NA	NA	NA	NA	NA
VOC (as methane)	lb/hr	2.4	2.3	2.2	NA	2.2	NA	NA	NA	NA	NA
Sulfuric Acid Mist	lb/hr	0.84	0.80	0.78	NA	0.74	NA	NA	NA	NA	NA
50 Percent Load											
Temperature (°F)		175	178	175	NA	182	NA	NA	NA	NA	NA
Velocity (ft/sec)		39.3	38.6	37.9	NA	37.4	NA	NA	NA	NA	NA
Maximum Hourly Emissions per Unit											
SO_2	lb/hr	6.7	6.4	6.2	NA	5.9	NA	NA	NA	NA	NA
PM/PM_{10}	lb/hr	10.4	10.3	10.3	NA	10.2	NA	NA	NA	NA	NA
NO_x	lb/hr	8.7	8.3	8.0	NA	7.6	NA	NA	NA	NA	NA
CO	lb/hr	11.2	10.9	10.7	NA	10.3	NA	NA	NA	NA	NA
VOC (as methane)	lb/hr	1.9	1.9	1.9	NA	1.8	NA	NA	NA	NA	NA
Sulfuric Acid Mist	lb/hr	0.67	0.64	0.62	NA	0.59	NA	NA	NA	NA	NA

[a] Refer to Appendix A for detailed information on basis of pollutant emission rates and operating data. Duct firing is assumed for 100% operating load. No duct firing is assumed for loads less than 100%.

[b] Steam augmentation and inlet fogging.

Source: GE, 2004 - CT Performance Data; Golder Associates, 2004

Table 2-2. Stack, Operating, and Emission Data for the Combustion Turbines/HRSGs for Combined Cycle Operation-Distillate Light Oil Combustion

		Operating and Emission Data [a] for Ambient Temperarure			
		Combustion Turbine/ HRSG			
Parameter		35 °F	59 °F	75 °F	95 °F
CT/HRSG Stack Data (ft)					
Height		131	131	131	131
Diameter		19.0	19.0	19.0	19.0
100 Percent Load					
Temperature (°F)		297	295	294	294
Velocity (ft/sec)		75.5	72.0	69.3	65.3
Maximum Hourly Emissions per Unit					
SO_2	lb/hr	3.1	3.0	2.9	2.7
PM/PM_{10}	lb/hr	17.6	17.6	17.6	17.5
NO_x	lb/hr	64.6	62.1	59.7	55.9
CO	lb/hr	69.5	66.0	63.3	59.0
VOC (as methane)	lb/hr	7.8	7.5	7.2	6.8
Lead	lb/hr	0.03	0.03	0.02	0.02
Sulfuric Acid Mist	lb/hr	0.62	0.60	0.57	0.54
75 Percent Load					
Temperature (°F)		271	274	276	278
Velocity (ft/sec)		54.4	53.8	53.1	52.1
Maximum Hourly Emissions per Unit					
SO_2	lb/hr	2.5	2.4	2.3	2.2
PM/PM_{10}	lb/hr	17.5	17.5	17.5	17.4
NO_x	lb/hr	52.2	50.2	48.3	45.6
CO	lb/hr	51.4	50.6	49.7	48.3
VOC (as methane)	lb/hr	5.8	5.7	5.7	5.5
Lead	lb/hr	0.02	0.02	0.02	0.02
Sulfuric Acid Mist	lb/hr	0.51	0.49	0.47	0.44
50 Percent Load					
Temperature (°F)		256	259	264	268
Velocity (ft/sec)		44.8	44.5	44.1	43.3
Maximum Hourly Emissions per Unit					
SO_2	lb/hr	2.0	1.9	1.8	1.7
PM/PM_{10}	lb/hr	17.4	17.4	17.4	17.4
NO_x	lb/hr	40.2	38.8	37.4	35.3
CO	lb/hr	44.0	43.4	42.7	41.3
VOC (as methane)	lb/hr	4.9	4.8	4.8	4.7
Lead	lb/hr	0.02	0.02	0.02	0.01
Sulfuric Acid Mist	lb/hr	0.39	0.38	0.37	0.35

[a] Refer to Appendix A for detailed information on basis of pollutant emission rates and operating data.

Source: GE, 2004 - CT Performance Data; Golder Associates, 2004

Table 2-3. Proposed Pollutant Gaseous Emission Concentrations and PM_{10} Emission Rates For Each CT/HRSG Unit

			Emisssion Rate			
			Maximum		59 °F	
Pollutant	Fuel	Method of Operation	(ppmvd @15% O_2)	lb/hour	(ppmvd @15% O_2)	lb/hour
Nitrogen Oxides	Gas	Combined Cycle (CC)	2	13.64	2	12.98
	Gas	CC - w/Duct Firing	2	19.39	2	18.79
	Gas	CC - w/Duct Firing, Power Aug.	2	21.15	2	21.15
	Oil	CC	8	64.59	8	62.09
Carbon Monoxide	Gas	CC	4.14	17.19	4.13	16.33
	Gas	CC - w/Duct Firing	7.78	39.19	7.56	38.33
	Gas	CC - w/Duct Firing, Power Aug.	14.05	74.97	NA	NA
	Oil	CC	14.14	69.49	13.97	65.98
Volatile Organic Compounds	Gas	CC	1.27	2.98	1.26	2.85
	Gas	CC - w/Duct Firing	2.03	5.18	1.94	5.05
	Gas	CC - w/Duct Firing, Power Aug.	2.23	5.70	NA	NA
	Oil	CC	2.79	7.82	2.77	7.47
Particulate Matter	Gas	CC	NA	11.09	NA	10.99
	Gas	CC - w/Duct Firing	NA	14.45	NA	14.35
	Gas	CC - w/Duct Firing, Power Aug.	NA	14.40	NA	NA
	Oil	CC	NA	17.63	NA	17.60
Sulfur Dioxide	Gas	CC	NA	10.33	NA	9.84
	Gas	CC - w/Duct Firing	NA	13.37	NA	12.88
	Gas	CC - w/Duct Firing, Power Aug.	NA	13.13	NA	NA
	Oil	CC	NA	3.11	NA	2.98
Sulfuic Acid Mist (SAM)	Gas	CC	NA	1.03	NA	0.98
	Gas	CC - w/Duct Firing	NA	1.34	NA	1.29
	Gas	CC - w/Duct Firing, Power Aug.	NA	1.31	NA	NA
	Oil	CC	NA	0.62	NA	0.60

Source: GE, 2004 - CT Performance Data; Golder Associates, 2004

Note: Based on maximum emission rates over turbine inlet operating conditions for all operating loads.

Table 2-4. Summary of Maximum Potential Annual Emissions for the CTs/HRSG for Combined Cycle Operations

	Maximum Hourly Emissions (lb/hr) [a] Combined Cycle (CC)				Maximum Emissions (tons/year) based on hours for Operating Scenario				
					CC/ NG 100 % Load	8,760	5,880	5,480	5,380	5,380
					CC/ DB /NG100 % Load	0	2,880	2,880	2,880	2,480
					CC/ DB&PA/NG100 % Load	0	0	400	0	400
					CC/ OIL 100 % Load	0	0	0	500	500
Fuel:	NG	NG	NG	Oil						
Load:	100%	100% w/DB	100% w/DB & PA	100%						
Pollutant					TOTAL	8,760	8,760	8,760	8,760	8,760
One Combustion Turbine										
SO_2	9.84	12.9	13.1	3.0		43.1	47.5	**48.1**	45.77	45.82
PM/PM_{10}	11.0	14.4	14.4	17.60		48.1	53.0	53.7	**54.63**	54.64
NO_x	13.0	18.8	21.1	62.09		56.8	65.2	66.8	**77.49**	77.96
CO	16.3	38.3	75.0	65.98		71.5	103.2	114.9	115.60	**122.93**
VOC (as methane)	2.85	5.0	5.7	7.47		12.5	15.6	16.2	**16.79**	16.92
Sulfuric Acid Mist	0.98	1.29	1.31	0.60		4.3	4.7	**4.8**	4.65	4.66
HAPs	0.78	1.02	1.04	2.41		3.4	3.8	3.8	**4.18**	4.18
Lead	0.00	0.00	0.00	0.026		0.0000	0.0000	0.0000	**0.0064**	0.0064
Four Combustion Turbines										
SO_2	39.4	51.5	52.5	12		172	190	193	183	183
PM/PM_{10}	44.0	57.4	57.6	70		192.5	211.9	214.6	219	219
NO_x	51.9	75.2	84.6	248		227	261	267	310	312
CO	65.3	153	300	264		286	413	460	462	492
VOC (as methane)	11.39	20.2	22.8	29.9		49.9	62.5	64.8	67.2	67.7
Sulfuric Acid Mist	3.94	5.15	5.25	2.4		17.2	19.0	19.3	18.6	18.6
HAPs	3.13	4.09	4.17	9.64		13.71	15.09	15.30	16.7	16.7
Lead	0.00	0.00	0.00	0.102		0.000	0.000	0.000	0.026	0.026

[a] Based on 59 °F ambient inlet air temperature except for power augmentation at 80 °F .

Source: GE, 2004 - CT Performance Data; Golder Associates, 2004

Table 2-6. Summary of Maximum Potential Annual Emissions for the FPL Turkey Point Unit 5 Combined Cycle Project

Pollutant	Annual Emissions (tons/year)			PSD Significant Emission Rate (tons/year)	PSD Review Required?
	4 CTs/HRSGs with Duct Burners	Cooling Tower	TOTAL		
SO_2	193	NA	193	40	Yes
PM	219	201.2	420	25	Yes
PM_{10}	219	10.3	229	15	Yes
NO_x	312	NA	312	40	Yes
CO	492	NA	492	100	Yes
VOC (as methane)	67.7	NA	68	40	Yes
Sulfuric Acid Mist	19.3	NA	19.3	7	Yes
Lead	0.026	NA	0.026	0.6	No

Source: GE, 2004 - CT Performance Data; Golder Associates, 2004

Table 2-5. Physical, Performance, and Emissions Data for the Mechanical Draft Cooling Tower

Parameter	Turkey Point 4 x 1
Physical Data	
Number of Cells	22
Deck Dimensions, ft	
Length	661.1
Width	114
Height	51
Stack Dimensions	
Height, ft	65
Stack Top Effective Inner Diameter, per cell, ft	38
Effective Diameter, all cells, ft	178.2
Performance Data	
Discharge Velocity, ft/min	1,323
Circulating Water Flow Rate (CWFR), gal/min	306,000
Design hot water temperature, °F	105.2
Design cold water temperature, °F	86.9
Heat Rejected, million Btu/hr	2,600
Design Air Flow Rate per cell, acfm	1,500,000
Liquid/ Gas (Air Flow) (L/G) Ratio	1.045
Hours of operation	8,760
Emission Data	
Drift Rate[a] (DR), percent	0.0010
Total Dissolved Solids (TDS) Concentration [b], maximum ppm	30,000
Solution Drift [c] (SD), lb/hr	512.6
PM Drift [d], lb/hr	45.9
tons/year	201.2
PM_{10} Drift[e]	
PM_{10} Emissions, lb/hr	2.35
tons/year	10.3

[a] Drift rate is the percent of circulating water.

[b] A TDS of 30,000 results in maximum PM emissions.

[c] Includes water and based on circulating water flow rate and drift rate (CWFR x DR x 8.34 lb/gal x 60 min/hr).

[d] PM calculated based on total dissolved solids and solution drift (TDS x SD).

[e] PM_{10} based on Cooling Tower PM_{10} emissions study see Appendix A.

Source: Marley, 2003. FPL, 2003, Golder, 2003.

Table 3.4-1. Stack, Operating, and Emission Data for the Combustion Turbines/HRSGs and Duct Burners for Combined Cycle Operation-Natural Gas Combustion

		Operating and Emission Data [a] for Ambient Temperature									
		Combustion Turbine/ HRSG					Combustion Turbine/ HRSG/ Duct Burner				
					w/Paug					w/Paug	
Parameter		35 °F	59 °F	75 °F	75 °F [b]	95 °F	35 °F	59 °F	75 °F	75 °F [b]	95 °F
CT/HRSG Stack Data (ft)											
Height		131	131	131	131	131	131	131	131	131	131
Diameter		19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0
100 Percent Load											
Temperature (°F)		203	202	204	204	201	189	188	189	188	190
Velocity (ft/sec)		63.0	60.2	58.3	62.5	55.2	62.3	59.6	57.7	61.6	54.9
Maximum Hourly Emissions per Unit											
SO_2	lb/hr	10.3	9.8	9.5	10.1	9.0	13.4	12.9	12.5	13.1	12.0
PM/PM_{10}	lb/hr	11.1	11.0	10.9	11.0	10.8	14.5	14.4	14.3	14.4	14.2
NO_x	lb/hr	13.6	13.0	12.5	13.3	11.8	19.4	18.8	18.4	21.1	17.9
CO	lb/hr	17.2	16.3	15.7	47.5	14.7	39.2	38.3	37.7	75.0	36.7
VOC (as methane)	lb/hr	3.0	2.8	2.8	2.9	2.6	5.2	5.0	5.0	5.7	4.8
Sulfuric Acid Mist	lb/hr	1.03	0.98	0.95	1.01	0.90	1.34	1.29	1.25	1.31	1.20
75 Percent Load											
Temperature (°F)		187	188	189	NA	190	NA	NA	NA	NA	NA
Velocity (ft/sec)		48.8	47.4	46.6	NA	44.9	NA	NA	NA	NA	NA
Maximum Hourly Emissions per Unit											
SO_2	lb/hr	8.4	8.0	7.8	NA	7.4	NA	NA	NA	NA	NA
PM/PM_{10}	lb/hr	10.7	10.6	10.6	NA	10.5	NA	NA	NA	NA	NA
NO_x	lb/hr	10.9	10.5	10.2	NA	9.7	NA	NA	NA	NA	NA
CO	lb/hr	13.6	13.1	12.8	NA	12.2	NA	NA	NA	NA	NA
VOC (as methane)	lb/hr	2.4	2.3	2.2	NA	2.2	NA	NA	NA	NA	NA
Sulfuric Acid Mist	lb/hr	0.84	0.80	0.78	NA	0.74	NA	NA	NA	NA	NA
50 Percent Load											
Temperature (°F)		175	178	175	NA	182	NA	NA	NA	NA	NA
Velocity (ft/sec)		39.3	38.6	37.9	NA	37.4	NA	NA	NA	NA	NA
Maximum Hourly Emissions per Unit											
SO_2	lb/hr	6.7	6.4	6.2	NA	5.9	NA	NA	NA	NA	NA
PM/PM_{10}	lb/hr	10.4	10.3	10.3	NA	10.2	NA	NA	NA	NA	NA
NO_x	lb/hr	8.7	8.3	8.0	NA	7.6	NA	NA	NA	NA	NA
CO	lb/hr	11.2	10.9	10.7	NA	10.3	NA	NA	NA	NA	NA
VOC (as methane)	lb/hr	1.9	1.9	1.9	NA	1.8	NA	NA	NA	NA	NA
Sulfuric Acid Mist	lb/hr	0.67	0.64	0.62	NA	0.59	NA	NA	NA	NA	NA

[a] Refer to Appendix A for detailed information on basis of pollutant emission rates and operating data. Duct firing is assumed for 100% operating load. No duct firing is assumed for loads less than 100%.

