



November 19, 2007

Mr. Lee Hoefert  
Florida Department of Environmental Protection  
Southeast District Office  
Air Quality Program Administrator  
400 North Congress Ave., Suite 200  
West Palm Beach, Florida 33401

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BUREAU OF AIR REGULATION

Re: **FPL West County Energy Center**  
**PA 05-47A Conditions of Certification & PSD-FL-354 Air Permit**  
**Final Design Details for Cooling Tower**

Dear Mr. Hoefert,

Florida Power & Light Company (FPL) has selected GEA Power Cooling, Inc. (GEA) to construct the cooling tower at the West County Energy Center.

The Prevention of Significant Deterioration (PSD) permit Section III.C.1. reads:

"Cooling Tower: The permittee is authorized to install two new 26-cell mechanical draft cooling tower with the following nominal design characteristics: a circulating flow rate of 306,000 gpm; design hot/cold water temperatures of 105° F / 87° F; a design air flow rate of 1,500,000 per cell; a liquid-to-gas air flow ratio of 1.045; and drift eliminators. The permittee shall submit the final design details within 60 days of selecting the vendor."

In accordance with the condition above, FPL is hereby submitting final design details for the cooling towers. Enclosed please find the technical data sheet submitted to FPL by GEA.

Please note that the liquid-to-gas air flow ratio is lower in the design specifications (1.310) than in the permit language (1.045). Golder Associates has reviewed the cooling tower design data and the original modeling. Their analysis indicates that the lower liquid-to-gas air flow ratio does not affect the original modeling results.

Please let me know if you have any questions and/or require additional information. You can reach me at (561) 691-7518.

Sincerely,

Barbara P. Linkiewicz  
Director of Environmental Licensing

cc: Al Linero, FDEP Division of Air Resource Management  
Mike Halpin, FDEP Siting Office  
Tim Gray, FDEP SED  
James Stormer, PBC Health Department

Reference-Tech Section	Technical Data Required	Tech Fill-In Data
<b>E640</b>	<b>Low Voltage Induction Motors</b>	
E640	Bidder's Name	GEA Power Cooling, Inc.
E640	Motor manufacturer	Siemens, Reliance, or WEG
E640	Driven Equipment	Fan
E640	Design standards (e.g., NEMA/IEEE, IEC)	NEMA/IEEE
E640	Driven equipment maximum brake horsepower, hp	200
E640	Motor nameplate, hp	200
E640	Service factor (NEMA/IEEE motors only)	1.15
E640	Motor bearing type	Anti-Friction
E640	Motor efficiency at nameplate, hp, percent	95.5%
E640	Bearing lubrication system	Grease
E640	Space heater rating (watts / voltage / phase)	TBD / 220 / 1
<b>15651</b>	<b>Mechanical Draft Cooling Tower</b>	
<b>15651</b>	<b>GENERAL EQUIPMENT DATA</b>	
15651	Type, cross-flow or counterflow	Counterflow
15651	Model No.	544849-26B-33-FCF
15651	Number of cells	26
15651	Number of fans	26
<b>15651</b>	<b>Tower Dimensions (less stairs), ft</b>	
15651	Fan stack height	14
15651	Basin curb to fan deck height	49
15651	Basin curb to top of air inlet height	27
15651	Vertical waterfall height	28
15651	Circulating water riser inlet elevation	36
<b>15651</b>	<b>Counterflow towers</b>	
15651	Top fill to bottom of drift eliminators	7
15651	Top of drift eliminators to fan deck bottom	9
15651	Center line of water distribution pipe to spray nozzle exit	0.5
15651	Spray nozzle exit to top of fill	3.5
<b>15651</b>	<b>Basin Dimensions</b>	
15651	Column extension below basin curb, ft	4
15651	Number of concrete perimeter piers required	0
15651	Number of concrete interior piers required	0
<b>15651</b>	<b>Rectangular towers</b>	
15651	Basin inside length, ft	704
15651	Basin inside width, ft	108
<b>15651</b>	<b>Materials (by ASTM numbers)</b>	
15651	Structural framework	Fiberglass / Fire Retardant
15651	Fan deck	Fiberglass / Fire Retardant
15651	Casing	Fiberglass / Fire Retardant
15651	Fan stacks	Fiberglass / Fire Retardant
15651	Fill	PVC
15651	Fill support	Fiberglass / Fire Retardant
15651	Drift eliminators	PVC
15651	Drift eliminator support	Fiberglass / Fire Retardant
15651	Louvers	Fiberglass / Fire Retardant
15651	Wall partitions	Fiberglass / Fire Retardant
15651	Wind walls	Fiberglass / Fire Retardant
15651	Stairs and walkways	Fiberglass / Fire Retardant
15651	Water distribution header	Fiberglass / Fire Retardant
15651	Water distribution header support	Fiberglass / Fire Retardant
15651	Water distribution nozzles or orifices	Polypropylene
15651	Mechanical drive support	Epoxy Coated Steel
15651	Exterior ladders	Fiberglass / Fire Retardant
15651	Interior ladders	Fiberglass / Fire Retardant
15651	Fan	Fiberglass Blades