[b] Steam augmentation and inlet cooling

Source: GE, 2004 - CT Performance Data; Golder Associates, 2004

Table 3.4-2. Stack, Operating, and Emission Data for the Combustion Turbines/HRSGs for Combined Cycle Operation-Distillate Fuel Oil Combustion

Parameter		Operating and Emission Data [a] for Ambient Temperarure Combustion Turbine/ HRSG 35 °F	59 °F	75 °F	95 °F
CT/HRSG Stack Data (ft)					
Height		131	131	131	131
Diameter		19.0	19.0	19.0	19.0
100 Percent Load					
Temperature (°F)		297	295	294	294
Velocity (ft/sec)		75.5	72.0	69.3	65.3
Maximum Hourly Emissions per Unit					
SO_2	lb/hr	3.1	3.0	2.9	2.7
PM/PM_{10}	lb/hr	17.6	17.6	17.6	17.5
NO_x	lb/hr	64.6	62.1	59.7	55.9
CO	lb/hr	69.5	66.0	63.3	59.0
VOC (as methane)	lb/hr	7.8	7.5	7.2	6.8
Lead	lb/hr	0.03	0.03	0.02	0.02
Sulfuric Acid Mist	lb/hr	0.62	0.60	0.57	0.54
75 Percent Load					
Temperature (°F)		271	274	276	278
Velocity (ft/sec)		54.4	53.8	53.1	52.1
Maximum Hourly Emissions per Unit					
SO_2	lb/hr	2.5	2.4	2.3	2.2
PM/PM_{10}	lb/hr	17.5	17.5	17.5	17.4
NO_x	lb/hr	52.2	50.2	48.3	45.6
CO	lb/hr	51.4	50.6	49.7	48.3
VOC (as methane)	lb/hr	5.8	5.7	5.7	5.5
Lead	lb/hr	0.02	0.02	0.02	0.02
Sulfuric Acid Mist	lb/hr	0.51	0.49	0.47	0.44
50 Percent Load					
Temperature (°F)		256	259	264	268
Velocity (ft/sec)		44.8	44.5	44.1	43.3
Maximum Hourly Emissions per Unit					
SO_2	lb/hr	2.0	1.9	1.8	1.7
PM/PM_{10}	lb/hr	17.4	17.4	17.4	17.4
NO_x	lb/hr	40.2	38.8	37.4	35.3
CO	lb/hr	44.0	43.4	42.7	41.3
VOC (as methane)	lb/hr	4.9	4.8	4.8	4.7
Lead	lb/hr	0.02	0.02	0.02	0.01
Sulfuric Acid Mist	lb/hr	0.39	0.38	0.37	0.35

[a] Refer to Appendix A for detailed information on basis of pollutant emission rates and operating data.

Source: GE, 2004 - CT Performance Data; Golder Associates, 2004

Table 3.4-3. Physical, Performance, and Emissions Data for the Mechanical Draft Cooling Tower

Parameter	Turkey Point 4 x 1
Physical Data	
Number of Cells	22
Deck Dimensions, ft	
Length	661.1
Width	114
Height	51
Stack Dimensions	
Height, ft	65
Stack Top Effective Inner Diameter, per cell, ft	38
Effective Diameter, all cells, ft	178.2
Performance Data	
Discharge Velocity, ft/min	1,323
Circulating Water Flow Rate (CWFR), gal/min	306,000
Design hot water temperature, °F	105.2
Design cold water temperature, °F	86.9
Heat Rejected, million Btu/hr	2,600
Design Air Flow Rate per cell, acfm	1,500,000
Liquid/ Gas (Air Flow) (L/G) Ratio	1.045
Hours of operation	8,760
Emission Data	
Drift Rate[a] (DR), percent	0.0010
Total Dissolved Solids (TDS) Concentration [b], maximum ppm	30,000
Solution Drift [c] (SD), lb/hr	513
PM Drift [d], lb/hr	45.90
tons/year	201.2
PM_{10} Drift[e]	
PM_{10} Emissions, lb/hr	2.35
tons/year	10.3

[a] Drift rate is the percent of circulating water.

[b] A TDS of 30,000 results in maximum PM emissions.

[c] Includes water and based on circulating water flow rate and drift rate (CWFR x DR x 8.34 lb/gal x 60 min/hr).

[d] PM calculated based on total dissolved solids and solution drift (TDS x SD).

[e] PM_{10} based on a TDS of 4,000 ppm, see Cooling Tower PM Emissions Study, see Appendix A.

Source: Marley, 2003. FPL, 2003, Golder, 2003.

Table 3.4-4. Summary of Maximum Potential Annual Emissions for the FPL Turkey Point Unit 5 Combined Cycle Project

Pollutant	Annual Emissions (tons/year)			PSD Significant Emission Rate (tons/year)	PSD Review Required?
	4 CTs/HRSGs with Duct Burners	Cooling Tower	TOTAL		
SO_2	193	NA	193	40	Yes
PM	219	201.2	420	25	Yes
PM_{10}	219	10.3	229	15	Yes
NO_x	312	NA	312	40	Yes
CO	492	NA	492	100	Yes
VOC (as methane)	67.7	NA	67.7	40	Yes
Sulfuric Acid Mist	19.3	NA	19.3	7	Yes
Lead	0.026	NA	0.026	0.6	No

Table 4-1. Proposed BACT Emission Limitations and Compliance Methods For Each CT/HRSG Unit

Pollutant	Fuel	Method of Operation	Emisssion Rate (ppmvd @15% O_2)	Emisssion Rate lb/hr	Compliance Method
Nitrogen Oxides	Gas	Combined Cycle (CC)	2	13.64	EPA Method 7E Initial Test; CEM 24-hr Block Average
	Gas	CC - w/Duct Firing	2	19.39	EPA Method 7E Initial Test; CEM 24-hr Block Average
	Gas	CC - w/Duct Firing, Power Aug.	2	21.15	EPA Method 7E Initial Test; CEM 24-hr Block Average
	Oil	CC	8	64.59	EPA Method 7E Initial Test; CEM 24-hr Block Average
Carbon Monoxide	Gas	CC	4.14	17.19	EPA Method 7E Initial Test; CEM 24-hr Block Average
	Gas	CC - w/Duct Firing	7.78	39.19	EPA Method 7E Initial Test; CEM 24-hr Block Average
	Gas	CC - w/Duct Firing, Power Aug.	14.05	74.97	EPA Method 7E Initial Test; CEM 24-hr Block Average
	Oil	CC	14.14	69.49	EPA Method 7E Initial Test; CEM 24-hr Block Average
Volatile Organic Compounds	Gas	CC	1.27	2.98	EPA Method 25 Initial Test
	Gas	CC - w/Duct Firing	2.03	5.18	EPA Method 25 Initial Test
	Gas	CC - w/Duct Firing, Power Aug.	2.23	5.70	EPA Method 25 Initial Test
	Oil	CC	2.79	7.82	EPA Method 25 Initial Test
Particulate Matter	Gas	CC	NA		Fuel Specification VE <10%
	Oil	CC	NA		Fuel Specification VE <20%
Sulfur Dioxide & Sulfuic Acid Mist (SAM)	Gas	CC	NA		Fuel Specification
	Oil	CC	NA		Fuel Specification (0.0015 % Sulfur)

Source: GE, 2004 - CT Performance Data; Golder Associates, 2004

Note: Based on maximum emission rates over turbine inlet operating conditions for all operating loads.

Table A-2. Maximum Emissions for Criteria Pollutants for FPL Turkey Point Combined-Cycle Expansion Project
GE Frame 7FA, Dry Low NOx Combustor, Natural Gas, Base Load

	CT Only Turbine Inlet Temperature					CT with Duct Burner Turbine Inlet Temperature				
Parameter	35 °F Case 8	59 °F Case 6	75 °F Case 4	75 °F PAug	95 °F Case 2	35 °F w/DB Case 7	59 °F w/DB Case 5	75 °F w/DB Case 3	75 °F w/DB PAug	95 °F w/DB Case 1
Particulate from CT, DB, and SCR										
Total PM_{10} = PM_{10} (front half) + PM_{10} ($(NH_4)_2SO_4$) from SCR only										
a. PM_{10} (front half) (lb/hr)										
CT- provided	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
DB (lb/hr) - calculated	0.0	0.0	0.0	0.0	0.0	2.8	2.8	2.8	2.8	2.8
Total CT/DB emission rate (lb/hr)	9.0	9.0	9.0	9.0	9.0	11.8	11.8	11.8	11.8	11.8
b. PM_{10} ($(NH_4)_2SO_4$) from SCR only = Sulfur trioxide from conversion of SO_2 converts to ammonium sulfate (= PM_{10})										
Particulate from conversion of SO_2 = SO_2 emissions (lb/hr) x conversion of SO_2 to SO_3 x lb SO_3/lb SO_2 x conversion of SO_3 to $(NH_4)_2SO_4$ x lb $(NH_4)_2SO_4$/ lb SO_3										
SO_2 emission rate (lb/hr)- calculated	10.3	9.8	9.5	10.1	9.0	13.4	12.9	12.5	13.1	12.0
Conversion (%) from SO_2 to SO_3	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8
MW SO_3/ SO_2 (80/64)	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Conversion (%) from SO_3 to $(NH_4)_2(SO_4)$	100	100	100	100	100	100	100	100	100	100
MW $(NH_4)_2$ SO_4/ SO_3 (132/80)	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
SCR Particulate (lb/hr)- calculated	2.09	1.99	1.92	2.04	1.81	2.70	2.60	2.53	2.65	2.42
Total CT emission rate (lb/hr) [a]	9.0	9.0	9.0	9.0	9.0	NA	NA	NA	NA	NA
Total HRSG stack emission rate (lb/hr) [a + b]	11.1	11.0	10.9	11.0	10.8	14.5	14.4	14.3	14.4	14.2
(lb/mmBtu, HHV)	0.0059	0.0062	0.0063	0.0060	0.0067	0.0060	0.0061	0.0063	0.0060	0.0065
Sulfur Dioxide										
SO_2 (lb/hr)= Natural gas (scf/hr) x sulfur content(gr/100 scf) x 1 lb/7000 gr x (lb SO_2 /lb S) /100										
Fuel use (cf/hr)	1,808,427	1,722,612	1,659,939	1,767,287	1,567,696	2,340,620	2,253,458	2,190,784	2,298,133	2,098,542
Sulfur content (grains/ 100 cf)	2	2	2	2	2	2	2	2	2	2
lb SO_2 /lb S (64/32)	2	2	2	2	2	2	2	2	2	2
CT emission rate (lb/hr)	10.3	9.8	9.5	10.1	9.0	NA	NA	NA	NA	NA
HRSG stack emission rate (lb/hr)	10.3	9.8	9.5	10.1	9.0	13.4	12.9	12.5	13.1	12.0
Nitrogen Oxides										
NOx (lb/hr) = NOx (ppmvd@ 15% O_2) x {[20.9 x (1-Moisture (%)/100] - Oxygen, dry(%)} x 2116.8 lb/ft^2 x Volume flow (acfm) x 46 (mole. wgt NOx) x 60 min/hr / [1545 x (CT temp.(°F) + 460) x (20.9-15) x 1,000,000 (adj. for ppm)]										
CT/DB, ppmvd @15% O_2	9	9	9	9	9	10.9	10.9	10.9	9.8	10.9
Moisture (%)	7.68	8.24	8.94	14.13	9.88	9.66	10.31	11.07	16.07	12.11
Oxygen (%)	12.72	12.63	12.5	11.46	12.34	10.52	10.33	10.13	9.25	9.84
Turbine Flow (acfm)	2,507,830	2,433,299	2,377,868	2,502,463	2,291,092	2,533,839	2,459,953	2,404,564	2,611,200	2,318,175
Turbine Exhaust Temperature (°F)	1,090	1,114	1,131	1,103	1,154	1,090	1,114	1,131	1,103	1,154
CT/DB Emission rate (lb/hr)	61.4	58.4	56.3	59.9	53.2	105.4	102.4	100.3	103.9	97.2
CT/DB Emission rate (lb/hr)(provided)	61.0	58.0	56.0	57.0	53.0					
HRSG Stack emission rate, ppmvd @ 15% O_2	2	2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
HRSG Stack emission rate (lb/hr)	13.6	13.0	12.5	13.3	11.8	19.4	18.8	18.4	21.1	17.9
Carbon Monoxide										
CO (lb/hr) = CO(ppm) x [1 - Moisture(%)/100] x 2116.8 lb/ft^2 x Volume flow (acfm) x 28 (mole. wgt CO) x 60 min/hr / [1545 x (CT temp.(°F) + 460°F) x 1,000,000 (adj. for ppm)]										
Basis, ppmvd	5	5	5	15	5	11.7	12.0	12.3	23.5	12.8
Basis, ppmvd @ 15% O2 - calculated	4.14	4.13	4.11	11.72	4.09	7.4	7.6	7.6	14.0	7.8
Moisture (%)	7.68	8.24	8.94	14.13	9.88	9.66	10.31	11.07	16.07	12.11
Oxygen (%)	12.72	12.63	12.50	11.46	12.34	10.52	10.33	10.13	9.25	9.84
Turbine Flow (acfm)	2,507,830	2,433,299	2,377,868	2,502,463	2,291,092	2,533,839	2,459,953	2,404,564	2,611,200	2,318,175
Turbine Exhaust Temperature (°F)	1,090	1,114	1,131	1,103	1,154	1,090	1,114	1,131	1,103	1,154
CT/DB Emission rate (lb/hr) (corrected 3/3/03)	17.2	16.33	15.7	47.5	14.7	39.2	38.3	37.7	75.0	36.7
Emission rate (lb/hr)	17.2	16.3	15.7	47.5	14.7	39.2	38.3	37.7	75.0	36.7
Volatile Organic Compounds										
VOCs (lb/hr) = VOC(ppmvd) x [1-Moisture(%)/100] x 2116.8 lb/ft^2 x Volume flow (acfm) x 16 (mole. wgt as methane) x 60 min/hr / [1545 x (CT temp.(°F) + 460°F) x 1,000,000 (adj. for ppm)]										
Basis, ppmvw	1.40	1.40	1.40	1.40	1.40	2.7	2.8	2.8	3.1	2.9
Basis, ppmvd @ 15% O2 - calculated	1.3	1.26	1.3	1.3	1.3	1.9	1.9	2.0	2.2	2.0
Moisture (%)	7.68	8.24	8.94	14.13	9.88	9.66	10.31	11.07	16.07	12.11
Oxygen (%) wet	12.72	12.63	12.50	11.46	12.34	10.52	10.33	10.13	9.25	9.84
Turbine Flow (acfm)	2,507,830	2,433,299	2,377,868	2,502,463	2,291,092	2,533,839	2,459,953	2,404,564	2,611,200	2,318,175
Turbine Exhaust Temperature (°F)	1,090	1,114	1,131	1,103	1,154	1,090	1,114	1,131	1,103	1,154
CT/DB Emission rate (lb/hr)	2.98	2.85	2.75	2.95	2.61	5.18	5.05	4.95	5.70	4.81
CT/DB Emission rate (lb/hr)(provided)	2.80	2.80	2.80	2.80	2.60					
HRSG Stack Emission rate (lb/hr)	2.98	2.85	2.75	2.95	2.61	5.18	5.05	4.95	5.70	4.81
Sulfuric Acid Mist										
Sulfuric Acid Mist (lb/hr)= SO_2 emission (lb/hr) x Conversion to H_2SO_4 (% by weight)/100										
CT SO_2 emission rate (lb/hr) - provided	10.3	9.8	9.5	10.1	9.0	13.4	12.9	12.5	13.1	12.0
CT Conversion to H_2SO_4 (% by weight) - provided	10	10	10	10	10	10	10	10	10	10
DB SO_2 emission rate (lb/hr) - provided	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
DB Conversion to H_2SO_4 (%) - provided	20	20	20	20	20	20	20	20	20	20

Table A-1. Design Information and Stack Parameters for FPL Turkey Point Combined-Cycle Expansion Project
GE Frame 7FA, Dry Low NOx Combustor, Natural Gas, Base Load
59 °F

Parameter	CT Only, Turbine Inlet Temperature					CT with Duct Burner, Turbine Inlet Temperature				
	35 °F Case 8	59 °F Case 6	75 °F Case 4	75 °F PAug	95 °F Case 2	35 °F w/DB Case 7	59 °F w/DB Case 5	75 °F w/DB Case 3	75 °F w/DB PAug	95 °F w/DB Case 1
Combustion Turbine Performance										
Net power output (MW)	185.04	173.64	165.24	183.43	152.34	185.04	173.64	165.24	183.43	152.34
Net heat rate (Btu/kWh, LHV)	9,122	9,258	9,379	9336	9,604	9,122	9,258	9,379	9,336	9,604
(Btu/kWh, HHV)	10,126	10,279	10,408	9,982	10,662	10,126	10,279	10,408	9,982	10,662
Heat Input (MMBtu/hr, LHV)	1,688	1,608	1,549	1649.6	1,463	1,688	1,608	1,549	1649.6	1,463
(MMBtu/hr, HHV)	1,874	1,785	1,720	1,831	1,624	1,874	1,785	1,720	1,831	1,624
Evaporative Cooler	Off	Off	Off	On	Off	Off	Off	Off	On	Off
Relative Humidity (%)	60	60	60	60	50	20	60	60	60	50
Fuel heating value (Btu/lb, LHV)	20,823	20,823	20,823	20,823	20,823	20,835	20,823	20,823	20,823	20,823
(Btu/lb, HHV)	23,114	23,114	23,114	23,114	23,114	23,127	23,114	23,114	23,114	23,114
(HHV/LHV)	1.110	1.110	1.110	1.110	1.110	1.110	1.110	1.110	1.110	1.110
Steam Flow (lb/hr)	NA	NA	NA	120,190	NA	NA	NA	NA	120,190	NA
Duct Burner (DB)										
Heat input (MMBtu/hr, HHV)	0	0	0	0	0	550	550	550	550	550
(MMBtu/hr, LHV)	0	0	0	0	0	495.5	495.5	495.5	495.5	495.5
CT/DB Exhaust Flow										
Mass Flow (lb/hr)- with no margin	3,786,000	3,610,000	3,480,000	3,653,000	3,293,000	3,808,099.6	3,632,100	3,502,100	3,675,100	3,315,100
- provided	3,786,000	3,610,000	3,480,000	3,653,000	3,293,000					
Temperature (°F)	1,090	1,114	1,131	1,103	1,154	1,090	1,114	1,131	1,103	1,154
Moisture (% Vol.)	7.68	8.24	8.94	14.13	9.88	9.66	10.31	11.07	16.07	12.11
Oxygen (% Vol.)	12.72	12.63	12.50	11.46	12.34	10.52	10.33	10.13	9.25	9.84
Molecular Weight	28.47	28.41	28.32	27.75	28.22	28.34	28.27	28.19	27.63	28.08
Fuel Usage										
Fuel usage (lb/hr) = Heat Input (MMBtu/hr) x 1,000,000 Btu/MMBtu (Fuel Heat Content, Btu/lb (LHV))										
Heat input (MMBtu/hr, LHV)	1,688	1,608	1,549	1,650	1,463	1,688	1,608	1,549	1,650	1,463
Heat content (Btu/lb, LHV)	20,823	20,823	20,823	20,823	20,823	20,823	20,823	20,823	20,823	20,823
Fuel usage (lb/hr)- calculated	81,064	77,217	74,408	79,220	70,273	81,064	77,217	74,408	79,220	70,273
Heat content (Btu/cf, LHV)- assumed	933	933	933	933	933	933	933	933	933	933
Fuel density (lb/ft^3)	0.0448	0.0448	0.0448	0.0448	0.0448	0.0448	0.0448	0.0448	0.0448	0.0448
Fuel usage (cf/hr)- calculated	1,808,427	1,722,612	1,659,939	1,767,287	1,567,696	1,809,469	1,722,612	1,659,939	1,767,287	1,567,696
Fuel Usage - Duct Burner Only										
Fuel usage (lb/hr)- calculated	0	0	0	0	0	23,796	23,796	23,796	23,796	23,796
Fuel usage (cf/hr)- calculated	0	0	0	0	0	531,151	530,846	530,846	530,846	530,846
HRSG - Stack Height (ft)	131	131	131	131	131	131	131	131	131	131
Diameter (ft)	19	19	19	19	19	19	19	19	19	19
CT Flow Conditions										
Turbine Flow (acfm) = [(Mass Flow (lb/hr) x 1,545 x (Temp. (°F)+ 460°F)] / [Molecular weight x 2116.8] / 60 min/hr										
Mass flow (lb/hr)	3,786,000	3,610,000	3,480,000	3,653,000	3,293,000	NA	NA	NA	NA	NA
Temperature (°F)	1,090	1,114	1,131	1,103	1,154	NA	NA	NA	NA	NA
Molecular weight	28.47	28.41	28.32	27.75	28.22	NA	NA	NA	NA	NA
Volume flow (acfm)- calculated	2,507,830	2,433,299	2,377,868	2,502,463	2,291,092	NA	NA	NA	NA	NA
(ft^3/s)- calculated	41,797	40,555	39,631	41,708	38,185	NA	NA	NA	NA	NA
Diameter (ft)	22	22	22	22	22	NA	NA	NA	NA	NA
Velocity (ft/sec)- calculated	110.0	106.7	104.3	109.7	100.5	NA	NA	NA	NA	NA
HRSG Stack Flow Conditions										
Velocity (ft/sec) = Volume flow (acfm) / [((diameter)² /4) x 3.14159] / 60 sec/min										
Mass flow (lb/hr)	3,786,000	3,610,000	3,480,000	3,653,000	3,293,000	3,808,100	3,632,100	3,502,100	3,675,100	3,315,100
HRSG Stack Temperature (°F)	203	202	204	204	201	189	188	189	188	190
Molecular weight	28.47	28.41	28.32	27.75	28.22	28.34	28.27	28.19	27.63	28.08
Volume flow (acfm)	1,072,219	1,023,872	992,397	1,063,107	938,297	1,060,289	1,013,207	981,473	1,048,363	933,446
Diameter (ft)	19	19	19	19	19	19	19	19	19	19
Velocity (ft/sec)- calculated	63.0	60.2	58.3	62.5	55.2	62.3	59.6	57.7	61.6	54.9

Note: Universal gas constant = 1,545 ft-lb(force)/°R; atmospheric pressure = 2,116.8 lb(force)/ft^2; 14.7 lb/ft^3

Source: GE, 2004 - CT Performance Data; Golder Associates, 2004 - DB Calculations

Table A-2. Maximum Emissions for Criteria Pollutants for FPL Turkey Point Combined-Cycle Expansion Project
GE Frame 7FA, Dry Low NOx Combustor, Natural Gas, Base Load

Parameter	CT Only Turbine Inlet Temperature					CT with Duct Burner Turbine Inlet Temperature				
	35 °F Case 8	59 °F Case 6	75 °F Case 4	75 °F PAug	95 °F Case 2	35 °F w/DB Case 7	59 °F w/DB Case 5	75 °F w/DB Case 3	75 °F w/DB PAug	95 °F w/DB Case 1
HRSG Stack Emission rate (lb/hr)	1.03	0.98	0.95	1.01	0.90	1.34	1.29	1.25	1.31	1.20
Lead										
Lead (lb/hr) = NA										
Emission Rate Basis	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Emission rate (lb/hr)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Note: ppmvd= parts per million, volume dry; O_2= oxygen.

Source: GE, 2004 - CT Performance Data; Golder Associates, 2004 - DB Calculations

Table A-3. Design Information and Stack Parameters for FPL Turkey Point Combined-Cycle Expansion Project
GE Frame 7FA, Dry Low NOx Combustor, Natural Gas, 75% Load
59 °F

Parameter	Turbine Inlet Temperature			
	35 °F	59 °F	75 °F	95 °F
	Case 12	Case 11	Case 10	Case 9
Combustion Turbine Performance				
Net power output (MW)	138.64	130.04	123.84	114.14
Net heat rate (Btu/kWh, LHV)	9,867	10,078	10,279	10,612
(Btu/kWh, HHV)	10,949	11,192	11,407	11,779
Heat Input (MMBtu/hr, LHV)	1,368	1,311	1,273	1,211
(MMBtu/hr, HHV)	1,518	1,455	1,413	1,344
Relative Humidity (%)	60	60	60	50
Fuel heating value (Btu/lb, LHV)	20,823	20,823	20,823	20,823
(Btu/lb, HHV)	23,114	23,114	23,114	23,114
(HHV/LHV)	1.110	1.110	1.110	1.110
CT Exhaust Flow				
Mass Flow (lb/hr)- with no margin	3,003,000	2,906,000	2,842,000	2,729,000
- provided	3,003,000	2,906,000	2,842,000	2,729,000
Temperature (°F)	1,140	1,159	1,171	1,190
Moisture (% Vol.)	7.77	8.26	8.91	9.8
Oxygen (% Vol.)	12.63	12.60	12.53	12.43
Molecular Weight	28.46	28.41	28.33	28.22
Fuel Usage				
Fuel usage (lb/hr) = Heat Input (MMBtu/hr) x 1,000,000 Btu/MMBtu (Fuel Heat Content, Btu/lb (LHV))				
Heat input (MMBtu/hr, LHV)	1,368	1,311	1,273	1,211
Heat content (Btu/lb, LHV)	20,823	20,823	20,823	20,823
Fuel usage (lb/hr)- calculated	65,677	62,969	61,115	58,166
Heat content (Btu/cf, LHV)- assumed	933	933	933	933
Fuel density (lb/ft^3)	0.0448	0.0448	0.0448	0.0448
Fuel usage (cf/hr)- calculated	1,465,696	1,405,250	1,363,881	1,298,077
HRSG Stack				
HRSG - Stack Height (ft)	131	131	131	131
Diameter (ft)	19	19	19	19
CT Flow Conditions				
Turbine Flow (acfm) = [(Mass Flow (lb/hr) x 1,545 x (Temp. (°F)+ 460°F)] / [Molecular weight x 2116.8] / 60 min/hr				
Mass flow (lb/hr)	3,003,000	2,906,000	2,842,000	2,729,000
Temperature (°F)	1,140	1,159	1,171	1,190
Molecular weight	28.46	28.41	28.33	28.22
Volume flow (acfm)- calculated	2,053,499	2,014,772	1,990,566	1,940,685
(ft^3/s)- calculated	34,225	33,580	33,176	32,345
Diameter (ft)	22.0	22.0	22.0	22.0
Velocity (ft/sec)- calculated	90.0	88.3	87.3	85.1
HRSG Stack Flow Conditions				
Velocity (ft/sec) = Volume flow (acfm) / [((diameter)^2 /4) x 3.14159] / 60 sec/min				
Mass flow (lb/hr)	3,003,000	2,906,000	2,842,000	2,729,000
HRSG Stack Temperature (°F)	187	188	189	190
Molecular weight	28.46	28.41	28.33	28.22
CT volume flow (acfm)	830,127	806,158	791,955	764,277
Diameter (ft)	19	19	19	19
Velocity (ft/sec)- calculated	48.8	47.4	46.6	44.9

Note: Universal gas constant = 1,545 ft-lb(force)/°R; atmospheric pressure = 2,116.8 lb(force)/ft^2; 14.7 lb/ft^3

Source: GE, 2004 - CT Performance Data; Golder Associates, 2004

Table A-4. Maximum Emissions for Criteria Pollutants for FPL Turkey Point Combined-Cycle Expansion Project
GE Frame 7FA, Dry Low NOx Combustor, Natural Gas, 75% Load

Parameter	Turbine Inlet Temperature			
	35 °F	59 °F	75 °F	95 °F
	Case 12	Case 11	Case 10	Case 9
Particulate from CTand SCR				
Total PM_{10} = PM_{10} (front half) + PM_{10} ($(NH_4)_2SO_4$) from SCR only				
a. PM_{10} (front half) (lb/hr)				
CT- provided	9.0	9.0	9.0	9.0
b. PM_{10} ($(NH_4)_2SO_4$) from SCR only = Sulfur trioxide from conversion of SO_2 converts to ammonium sulfate (= PM_{10})				
Particulate from conversion of SO_2 = SO_2 emissions (lb/hr) x conversion of SO_2 to SO_3 x lb SO_3/lb SO_2 x conversion of SO_3 to $(NH_4)_2SO_4$ x lb $(NH_4)_2SO_4$/ lb SO_3				
SO_2 emission rate (lb/hr)- calculated	8.4	8.0	7.8	7.4
Conversion (%) from SO_2 to SO_3	9.8	9.8	9.8	9.8
MW SO_3/ SO_2 (80/64)	1.3	1.3	1.3	1.3
Conversion (%) from SO_3 to $(NH_4)_2(SO_4)$	100	100	100	100
MW $(NH_4)_2$ SO_4/ SO_3 (132/80)	1.7	1.7	1.7	1.7
SCR Particulate (lb/hr)- calculated	1.69	1.62	1.58	1.50
Total CT emission rate (lb/hr) [a]	9.0	9.0	9.0	9.0
Total HRSG stack emission rate (lb/hr) [a + b]	10.7	10.6	10.6	10.5
(lb/mmBtu, HHV)	0.0067	0.0069	0.0071	0.0074
Sulfur Dioxide				
SO_2 (lb/hr)= Natural gas (scf/hr) x sulfur content(gr/100 scf) x 1 lb/7000 gr x (lb SO_2 /lb S) /100				
Fuel use (cf/hr)	1,465,696	1,405,250	1,363,881	1,298,077
Sulfur content (grains/ 100 cf)	2	2	2	2
lb SO_2 /lb S (64/32)	2	2	2	2
Emission rate (lb/hr)- calculated	8.4	8.0	7.8	7.4
Nitrogen Oxides				
NOx (lb/hr) = NOx (ppmvd@ 15% O_2) x {[20.9 x (1-Moisture (%)/100] - Oxygen, dry(%)} x 2116.8 lb/ft^2 x Volume flow (acfm) x 46 (mole. wgt NOx) x 60 min/hr / [1545 x (CT temp.(°F) + 460) x (20.9-15) x 1,000,000 (adj. for ppm)]				
CT / DB, ppmvd @15% O_2	9	9	9	9
Moisture (%)	7.77	8.26	8.91	9.8
Oxygen (%)	12.63	12.60	12.53	12.43
Turbine Flow (acfm)	2,053,499	2,014,772	1,990,566	1,940,685
Turbine Exhaust Temperature (°F)	1,140	1,159	1,171	1,190
CT/DB Emission rate (lb/hr)	49.2	47.2	45.8	43.6
CT/DB Emission rate (lb/hr)(provided)	49.0	47.0	46.0	44.0
HRSG Stack, ppmvd @ 15% O_2	2	2	2.0	2.0
HRSG Stack Emission rate (lb/hr)	10.9	10.5	10.2	9.7
Carbon Monoxide				
CO (lb/hr) = CO(ppm) x [1 - Moisture(%)/100] x 2116.8 lb/ft^2 x Volume flow (acfm) x 28 (mole. wgt CO) x 60 min/hr / [1545 x (CT temp.(°F) + 460°F) x 1,000,000 (adj. for ppm)]				
Basis, ppmvd	5	5	5	5
Moisture (%)	7.77	8.26	8.91	9.8
Turbine Flow (acfm)	2,053,499	2,014,772	1,990,566	1,940,685
Turbine Exhaust Temperature (°F)	1,140	1,159	1,171	1,190
HRSG Exhaust Temperature (°F)	187	188	189	190
Emission rate (lb/hr)- provided	13.6	13.1	12.8	12.2

Table A-4. Maximum Emissions for Criteria Pollutants for FPL Turkey Point Combined-Cycle Expansion Project
GE Frame 7FA, Dry Low NOx Combustor, Natural Gas, 75% Load

Parameter	Turbine Inlet Temperature			
	35 °F	59 °F	75 °F	95 °F
	Case 12	Case 11	Case 10	Case 9
Volatile Organic Compounds				
VOCs (lb/hr) = VOC(ppmvd) x [1-Moisture(%)/100] x 2116.8 lb/ft^2 x Volume flow (acfm) x 16 (mole. wgt as methane) x 60 min/hr / [1545 x (CT temp.(°F) + 460°F) x 1,000,000 (adj. for ppm)]				
Basis, ppmvw	1.4	1.4	1.4	1.4
Moisture (%)	7.77	8.26	8.91	9.8
Turbine Flow (acfm)	2,053,499	2,014,772	1,990,566	1,940,685
Turbine Exhaust Temperature (°F)	1,140	1,159	1,171	1,190
HRSG Exhaust Temperature (°F)	186.8	186.8	186.8	186.8
Emission rate (lb/hr)	2.36	2.29	2.25	2.17
Emission rate (lb/hr)	2.40	2.20	2.20	2.20
Sulfuric Acid Mist				
Sulfuric Acid Mist (lb/hr)= SO_2 emission (lb/hr) x Conversion to H_2SO_4 (% by weight)/100				
CT SO_2 emission rate (lb/hr) - provided	8.4	8.0	7.8	7.4
CT Conversion to H_2SO_4 (% by weight) - provided	10	10	10	10
DB SO_2 emission rate (lb/hr) - provided	0	0	0	0
DB Conversion to H_2SO_4 (%) - provided	20	20	20	20
Emission rate (lb/hr)- calculated	0.84	0.80	0.78	0.74
Lead				
Lead (lb/hr) = NA				
Emission Rate Basis	NA	NA	NA	NA
Emission rate (lb/hr)	NA	NA	NA	NA

Note: ppmvd= parts per million, volume dry; O_2= oxygen.

Source: GE, 2004 - CT Performance Data; Golder Associates, 2004

Table A-5. Design Information and Stack Parameters for FPL Turkey Point Combined-Cycle Expansions Project
GE Frame 7FA, Dry Low NOx Combustor, Natural Gas, 50% Load
59 °F

Parameter	Turbine Inlet Temperature			
	35 °F	59 °F	75 °F	95 °F
	Case 16	Case 15	Case 14	Case 13
Combustion Turbine Performance				
Net power output (MW)	92.24	86.54	82.34	75.94
Net heat rate (Btu/kWh, LHV)	11,869	12,127	12,331	12,715
(Btu/kWh, HHV)	13,177	13,463	13,690	14,111
Heat Input (MMBtu/hr, LHV)	1,095	1,050	1,016	965
(MMBtu/hr, HHV)	1,215	1,165	1,127	1,072
Relative Humidity (%)	60	60	60	50
Fuel heating value (Btu/lb, LHV)	20,823	20,823	20,823	20,823
(Btu/lb, HHV)	23,114	23,114	23,114	23,114
(HHV/LHV)	1.110	1.110	1.110	1.110
CT Exhaust Flow				
Mass Flow (lb/hr)- with no margin	2,464,000	2,404,000	2,363,000	2,298,000
- provided	2,464,000	2,404,000	2,363,000	2,298,000
Temperature (°F)	1,192	1,200	1,200	1,200
Moisture (% Vol.)	7.52	7.96	8.56	9.37
Oxygen (% Vol.)	12.91	12.94	12.93	12.92
Molecular Weight	28.47	28.42	28.35	28.25
Fuel Usage				
Fuel usage (lb/hr) = Heat Input (MMBtu/hr) x 1,000,000 Btu/MMBtu (Fuel Heat Content, Btu/lb (LHV))				
Heat input (MMBtu/hr, LHV)	1,095	1,050	1,016	965
Heat content (Btu/lb, LHV)	20,823	20,823	20,823	20,823
Fuel usage (lb/hr)- calculated	52,586	50,406	48,768	46,362
Heat content (Btu/cf, LHV)- assumed	933	933	933	933
Fuel density (lb/ft^3)	0.0448	0.0448	0.0448	0.0448
Fuel usage (cf/hr)- calculated	1,173,542	1,124,886	1,088,340	1,034,646
HRSG Stack				
HRSG - Stack Height (ft)	131	131	131	131
Diameter (ft)	19	19	19	19
CT Flow Conditions				
Turbine Flow (acfm) = [(Mass Flow (lb/hr) x 1,545 x (Temp. (°F)+ 460°F)] / [Molecular weight x 2116.8] / 60 min/hr				
Mass flow (lb/hr)	2,464,000	2,404,000	2,363,000	2,298,000
Temperature (°F)	1,192	1,200	1,200	1,200
Molecular weight	28.47	28.42	28.35	28.25
Volume flow (acfm)- calculated	1,738,988	1,707,858	1,683,015	1,642,593
(ft^3/s)- calculated	28,983	28,464	28,050	27,377
Diameter (ft)	22.0	22.0	22.0	22.0
Velocity (ft/sec)- calculated	76.2	74.9	73.8	72.0
HRSG Stack Flow Conditions				
Velocity (ft/sec) = Volume flow (acfm) / [((diameter)^2 /4) x 3.14159] / 60 sec/min				
Mass flow (lb/hr)	2,464,000	2,404,000	2,363,000	2,298,000
HRSG Stack Temperature (°F)	175	178	175	182
Molecular weight	28.47	28.42	28.35	28.25
CT volume flow (acfm)	668,753	655,879	644,108	635,466
Diameter (ft)	19	19	19	19
Velocity (ft/sec)- calculated	39.3	38.6	37.9	37.4

Note: Universal gas constant = 1,545 ft-lb(force)/°R; atmospheric pressure = 2,116.8 lb(force)/ft^2; 14.7 lb/ft^3

Source: GE, 2004 - CT Performance Data; Golder Associates, 2004

Table A-6. Maximum Emissions for Criteria Pollutants for FPL Turkey Point Combined-Cycle Project
GE Frame 7FA, Dry Low NOx Combustor, Natural Gas, 50% Load

Parameter	Turbine Inlet Temperature			
	35 °F	59 °F	75 °F	95 °F
	Case 16	Case 15	Case 14	Case 13
Particulate from CTand SCR				
Total PM_{10} = PM_{10} (front half) + PM_{10} ($(NH_4)_2SO_4$) from SCR only				
a. PM_{10} (front half) (lb/hr)				
CT- provided	9.0	9.0	9.0	9.0
b. PM_{10} ($(NH_4)_2SO_4$) from SCR only = Sulfur trioxide from conversion of SO_2 converts to ammonium sulfate (= PM_{10})				
Particulate from conversion of SO_2 = SO_2 emissions (lb/hr) x conversion of SO_2 to SO_3 x lb SO_3/lb SO_2 x conversion of SO_3 to $(NH_4)_2SO_4$ x lb $(NH_4)_2SO_4$/ lb SO_3				
SO_2 emission rate (lb/hr)- calculated	6.7	6.4	6.2	5.9
Conversion (%) from SO_2 to SO_3	9.8	9.8	9.8	9.8
MW SO_3/ SO_2 (80/64)	1.3	1.3	1.3	1.3
Conversion (%) from SO_3 to $(NH_4)_2(SO_4)$	100	100	100	100
MW $(NH_4)_2$ SO_4/ SO_3 (132/80)	1.7	1.7	1.7	1.7
SCR Particulate (lb/hr)- calculated	1.36	1.30	1.26	1.20
CT emission rate (lb/hr) [a]	9.0	9.0	9.0	9.0
Total emission rate (lb/hr) [a + b]	10.4	10.3	10.3	10.2
(lb/mmBtu, HHV)	0.0080	0.0083	0.0085	0.0089
Sulfur Dioxide				
SO_2 (lb/hr)= Natural gas (scf/hr) x sulfur content(gr/100 scf) x 1 lb/7000 gr x (lb SO_2 /lb S) /100				
Fuel use (cf/hr)	1,173,542	1,124,886	1,088,340	1,034,646
Sulfur content (grains/ 100 cf)	2	2	2	2
lb SO_2 /lb S (64/32)	2	2	2	2
Emission rate (lb/hr)- calculated	6.7	6.4	6.2	5.9
Nitrogen Oxides				
NOx (lb/hr) = NOx (ppmvd@ 15% O_2) x {[20.9 x (1-Moisture (%)/100] - Oxygen, dry(%)} x 2116.8 lb/ft^2 x Volume flow (acfm) x 46 (mole. wgt NOx) x 60 min/hr / [1545 x (CT temp.(°F) + 460) x (20.9-15) x 1,000,000 (adj. for ppm)]				
CT / DB, ppmvd @15% O_2	9	9	9	9
Moisture (%)	7.52	7.96	8.56	9.37
Oxygen (%)	12.91	12.94	12.93	12.92
Turbine Flow (acfm)	1,738,988	1,707,858	1,683,015	1,642,593
Turbine Exhaust Temperature (°F)	1,192	1,200	1,200	1,200
CT/DB Emission rate (lb/hr)	39.0	37.4	36.1	34.4
CT/DB Emission rate (lb/hr)(provided)	39.0	37.0	36.0	34.0
CT emission rate, ppmvd @ 15% O_2	9	9	9	9
CT emission rate (lb/hr)	38.97	37.37	36.15	34.37
HRSG Stack, ppmvd @ 15% O_2	2	2	2.0	2.0
HRSG Stack emission rate (lb/hr)	8.7	8.3	8.0	7.6
Carbon Monoxide				
CO (lb/hr) = CO(ppm) x [1 - Moisture(%)/100] x 2116.8 lb/ft^2 x Volume flow (acfm) x 28 (mole. wgt CO) x 60 min/hr / [1545 x (CT temp.(°F) + 460°F) x 1,000,000 (adj. for ppm)]				
Basis, ppmvd	5	5	5	5
Moisture (%)	7.52	7.96	8.56	9.37
Turbine Flow (acfm)	1,738,988	1,707,858	1,683,015	1,642,593
Turbine Exhaust Temperature (°F)	1,192	1,200	1,200	1,200
HRSG Exhaust Temperature (°F)	175	178	175	182
Emission rate (lb/hr)- provided	11.2	10.9	10.7	10.3

Table A-6. Maximum Emissions for Criteria Pollutants for FPL Turkey Point Combined-Cycle Project
GE Frame 7FA, Dry Low NOx Combustor, Natural Gas, 50% Load

Parameter	Turbine Inlet Temperature			
	35 °F	59 °F	75 °F	95 °F
	Case 16	Case 15	Case 14	Case 13
Volatile Organic Compounds				
VOCs (lb/hr) = VOC(ppmvd) x [1-Moisture(%)/100] x 2116.8 lb/ft^2 x Volume flow (acfm) x 16 (mole. wgt as methane) x 60 min/hr / [1545 x (CT temp.(°F) + 460°F) x 1,000,000 (adj. for ppm)]				
Basis, ppmvw	1.4	1.4	1.4	1.4
Moisture (%)	7.52	7.96	8.56	9.37
Turbine Flow (acfm)	1,738,988	1,707,858	1,683,015	1,642,593
Turbine Exhaust Temperature (°F)	1,192	1,200	1,200	1,200
HRSG Exhaust Temperature (°F)	175	175	175	175
Emission rate (lb/hr)	1.94	1.89	1.87	1.82
Emission rate (lb/hr)- provided	2.00	1.80	1.80	1.80
Sulfuric Acid Mist				
Sulfuric Acid Mist (lb/hr)= SO_2 emission (lb/hr) x Conversion to H_2SO_4 (% by weight)/100				
CT SO_2 emission rate (lb/hr) - provided	6.7	6.4	6.2	5.9
CT Conversion to H_2SO_4 (% by weight) - provided	10	10	10	10
DB SO_2 emission rate (lb/hr) - provided	0	0	0	0
DB Conversion to H_2SO_4 (%) - provided	20	20	20	20
Emission rate (lb/hr)- calculated	0.67	0.64	0.62	0.59
Lead				
Lead (lb/hr) = NA				
Emission Rate Basis	NA	NA	NA	NA
Emission rate (lb/hr)	NA	NA	NA	NA

Note: ppmvd= parts per million, volume dry; O_2= oxygen.

Source: GE, 2004 - CT Performance Data; Golder Associates, 2004

Table A-7. Design Information and Stack Parameters for the FPL Turkey Point Combined-Cycle Expansion I
GE Frame 7FA, Dry Low NOx Combustor, Natural Gas, Peak

Parameter	Turbine Inlet Temperature 75 °F Case 18	95 °F Case 17
Combustion Turbine Performance		
Net power output (MW)	173.43	164.93
Net heat rate (Btu/kWh, LHV)	9,308	9,444
(Btu/kWh, HHV)	10,335	10,482
Heat Input (MMBtu/hr, LHV)	1,615	1,557
(MMBtu/hr, HHV)	1,792	1,729
Relative Humidity (%)	60	50
Fuel heating value (Btu/lb, LHV)	20,823	20,823
(Btu/lb, HHV)	23,127	23,127
(HHV/LHV)	1.110	1.110
CT Exhaust Flow		
Mass Flow (lb/hr)- with no margin	3,532,000	3,395,000
- provided	3,532,000	3,395,000
Temperature (°F)	1,144	1,161
Moisture (% Vol.)	9.39	10.54
Oxygen (% Vol.)	12.24	12.01
Molecular Weight	28.29	28.16
Fuel Usage		
Fuel usage (lb/hr) = Heat Input (MMBtu/hr) x 1,000,000 Btu/MMBtu (Fuel Heat Content, Btu/lb (LHV))		
Heat input (MMBtu/hr, LHV)	1,615	1,557
Heat content (Btu/lb, LHV)	20,823	20,823
Fuel usage (lb/hr)- calculated	77,544	74,792
Heat content (Btu/cf, LHV)- assumed	933	933
Fuel density (lb/ft^3)	0.0448	0.0448
Fuel usage (cf/hr)- calculated	1,730,520	1,669,110
HRSG Stack		
HRSG - Stack Height (ft)	131	131
Diameter (ft)	19	19
CT Flow Conditions		
Turbine Flow (acfm) = [(Mass Flow (lb/hr) x 1,545 x (Temp. (°F)+ 460°F)] / [Molecular weight x 2116.8] /		
Mass flow (lb/hr)	3,532,000	3,395,000
Temperature (°F)	1,144	1,161
Molecular weight	28.29	28.16
Volume flow (acfm)- calculated	2,436,160	2,377,251
(ft^3/s)- calculated	40,603	39,621
Diameter (ft)	22	22
Velocity (ft/sec)- calculated	106.8	104.2
HRSG Stack Flow Conditions		
Velocity (ft/sec) = Volume flow (acfm) / [((diameter)² /4) x 3.14159] / 60 sec/min		
Mass flow (lb/hr)	3,532,000	3,395,000
HRSG Stack Temperature (°F)	206	202
Molecular weight	28.29	28.16
CT volume flow (acfm)	1,012,047	971,167
Diameter (ft)	19	19
Velocity (ft/sec)- calculated	59.5	57.1

Note: Universal gas constant = 1,545 ft-lb(force)/°R; atmospheric pressure = 2,116.8 lb(force)/ft²; 14.7 lb/ft^3

Source: GE, 2004 - CT Performance Data; Golder Associates, 2004

Table A-8. Maximum Emissions for Criteria Pollutants for FPL Turkey Point Combined-Cycle Expansion Pr
GE Frame 7FA, Dry Low NOx Combustor, Natural Gas, Peak

Parameter	Turbine Inlet Temperature 75 °F Case 18	95 °F Case 17
Particulate from CTand SCR		
Total PM_{10} = PM_{10} (front half) + PM_{10} ($(NH_4)_2SO_4$) from SCR only		
a. PM_{10} (front half) (lb/hr)		
CT- provided	9.0	9.0
b. PM_{10} ($(NH_4)_2SO_4$) from SCR only = Sulfur trioxide from convers		
Particulate from conversion of SO_2 = SO_2 emissions (lb/hr) x conversion of SO_2 to SO_3 x lb SO_3/lb SO_2 conversion of SO_3 to $(NH_4)_2SO_4$ x lb $(NH_4)_2SO_4$/ lb SO_3		
SO_2 emission rate (lb/hr)- calculated	9.9	9.5
Conversion (%) from SO_2 to SO_3	9.8	9.8
MW SO_3/ SO_2 (80/64)	1.3	1.3
Conversion (%) from SO_3 to $(NH_4)_2(SO_4)$	100	100
MW $(NH_4)_2$ SO_4/ SO_3 (132/80)	1.7	1.7
SCR Particulate (lb/hr)- calculated	2.00	1.93
Total CT emission rate (lb/hr) [a]	9.0	9.0
Total HRSG stack emission rate (lb/hr) [a + b]	11.0	10.9
(lb/mmBtu, HHV)	0.0059	0.0060
Sulfur Dioxide		
SO_2 (lb/hr)= Natural gas (scf/hr) x sulfur content(gr/100 scf) x 1 lb/7000 gr x (lb SO_2 /lb S) /100		
Fuel use (cf/hr)	1,730,520	1,669,110
Sulfur content (grains/ 100 cf)	2	2
lb SO_2 /lb S (64/32)	2	2
Emission rate (lb/hr)- calculated	9.9	9.5
Nitrogen Oxides		
NOx (lb/hr) = NOx (ppmvd@ 15% O_2) x {[20.9 x (1-Moisture (%)/100] - Oxygen, dry(%)} x 2116.8 lb/ft^2 x 46 (mole. wgt NOx) x 60 min/hr / [1545 x (CT temp.(°F) + 460) x (20.9-15) x 1,000,000 (ad		
CT/DB, ppmvd @15% O_2	18	18
Moisture (%)	9.39	10.54
Oxygen (%)	12.24	12.01
Turbine Flow (acfm)	2,436,160	2,377,251
Turbine Exhaust Temperature (°F)	1,144	1,161
CT/DB Emission rate (lb/hr)	117.4	113.1
CT emission rate, ppmvd @ 15% O_2	18	18
CT emission rate (lb/hr)	117.4	113.1
CT emission rate (lb/hr)(provided)	117.0	113.0
HRSG Stack, ppmvd @ 15% O_2	2.0	2.0
HRSG Stack Emission rate (lb/hr)	13.0	12.6
Carbon Monoxide		
CO (lb/hr) = CO(ppm) x [1 - Moisture(%)/100] x 2116.8 lb/ft^2 x Volume flow (acfm) x 28 (mole. wgt CO) x 60 min/hr / [1545 x (CT temp.(°F) + 460°F) x 1,000,000 (adj. for ppm)]		
Basis, ppmvd	9	9
Basis, ppmvd @ 15% O2 - calculated	7.18	7.10
Moisture (%)	9.39	10.54
Oxygen (%)	12.24	12.01
Turbine Flow (acfm)	2,436,160	2,377,251
Turbine Exhaust Temperature (°F)	1,144	1,161
HRSG Exhaust Temperature (°F)	206	202
Emission rate (lb/hr)	28.5	27.2
Emission rate (lb/hr)(provided)	29.0	27.0

Table A-8. Maximum Emissions for Criteria Pollutants for FPL Turkey Point Combined-Cycle Expansion Pr
GE Frame 7FA, Dry Low NOx Combustor, Natural Gas, Peak

Parameter	Turbine Inlet Temperature	
	75 °F	95 °F
	Case 18	Case 17
Volatile Organic Compounds		
VOCs (lb/hr) = VOC(ppmvd) x [1-Moisture(%)/100] x 2116.8 lb/ft^2 x Volume flow (acfm) x 16 (mole. wgt as methane) x 60 min/hr / [1545 x (CT temp.(°F) + 460°F) x 1,000,000 (adj. for ppm)]		
Basis, ppmvw	1.4	1.4
Basis, ppmvd @ 15% O2 - calculated	1.2	1.2
Moisture (%)	9.39	10.54
Oxygen (%)	12.24	12.01
Turbine Flow (acfm)	2,436,160	2,377,251
Turbine Exhaust Temperature (°F)	1,144	1,161
HRSG Exhaust Temperature (°F)	206	202
Emission rate (lb/hr)	2.80	2.70
Emission rate (lb/hr)(provided)	2.80	2.80
Sulfuric Acid Mist		
Sulfuric Acid Mist (lb/hr)= SO_2 emission (lb/hr) x Conversion to H_2SO_4 (% by weight)/100		
CT SO_2 emission rate (lb/hr) - provided	9.9	9.5
CT Conversion to H_2SO_4 (% by weight) - provided	10	10
DB SO_2 emission rate (lb/hr) - provided	0	0
DB Conversion to H_2SO_4 (%) - provided	20	20
Emission rate (lb/hr)- calculated	0.99	0.95
Lead		
Lead (lb/hr) = NA		
Emission Rate Basis	NA	NA
Emission rate (lb/hr)	NA	NA

Note: ppmvd= parts per million, volume dry; O_2= oxygen.

Source: GE, 2004 - CT Performance Data; Golder Associates, 2004

Table A-9. Design Information and Stack Parameters for FPL Turkey Point Combined-Cycle Expansion Project
GE Frame 7FA, Dry Low NOx Combustor, Distillate Oil, Base Load
59 °F

Parameter	Turbine Inlet Temperature			
	35 °F	59 °F	75 °F	95 °F
	Case 28	Case 26	Case 24	Case 22
Combustion Turbine Performance				
Net power output (MW)	187.7	179.2	170.7	157.5
Net heat rate (Btu/kWh, LHV)	10,141	10,208	10,303	10,470
(Btu/kWh, HHV)	10,753	10,821	10,922	11,100
Heat Input (MMBtu/hr, LHV)	1,904	1,830	1,759	1,649
(MMBtu/hr, HHV)	2,018	1,939	1,864	1,748
Relative Humidity (%)	60	60	60	50
Fuel heating value (Btu/lb, LHV)	18,387	18,387	18,387	18,387
(Btu/lb, HHV)	19,490	19,490	19,490	19,490
(HHV/LHV)	1.060	1.060	1.060	1.060
CT Exhaust Flow				
Mass Flow (lb/hr)- with no margin	3,955,000	3,771,000	3,628,000	3,407,000
- provided	3,955,000	3,771,000	3,628,000	3,407,000
Temperature (°F)	1,068	1,097	1,115	1,143
Moisture (% Vol.)	11.11	11.65	12.13	13.07
Oxygen (% Vol.)	11.16	11.00	10.92	10.77
Molecular Weight	28.33	28.28	28.22	28.12
Fuel Usage				
Fuel usage (lb/hr) = Heat Input (MMBtu/hr) x 1,000,000 Btu/MMBtu (Fuel Heat Content, Btu/lb (LHV))				
Heat input (MMBtu/hr, LHV)	1,904	1,830	1,759	1,649
Heat content (Btu/lb, LHV)	18,387	18,387	18,387	18,387
Fuel usage (lb/hr)- calculated	103,562	99,500	95,660	89,705
HRSG Stack				
CT/Bypass-Stack height (ft)	80	80	80	80
Diameter (ft)	22	22	22	22
HRSG - Stack Height (ft)	131	131	131	131
Diameter (ft)	19	19	19	19
CT Flow Conditions				
Turbine Flow (acfm) = [(Mass Flow (lb/hr) x 1,545 x (Temp. (°F)+ 460°F)] / [Molecular weight x 2116.8] / 60 min/hr				
Mass flow (lb/hr)	3,955,000	3,771,000	3,628,000	3,407,000
Temperature (°F)	1,068	1,097	1,115	1,143
Molecular weight	28.33	28.28	28.22	28.12
Volume flow (acfm)- calculated	2,594,872	2,525,704	2,462,754	2,362,720
(ft^3/s)- calculated	43,248	42,095	41,046	39,379
Diameter (ft)	22	22	22	22
Velocity (ft/sec)- calculated	113.8	110.7	108.0	103.6
HRSG Stack Flow Conditions				
Velocity (ft/sec) = Volume flow (acfm) / [((diameter)^2 /4) x 3.14159] / 60 sec/min				
Mass flow (lb/hr)	3,955,000	3,771,000	3,628,000	3,407,000
HRSG Stack Temperature (°F)	297	295	294	294
Molecular weight	28.33	28.28	28.22	28.12
CT volume flow (acfm)	1,285,209	1,224,407	1,178,213	1,110,611
(ft^3/s)- calculated	21,420	20,407	19,637	18,510
Diameter (ft)	19	19	19	19
Velocity (ft/sec)- calculated	75.5	72.0	69.3	65.3

Note: Universal gas constant = 1,545 ft-lb(force)/°R; atmospheric pressure = 2,116.8 lb(force)/ft^2; 14.7 lb/ft^3

Source: GE, 2004 - CT Performance Data; Golder Associates, 2004

Table A-10. Maximum Emissions for Criteria Pollutants for FPL Turkey Point Combined-Cycle Expansion Project
GE Frame 7FA, Dry Low NOx Combustor, Distillate Oil, Base Load

Parameter	Turbine Inlet Temperature 35 °F Case 28	59 °F Case 26	75 °F Case 24	95 °F Case 22
Particulate from CTand SCR				
Total PM_{10} = PM_{10} (front half) + PM_{10} ($(NH_4)_2SO_4$) from SCR only				
a. PM_{10} (front half) (lb/hr)				
CT- provided	17.0	17.0	17.0	17.0
b. PM_{10} ($(NH_4)_2SO_4$) from SCR only = Sulfur trioxide from conversion of SO_2 converts to ammonium sulfate (= PM_{10})				
Particulate from conversion of SO_2 = SO_2 emissions (lb/hr) x conversion of SO_2 to SO_3 x lb SO_3/lb SO_2 x conversion of SO_3 to $(NH_4)_2SO_4$ x lb $(NH_4)_2SO_4$/ lb SO_3				
SO_2 emission rate (lb/hr)- calculated	3.1	3.0	2.9	2.7
Conversion (%) from SO_2 to SO_3	9.8	9.8	9.8	9.8
MW SO_3/ SO_2 (80/64)	1.3	1.3	1.3	1.3
Conversion (%) from SO_3 to $(NH_4)_2(SO_4)$	100	100	100	100
MW $(NH_4)_2$ SO_4/ SO_3 (132/80)	1.7	1.7	1.7	1.7
SCR Particulate (lb/hr)- calculated	0.63	0.60	0.58	0.54
CT emission rate (lb/hr) [a]	17.0	17.0	17.0	17.0
Total HRSG stack emission rate (lb/hr) [a + b]	17.6	17.6	17.6	17.5
(lb/mmBtu, HHV)	0.0087	0.0091	0.0094	0.0100
Sulfur Dioxide				
SO_2 (lb/hr)= Fuel oil (lb/hr) x sulfur content(% weight) x (lb SO_2 /lb S) /100				
Fuel oil Sulfur Content	0.0015%	0.0015%	0.0015%	0.0015%
Fuel oil use (lb/hr)	103,562	99,500	95,660	89,705
lb SO2 / lb S (64/32)	2	2	2	2
Emission rate (lb/hr)- calculated	3.1	3.0	2.9	2.7
Nitrogen Oxides				
NOx (lb/hr) = NOx (ppmvd@ 15% O_2) x {[20.9 x (1-Moisture (%)/100] - Oxygen, dry(%)} x 2116.8 lb/ft^2 x Volume flow (acfm) x 46 (mole. wgt NOx) x 60 min/hr / [1545 x (CT temp.(°F) + 460) x (20.9-15) x 1,000,000 (adj. for ppm)]				
CT/DB, ppmvd @15% O_2	42	42	42	42
Moisture (%)	11.11	11.65	12.13	13.07
Oxygen (%)	11.16	11.00	10.92	10.77
Turbine Flow (acfm)	2,594,872	2,525,704	2,462,754	2,362,720
Turbine Exhaust Temperature (°F)	1,068	1,097	1,115	1,143
CT/DB Emission rate (lb/hr)	339.1	326.0	313.4	293.5
CT emission rate, ppmvd @ 15% O_2	42	42	42	42
CT emission rate (lb/hr)	339.1	326.0	313.4	293.5
CT emission rate (lb/hr)(provided)	338.0	325.0	313.0	293.0
HRSG Stack, ppmvd @ 15% O_2	8	8	8.0	8.0
HRSG Stack Emission rate (lb/hr)	64.6	62.1	59.7	55.9
Carbon Monoxide				
CO (lb/hr) = CO(ppm) x [1 - Moisture(%)/100] x 2116.8 lb/ft^2 x Volume flow (acfm) x 28 (mole. wgt CO) x 60 min/hr / [1545 x (CT temp.(°F) + 460°F) x 1,000,000 (adj. for ppm)]				
Basis, ppmvd	20	20	20	20
Moisture (%)	11.11	11.65	12.13	13.07
Basis, ppmvd @ 15% O_2	14.14	13.97	13.93	13.86
Turbine Flow (acfm)	2,594,872	2,525,704	2,462,754	2,362,720
Turbine Exhaust Temperature (°F)	1,068	1,097	1,115	1,143
HRSG Exhaust Temperature (°F)	297	295	294	294
Emission rate (lb/hr)	69.5	66.0	63.3	59.0
Emission rate (lb/hr)- provided	69.0	66.0	63.0	59.0

Table A-10. Maximum Emissions for Criteria Pollutants for FPL Turkey Point Combined-Cycle Expansion Project
GE Frame 7FA, Dry Low NOx Combustor, Distillate Oil, Base Load

Parameter	Turbine Inlet Temperature			
	35 °F	59 °F	75 °F	95 °F
	Case 28	Case 26	Case 24	Case 22
Volatile Organic Compounds				
VOCs (lb/hr) = VOC(ppmvd) x 2116.8 lb/ft^2 x Volume flow (acfm) x 16 (mole. wgt as methane) x 60 min/hr / [1545 x (CT temp.(°F) + 460°F) x 1,000,000 (adj. for ppm)]				
Basis, ppmvw	3.5	3.5	3.5	3.5
Basis, ppmvd	3.94	3.96	3.98	4.03
Basis, ppmvd @ 15% O_2	2.78	2.77	2.77	2.79
Moisture (%)	11.11	11.65	12.13	13.07
Oxygen (%)	11.16	11.00	10.92	10.77
Oxygen (%-dry)	12.55	12.45	12.43	12.39
Turbine Flow (acfm)	2,594,872	2,525,704	2,462,754	2,362,720
Turbine Exhaust Temperature (°F)	1,068	1,097	1,115	1,143
Emission rate (lb/hr)	7.82	7.47	7.20	6.79
Emission rate (lb/hr)- provided	8.00	7.50	7.00	7.00
Sulfuric Acid Mist				
Sulfuric Acid Mist (lb/hr)= SO_2 emission (lb/hr) x Conversion to H_2SO_4 (% by weight)/100				
CT SO_2 emission rate (lb/hr) - provided	3.1	3.0	2.9	2.7
CT Conversion to H_2SO_4 (% by weight) - provided	20	20	20	20
DB SO_2 emission rate (lb/hr) - provided	0	0	0	0
DB Conversion to H_2SO_4 (%) - provided	20	20	20	20
Emission rate (lb/hr)- calculated	0.62	0.60	0.57	0.54
Lead				
Lead (lb/hr) = Basis (lb/10^{12} Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/10^{12} Btu				
Emission Rate Basis (lb/10^{12} Btu)	14	14	14	14
Emission rate (lb/hr)	0.0267	0.0256	0.0246	0.0231

Note: ppmvd= parts per million, volume dry; O_2= oxygen.

Source: GE, 2004 - CT Performance Data; Golder Associates, 2004

Table A-11. Design Information and Stack Parameters for FPL Turkey Point Combined-Cycle Expansion Project
GE Frame 7FA, Dry Low NOx Combustor, Distillate Oil, 75% Load
59 °F

Parameter	Turbine Inlet Temperature			
	35 °F	59 °F	75 °F	95 °F
	Case 32	Case 31	Case 30	Case 29
Combustion Turbine Performance				
Net power output (MW)	140.5	134.1	127.7	117.8
Net heat rate (Btu/kWh, LHV)	11,071	11,142	11,271	11,530
(Btu/kWh, HHV)	11,732	11,813	11,948	12,227
Heat Input (MMBtu/hr, LHV)	1,555	1,495	1,440	1,359
(MMBtu/hr, HHV)	1,649	1,584	1,526	1,440
Relative Humidity (%)	60	60	60	50
Fuel heating value (Btu/lb, LHV)	18,387	18,387	18,387	18,387
(Btu/lb, HHV)	19,490	19,490	19,490	19,490
(HHV/LHV)	1.060	1.060	1.060	1.060
CT Exhaust Flow				
Mass Flow (lb/hr)- with no margin	2,947,000	2,898,000	2,851,000	2,783,000
- provided	2,947,000	2,898,000	2,851,000	2,783,000
Temperature (°F)	1,200	1,200	1,200	1,200
Moisture (% Vol.)	11.74	11.85	12.07	12.65
Oxygen (% Vol.)	10.40	10.57	10.70	10.86
Molecular Weight	28.31	28.29	28.25	28.16
Fuel Usage				
Fuel usage (lb/hr) = Heat Input (MMBtu/hr) x 1,000,000 Btu/MMBtu (Fuel Heat Content, Btu/lb (LHV))				
Heat input (MMBtu/hr, LHV)	1,555	1,495	1,440	1,359
Heat content (Btu/lb, LHV)	18,387	18,387	18,387	18,387
Fuel usage (lb/hr)- calculated	84,581	81,286	78,289	73,905
HRSG Stack				
CT/Bypass-Stack height (ft)	80	80	80	80
Diameter (ft)	22	22	22	22
HRSG - Stack Height (ft)	131	131	131	131
Diameter (ft)	19	19	19	19
CT Flow Conditions				
Turbine Flow (acfm) = [(Mass Flow (lb/hr) x 1,545 x (Temp. (°F)+ 460°F)] / [Molecular weight x 2116.8] / 60 min/hr				
Mass flow (lb/hr)	2,947,000	2,898,000	2,851,000	2,783,000
Temperature (°F)	1,200	1,200	1,200	1,200
Molecular weight	28.31	28.29	28.25	28.16
Volume flow (acfm)- calculated	2,102,017	2,068,807	2,037,965	1,995,375
(ft^3/s)- calculated	35,034	34,480	33,966	33,256
Diameter (ft)	22	22	22	22
Velocity (ft/sec)- calculated	92.2	90.7	89.4	87.5
HRSG Stack Flow Conditions				
Velocity (ft/sec) = Volume flow (acfm) / [((diameter)^2 /4) x 3.14159] / 60 sec/min				
Mass flow (lb/hr)	2,947,000	2,898,000	2,851,000	2,783,000
HRSG Stack Temperature (°F)	271	274	276	278
Molecular weight	28.31	28.29	28.25	28.16
CT volume flow (acfm)	925,521	914,512	903,580	886,499
Diameter (ft)	19	19	19	19
Velocity (ft/sec)- calculated	54.4	53.8	53.1	52.1

Note: Universal gas constant = 1,545 ft-lb(force)/°R; atmospheric pressure = 2,116.8 lb(force)/ft^2; 14.7 lb/ft^3

Source: GE, 2004 - CT Performance Data; Golder Associates, 2004

Table A-12. Maximum Emissions for Criteria Pollutants for FPL Turkey Point Combined-Cycle Expansion Project
GE Frame 7FA, Dry Low NOx Combustor, Distillate Oil, 75% Load

Parameter	Turbine Inlet Temperature			
	35 °F	59 °F	75 °F	95 °F
	Case 32	Case 31	Case 30	Case 29
Particulate from CTand SCR				
Total PM_{10} = PM_{10} (front half) + PM_{10} ($(NH_4)_2SO_4$) from SCR only				
a. PM_{10} (front half) (lb/hr)				
CT- provided	17.0	17.0	17.0	17.0
b. PM_{10} ($(NH_4)_2SO_4$) from SCR only = Sulfur trioxide from conversion of SO_2 converts to ammonium sulfate (= PM_{10})				
Particulate from conversion of SO_2 = SO_2 emissions (lb/hr) x conversion of SO_2 to SO_3 x lb SO_3/lb SO_2 x conversion of SO_3 to $(NH_4)_2SO_4$ x lb $(NH_4)_2SO_4$/ lb SO_3				
SO_2 emission rate (lb/hr)- calculated	2.5	2.4	2.3	2.2
Conversion (%) from SO_2 to SO_3	9.8	9.8	9.8	9.8
MW SO_3/ SO_2 (80/64)	1.3	1.3	1.3	1.3
Conversion (%) from SO_3 to $(NH_4)_2(SO_4)$	100	100	100	100
MW $(NH_4)_2$ SO_4/ SO_3 (132/80)	1.7	1.7	1.7	1.7
SCR Particulate (lb/hr)- calculated	0.51	0.49	0.47	0.45
CT emission rate (lb/hr) [a]	17.0	17.0	17.0	17.0
Total HRSG stack emission rate (lb/hr) [a + b]	17.5	17.5	17.5	17.4
(lb/mmBtu, HHV)	0.0105	0.0109	0.0113	0.0120
Sulfur Dioxide				
SO_2 (lb/hr)= Fuel oil (lb/hr) x sulfur content(% weight) x (lb SO_2 /lb S) /100				
Fuel oil Sulfur Content	0.0015%	0.0015%	0.0015%	0.0015%
Fuel oil use (lb/hr)	84,581	81,286	78,289	73,905
lb SO2 / lb S (64/32)	2	2	2	2
Emission rate (lb/hr)- calculated	2.5	2.4	2.3	2.2
Nitrogen Oxides				
NOx (lb/hr) = NOx (ppmvd@ 15% O_2) x {[20.9 x (1-Moisture (%)/100] - Oxygen, dry(%)} x 2116.8 lb/ft^2 x Volume flow (acfm) x 46 (mole. wgt NOx) x 60 min/hr / [1545 x (CT temp.(°F) + 460) x (20.9-15) x 1,000,000 (adj. for ppm)]				
CT/DB, ppmvd @15% O_2	42	42	42	42
Moisture (%)	11.74	11.85	12.07	12.65
Oxygen (%)	10.40	10.57	10.70	10.86
Turbine Flow (acfm)	2,102,017	2,068,807	2,037,965	1,995,375
Turbine Exhaust Temperature (°F)	1,200	1,200	1,200	1,200
CT emission rate (lb/hr)	274.3	263.5	253.7	239.3
CT emission rate (lb/hr)(provided)	274.0	263.0	253.0	239.0
CT emission rate, ppmvd @ 15% O_2	42	42	42	42
CT emission rate (lb/hr)	274.3	263.5	253.7	239.3
HRSG Stack, ppmvd @ 15% O_2	8	8	8.0	8.0
HRSG Stack Emission rate (lb/hr)	52.2	50.2	48.3	45.6
Carbon Monoxide				
CO (lb/hr) = CO(ppm) x [1 - Moisture(%)/100] x 2116.8 lb/ft^2 x Volume flow (acfm) x 28 (mole. wgt CO) x 60 min/hr / [1545 x (CT temp.(°F) + 460°F) x 1,000,000 (adj. for ppm)]				
Basis, ppmvd	20	20	20	20
Moisture (%)	11.74	11.85	12.07	12.65
Turbine Flow (acfm)	2,102,017	2,068,807	2,037,965	1,995,375
Turbine Exhaust Temperature (°F)	1,200	1,200	1,200	1,200
HRSG Exhaust Temperature (°F)	271	274	276	278
Emission rate (lb/hr)	51.4	50.6	49.7	48.3
Emission rate (lb/hr)- provided	51.0	51.0	50.0	48.0

Table A-12. Maximum Emissions for Criteria Pollutants for FPL Turkey Point Combined-Cycle Expansion Project
GE Frame 7FA, Dry Low NOx Combustor, Distillate Oil, 75% Load

Parameter	Turbine Inlet Temperature			
	35 °F	59 °F	75 °F	95 °F
	Case 32	Case 31	Case 30	Case 29
Volatile Organic Compounds				
VOCs (lb/hr) = VOC(ppmvd) x 2116.8 lb/ft^2 x Volume flow (acfm) x 16 (mole. wgt as methane) x 60 min/hr / [1545 x (CT temp.(°F) + 460°F) x 1,000,000 (adj. for ppm)]				
Basis, ppmvw	3.5	3.5	3.5	3.5
Moisture (%)	11.74	11.85	12.07	12.65
Turbine Flow (acfm)	10.40	10.57	10.70	10.86
Turbine Exhaust Temperature (°F)	2,102,017	2,068,807	2,037,965	1,995,375
HRSG Exhaust Temperature (°F)	1,200	1,200	1,200	1,200
Emission rate (lb/hr)	5.83	5.74	5.65	5.53
Emission rate (lb/hr)- provided	6.00	5.50	5.50	5.50
Sulfuric Acid Mist				
Sulfuric Acid Mist (lb/hr)= SO_2 emission (lb/hr) x Conversion to H_2SO_4 (% by weight)/100				
CT SO_2 emission rate (lb/hr) - provided	2.5	2.4	2.3	2.2
CT Conversion to H_2SO_4 (% by weight) - provided	20	20	20	20
DB SO_2 emission rate (lb/hr) - provided	0	0	0	0
DB Conversion to H_2SO_4 (%) - provided	20	20	20	20
Emission rate (lb/hr)- calculated	0.51	0.49	0.47	0.44
Lead				
Lead (lb/hr) = Basis (lb/10^{12} Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/10^{12} Btu				
Emission Rate Basis (lb/10^{12} Btu)	14	14	14	14
Emission rate (lb/hr)	0.0218	0.0209	0.0202	0.0190

Note: ppmvd= parts per million, volume dry; O2= oxygen.

Source: GE, 2004 - CT Performance Data; Golder Associates, 2004

Table A-13. Design Information and Stack Parameters for FPL Turkey Point Combined-Cycle Expansion Project
GE Frame 7FA, Dry Low NOx Combustor, Distillate Oil, 50% Load
59 °F

Parameter	Turbine Inlet Temperature			
	35 °F	59 °F	75 °F	95 °F
	Case 36	Case 35	Case 34	Case 33
Combustion Turbine Performance				
Net power output (MW)	93.2	88.9	84.7	78.0
Net heat rate (Btu/kWh, LHV)	12,980	13,121	13,292	13,613
(Btu/kWh, HHV)	13,759	13,910	14,092	14,425
Heat Input (MMBtu/hr, LHV)	1,210	1,167	1,126	1,062
(MMBtu/hr, HHV)	1,282	1,237	1,194	1,125
Relative Humidity (%)	60	60	60	50
Fuel heating value (Btu/lb, LHV)	18,387	18,387	18,387	18,387
(Btu/lb, HHV)	19,490	19,490	19,490	19,490
(HHV/LHV)	1.060	1.060	1.060	1.060
CT Exhaust Flow				
Mass Flow (lb/hr)- with no margin	2,487,000	2,457,000	2,418,000	2,353,000
- provided	2,487,000	2,457,000	2,418,000	2,535,000
Temperature (°F)	1,200	1,200	1,200	1,200
Moisture (% Vol.)	10.21	10.38	10.65	11.37
Oxygen (% Vol.)	11.40	11.54	11.64	11.73
Molecular Weight	28.42	28.40	28.35	28.26
Fuel Usage				
Fuel usage (lb/hr) = Heat Input (MMBtu/hr) x 1,000,000 Btu/MMBtu (Fuel Heat Content, Btu/lb (LHV))				
Heat input (MMBtu/hr, LHV)	1,210	1,167	1,126	1,062
Heat content (Btu/lb, LHV)	18,387	18,387	18,387	18,387
Fuel usage (lb/hr)- calculated	65,802	63,452	61,250	57,736
HRSG Stack				
CT/Bypass-Stack height (ft)	80	80	80	80
Diameter (ft)	22	22	22	22
HRSG - Stack Height (ft)	131	131	131	131
Diameter (ft)	19	19	19	19
CT Flow Conditions				
Turbine Flow (acfm) = [(Mass Flow (lb/hr) x 1,545 x (Temp. (°F)+ 460°F)] / [Molecular weight x 2116.8] / 60 min/hr				
Mass flow (lb/hr)	2,487,000	2,457,000	2,418,000	2,353,000
Temperature (°F)	1,200	1,200	1,200	1,200
Molecular weight	28.42	28.40	28.35	28.26
Volume flow (acfm)- calculated	1,766,795	1,747,217	1,722,019	1,681,491
(ft^3/s)- calculated	29,447	29,120	28,700	28,025
Diameter (ft)	22	22	22	22
Velocity (ft/sec)- calculated	77.5	76.6	75.5	73.7
Stack Flow Conditions				
Velocity (ft/sec) = Volume flow (acfm) / [((diameter)² /4) x 3.14159] / 60 sec/min				
Mass flow (lb/hr)	2,487,000	2,457,000	2,418,000	2,353,000
HRSG Stack Temperature (°F)	256	259	264	268
Molecular weight	28.42	28.40	28.35	28.26
CT volume flow (acfm)	761,744	756,777	751,049	737,121
Diameter (ft)	19	19	19	19
Velocity (ft/see)- calculated	44.8	44.5	44.1	43.3

Note: Universal gas constant = 1,545 ft-lb(force)/°R; atmospheric pressure = 2,116.8 lb(force)/ft²; 14.7 lb/ft^3

Source: GE, 2004 - CT Performance Data; Golder Associates, 2004

Table A-14. Maximum Emissions for Criteria Pollutants for FPL Turkey Point Combined-Cycle Expansion Project
GE Frame 7FA, Dry Low NOx Combustor, Distillate Oil, 50% Load

Parameter	Turbine Inlet Temperature			
	35 °F	59 °F	75 °F	95 °F
	Case 36	Case 35	Case 34	Case 33
Particulate from CTand SCR				
Total PM_{10} = PM_{10} (front half) + PM_{10} ($(NH_4)_2SO_4$) from SCR only				
a. PM_{10} (front half) (lb/hr)				
CT- provided	17.0	17.0	17.0	17.0
b. PM_{10} ($(NH_4)_2SO_4$) from SCR only = Sulfur trioxide from conversion of SO_2 converts to ammonium sulfate (= PM_{10})				
Particulate from conversion of SO_2 = SO_2 emissions (lb/hr) x conversion of SO_2 to SO_3 x lb SO_3/lb SO_2 x conversion of SO_3 to $(NH_4)_2SO_4$ x lb $(NH_4)_2SO_4$/ lb SO_3				
SO_2 emission rate (lb/hr)- calculated	2.0	1.9	1.8	1.7
Conversion (%) from SO_2 to SO_3	9.8	9.8	9.8	9.8
MW SO_3/ SO_2 (80/64)	1.3	1.3	1.3	1.3
Conversion (%) from SO_3 to $(NH_4)_2(SO_4)$	100	100	100	100
MW $(NH_4)_2$ SO_4/ SO_3 (132/80)	1.7	1.7	1.7	1.7
SCR Particulate (lb/hr)- calculated	0.40	0.38	0.37	0.35
CT emission rate (lb/hr) [a]	17.0	17.0	17.0	17.0
Total HRSG stack emission rate (lb/hr) [a + b]	17.4	17.4	17.4	17.4
(lb/mmBtu, HHV)	0.0136	0.0141	0.0146	0.0154
Sulfur Dioxide				
SO_2 (lb/hr)= Fuel oil (lb/hr) x sulfur content(% weight) x (lb SO_2 /lb S) /100				
Fuel oil Sulfur Content	0.0015%	0.0015%	0.0015%	0.0015%
Fuel oil use (lb/hr)	65,802	63,452	61,250	57,736
lb SO2 / lb S (64/32)	2	2	2	2
Emission rate (lb/hr)- calculated	2.0	1.9	1.8	1.7
Nitrogen Oxides				
NOx (lb/hr) = NOx (ppmvd@ 15% O_2) x {[20.9 x (1-Moisture (%)/100] - Oxygen, dry(%)} x 2116.8 lb/ft^2 x Volume flow (acfm) x 46 (mole. wgt NOx) x 60 min/hr / [1545 x (CT temp.(°F) + 460) x (20.9-15) x 1,000,000 (adj. for ppm)]				
CT/DB, ppmvd @15% O_2	42	42	42	42
Moisture (%)	10.21	10.38	10.65	11.37
Oxygen (%)	11.40	11.54	11.64	11.73
Turbine Flow (acfm)	1,766,795	1,747,217	1,722,019	1,681,491
Turbine Exhaust Temperature (°F)	1,200	1,200	1,200	1,200
CT/DB Emission rate (lb/hr)	211.0	203.7	196.4	185.2
CT/DB Emission rate (lb/hr)(provided)	211.0	203.0	196.0	185.0
CT emission rate, ppmvd @ 15% O_2	42	42	42	42
CT emission rate (lb/hr)	211.0	203.7	196.4	185.2
HRSG Stack, ppmvd @ 15% O_2	8	8	8.0	8.0
HRSG Stack Emission rate (lb/hr)	40.2	38.8	37.4	35.3
Carbon Monoxide				
CO (lb/hr) = CO(ppm) x [1 - Moisture(%)/100] x 2116.8 lb/ft^2 x Volume flow (acfm) x 28 (mole. wgt CO) x 60 min/hr / [1545 x (CT temp.(°F) + 460°F) x 1,000,000 (adj. for ppm)]				
Basis, ppmvd	20	20	20	20
Moisture (%)	10.21	10.38	10.65	11.37
Turbine Flow (acfm)	1,766,795	1,747,217	1,722,019	1,681,491
Turbine Exhaust Temperature (°F)	1,200	1,200	1,200	1,200
HRSG Exhaust Temperature (°F)	28	28	28	28
Emission rate (lb/hr)	44.0	43.4	42.7	41.3
Emission rate (lb/hr)- provided	44.0	43.0	43.0	41.0

Table A-14. Maximum Emissions for Criteria Pollutants for FPL Turkey Point Combined-Cycle Expansion Project
GE Frame 7FA, Dry Low NOx Combustor, Distillate Oil, 50% Load

Parameter	Turbine Inlet Temperature			
	35 °F	59 °F	75 °F	95 °F
	Case 36	Case 35	Case 34	Case 33
Volatile Organic Compounds				
VOCs (lb/hr) = VOC(ppmvd) x 2116.8 lb/ft^2 x Volume flow (acfm) x 16 (mole. wgt as methane) x 60 min/hr / [1545 x (CT temp.(°F) + 460°F) x 1,000,000 (adj. for ppm)]				
Basis, ppmvw	3.5	3.5	3.5	3.5
Moisture (%)	10.21	10.38	10.65	11.37
Turbine Flow (acfm)	11.40	11.54	11.64	11.73
Turbine Exhaust Temperature (°F)	1,766,795	1,747,217	1,722,019	1,681,491
HRSG Exhaust Temperature (°F)	1,200	1,200	1,200	1,200
Emission rate (lb/hr)	4.90	4.85	4.78	4.66
Emission rate (lb/hr)- provided	5.00	5.00	5.00	4.50
Sulfuric Acid Mist				
Sulfuric Acid Mist (lb/hr)= SO_2 emission (lb/hr) x Conversion to H_2SO_4 (% by weight)/100				
CT SO_2 emission rate (lb/hr) - provided	2.0	1.9	1.8	1.7
CT Conversion to H_2SO_4 (% by weight) - provided	20	20	20	20
DB SO_2 emission rate (lb/hr) - provided	0	0	0	0
DB Conversion to H_2SO_4 (%) - provided	20	20	20	20
Emission rate (lb/hr)- calculated	0.39	0.38	0.37	0.35
Lead				
Lead (lb/hr) = Basis (lb/10^{12} Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/10^{12} Btu				
Emission Rate Basis (lb/10^{12} Btu)	14	14	14	14
Emission rate (lb/hr)	0.0169	0.0163	0.0158	0.0149

Note: ppmvd= parts per million, volume dry; O_2= oxygen.

Source: GE, 2004 - CT Performance Data; Golder Associates, 2004

Table A-15. Regulated and Hazardous Air Pollutant Emission Factors and Emissions for FPL Turkey Point Combined-Cycle Expansion Project when Firing Natural Gas

Parameter	Emission Rate (lb/hr) firing Natural Gas for Operating Conditions of Base Load (1)			Natural Gas Maximum Annual Emissions (TPY) (2)	
Ambient Temperature (°F):	59 °F	59 °F w/DB	75 °F w/DB	59 °F	59 °F
			Peak	1	4
HIR (MMBtu/hr):	1,785	2,335	2,381	CT/HRSG	CTs/HRSGs
Sulfuric acid mist	0.98	1.29	1.31	4.8	19.0
HAPs (Section 112(b) of Clean Air Act)					
1,3-Butadiene	0.000767	0.001004	0.001024	0.0037	0.0148
Acetaldehyde	0.0714	0.0934	0.0952	0.3447	1.38
Acrolein	0.0114	0.0149	0.0152	0.0552	0.221
Benzene	0.0214	0.0280	0.0286	0.1034	0.414
Ethylbenzene	0.0571	0.0747	0.0762	0.2758	1.103
Formadehyde	0.389	0.509	0.519	1.8788	7.52
Naphthalene	0.00232	0.00304	0.00310	0.0112	0.0448
Polycyclic Aromatic Hydrocarbons (PAH) (3)	0.00393	0.00514	0.00524	0.0190	0.0758
Propylene Oxide	0.0518	0.0677	0.0691	0.2499	1.000
Toluene	0.0589	0.0770	0.0786	0.2844	1.14
Xylene	0.114	0.149	0.152	0.5516	2.21
Antimony	0.0	0.0	0.0	0.00	0.00
Arsenic	0.0	0.0	0.0	0.00	0.00
Beryllium	0.0	0.0	0.0	0.00	0.00
Cadmium	0.0	0.0	0.0	0.00	0.00
Chromium	0.0	0.0	0.0	0.00	0.00
Lead	0.0	0.0	0.0	0.00	0.00
Manganese	0.0	0.0	0.0	0.00	0.00
Mercury	0.0	0.0	0.0	0.00	0.00
Nickel	0.0	0.0	0.0	0.00	0.00
Selenium	0.0	0.0	0.0	0.00	0.00
HAPs (Total)	0.782	1.023	1.044	5.04	15.1

(1) Emissions based on the following emission factors and conversion factors for firing natural gas:

Emission Factors		Value	Reference
Sulfuric acid mist		5	%; Conversion of SO_2 to SO_3 in gas turbine
1,3-Butadiene	(a)	0.43	lb/10^{12} Btu; AP-42,Table 3.1-3. EPA 2000
Acetaldehyde		40	lb/10^{12} Btu; AP-42,Table 3.1-3. EPA 2000
Acrolein		6.4	lb/10^{12} Btu; AP-42,Table 3.1-3. EPA 2000
Benzene		12	lb/10^{12} Btu; AP-42,Table 3.1-3. EPA 2000
Ethylbenzene		32	lb/10^{12} Btu; AP-42,Table 3.1-3. EPA 2000
Formadehyde		218	lb/10^{12} Btu; AP-42,Table 3.1-3. EPA 2000. Database
Naphthalene		1.3	lb/10^{12} Btu; AP-42,Table 3.1-3. EPA 2000
Polycyclic Aromatic Hydrocarbons (PAH)		2.2	lb/10^{12} Btu; AP-42,Table 3.1-3. EPA 2000
Propylene Oxide	(a)	29	lb/10^{12} Btu; AP-42,Table 3.1-3. EPA 2000
Toluene		33	lb/10^{12} Btu; AP-42,Table 3.1-3. EPA 2000. Database
Xylene		64	lb/10^{12} Btu; AP-42,Table 3.1-3. EPA 2000
Antimony		0.00E+00	
Arsenic		0.00E+00	
Beryllium		0.00E+00	
Cadmium		0.00E+00	
Chromium		0.00E+00	
Lead		0.00E+00	
Manganese		0.00E+00	
Mercury		0.00E+00	
Nickel		0.00E+00	
Selenium		0.00E+00	

(a) Based on 1/2 the detection limit; expected emissions are lower.

(2) Annual emissions based on ambient temperature of 59 °F firing natural gas for following hours: 5,880
2,480
400

(3) Assumed to be representative of Polycyclic Organic Matter (POM) emissions, a regulated HAP.

Table A-16. Regulated and Hazardous Air Pollutant Emission Factors and Emissions for FPL FPL Turkey Point Combined-Cycle Expansion Project when Firing Dist

Parameter	Emission Rate (lb/hr) Firing Distillate Fuel Oil (1)	Maximum Annual Emissions (TPY)			
	Base Load	Distillate Fuel Oil (2)		Natural Gas (4)	Natural Gas and Fuel Oil (5
Ambient Temperature (°F):	59 °F				
		1	4	4	4
HIR (MMBtu/hr):	1,939	CT/HRSG	CTs/HRSGs	CTs/HRSGs	CTs/HRSGs
Sulfuric acid mist	0.6	0.15	0.6	19.0	18.5
HAPs (Section 112(b) of Clean Air Act)					
1,3-Butadiene	0.0310	0.0078	0.0310	0.0148	0.045
Acetaldebyde	0.00	0.00	0.00	1.38	1.3
Acrolein	0.00	0.00	0.00	0.221	0.21
Benzene	0.107	0.0267	0.1067	0.414	0.50
Ethylbenzene	0.00	0.00	0.00	1.103	1.04
Formadebyde	0.456	0.114	0.456	7.52	7.5
Naphthalene	0.0679	0.0170	0.0679	0.0448	0.110
Polycyclic Aromatic Hydrocarbons (PAH) (3)	0.0776	0.0194	0.0776	0.0758	0.15
Propylene Oxide	0.00	0.00	0.00	1.000	0.94
Toluene	0.00	0.00	0.00	1.14	1.1
Xylene	0.00	0.00	0.00	2.21	2.1
Antimony	0.00	0.00	0.00	0.00	0.0
Arsenic	0.0213	0.00533	0.0213	0.00	0.021
Beryllium	0.000601	0.000150	0.000601	0.00	0.00060
Cadmium	0.00931	0.00233	0.00931	0.00	0.0093
Chromium	0.0213	0.00533	0.0213	0.00	0.021
Lead	0.0271	0.00679	0.0271	0.00	0.027
Manganese	1.53	0.383	1.53	0.00	1.5
Mercury	0.00233	0.000582	0.00233	0.00	0.0023
Nickel	0.00892	0.00223	0.00892	0.00	0.0089
Selenium	0.0485	0.0121	0.0485	0.00	0.048
HAPs (Total)	2.41	0.803	2.41	15.1	16.7

(1) Emissions based on the following emission factors and conversion factors for firing distillate fuel oil:

Emission Factors		Value	Reference
Sulfuric acid mist		5	%; Conversion of SO_2 to SO_3 in gas turbine
1,3-Butadiene	(a)	16	lb/10^{12} Btu; AP-42,Table 3.1-4. EPA 2000
Acetaldebyde		0.0	
Acrolein		0.0	
Benzene		55	lb/10^{12} Btu; AP-42,Table 3.1-4. EPA 2000
Ethylbenzene		0.0	
Formadehyde		235	lb/10^{12} Btu; AP-42,Table 3.1-4. EPA 2000
Napbthalene		35	lb/10^{12} Btu; AP-42,Table 3.1-4. EPA 2000
Polycyclic Aromatic Hydrocarbons (PAH)		40	lb/10^{12} Btu; AP-42,Table 3.1-4. EPA 2000
Propylene Oxide		0.0	
Toluene		0.0	
Xylene		0.0	
Antimony		0.0	
Arsenic	(a)	11	lb/10^{12} Btu; AP-42,Table 3.1-5. EPA 2000
Beryllium	(a)	0.3	lb/10^{12} Btu; AP-42,Table 3.1-5. EPA 2000
Cadmium		4.8	lb/10^{12} Btu; AP-42,Table 3.1-5. EPA 2000
Chromium		11	lb/10^{12} Btu; AP-42,Table 3.1-5. EPA 2000
Lead		14	lb/10^{12} Btu; AP-42,Table 3.1-5. EPA 2000
Manganese		790	lb/10^{12} Btu; AP-42,Table 3.1-5. EPA 2000
Mercury		1.2	lb/10^{12} Btu; AP-42,Table 3.1-5. EPA 2000
Nickel	(a)	4.6	lb/10^{12} Btu; AP-42,Table 3.1-5. EPA 2000
Selenium	(a)	25	lb/10^{12} Btu; AP-42,Table 3.1-5. EPA 2000

(a) Based on 1/2 the detection limit; expected emissions are lower.

(2) Annual emissions based on ambient temperature of 59 °F and firing fuel oil at base 500 hours

(3) Assumed to be representative of Polycyclic Organic Matter (POM) emissions, a regulated HAP.

(4) Annual emissions based on maximum emissions presented for natural gas-firing

(5) Maximum total annual emissions bas 500 hours of firing fuel and remaining hours firing natural gas.