Reference Tech Section	Technical Data Required	Tech Fill-In Data
15651	Fan hub	Epoxy Coated Steel
15651	Fan hub cover	Fiberglass / Fire Retardant
15651	Gear speed reducer case	Epoxy Coated Steel
15651	Oil fill drainline	316 SS
15651	Drive shaft	Carbon Composite
15651	Drive shaft coupling	316 SS
15651	Drive shaft guard	Epoxy Coated Steel
15651	Handrails	Fiberglass / Fire Retardant
15651	Anchor connectors	Silicon Bronze
15651	Casing fasteners	Silicon Bronze
15651	Louver fasteners	Silicon Bronze
15651	Mechanical drive support hardware	316 SS
15651	Gear speed reducer anchoring hardware	316 SS
15651	Drive shaft coupling hardware	316 SS
15651	Fan hardware	316 SS
15651	Counterflow tower	
15651	Water distribution laterals	Schedule 40 PVC
15651	Water distribution lateral supports	Fiberglass / Fire Retardant
15651	Fiberglass construction	
15651	Shear connectors	Fiberglass / Fire Retardant
15651	Joint connectors	Fiberglass / Fire Retardant
15651	Bolting	Silicon Bronze
15651	Washers	Silicon Bronze
15651	Nails	N/A
15651	<b>Miscellaneous</b>	
15651	Mechanical drive support	Epoxy Coated Steel
15651	Fiberglass casing weight, oz	16
15651	Fiberglass louver weight, oz	16
15651	Partition wall thickness, in.	16 oz
15651	Wind wall thickness, in.	16 oz
15651	<b>Stairways</b>	
15651	Number per tower	2
15651	Location	Endwalls
15651	Hardware	316 SS
15651	Description	Semi-Free Standing
15651	<b>Interior Ladders</b>	
15651	Number per tower	26
15651	Location	Fan deck to top of fill
15651	<b>Water Distribution</b>	
15651	Nozzle/orifice type/manufacturer	SP / CE Shepherd
15651	Number of nozzles/orifices per tower	7488
15651	Number of water inlet connections to tower	26
15651	Water inlet connection size, in.	30
15651	Header coating	N/A
15651	Header support method	Bottom
15651	Counterflow tower	
15651	Nozzle/orifice operating pressure, psi	1.3
15651	<b>Structure</b>	
15651	Column size, in. by in.	3 x 3
15651	Column spacing, ft	6 x 6
15651	Column load, maximum, lbf	5200
15651	Fill support member size, in. by in.	2 x 6
15651	Horizontal spacing of fill support members, ft	3
15651	<b>Fan deck</b>	
15651	Thickness, in.	1-1/8
15651	Maximum safe loading, lbf	75

Reference Tech Section	Technical Data Required	Tech Fill-In Data
15651	<b>Access Doors</b>	
15651	Number	26
15651	Size, in. by in.	30 x 30
15651	Location	Fan Deck
15651	<b>Air Inlet</b>	
15651	Gross air inlet area, per tower, ft2	37908
15651	Total louvered area, per tower, ft2	0
15651	Net air inlet area, per tower, ft2	37908
15651	<b>Louvers</b>	
15651	Number of louvers	2.5 Bay Width on Corners
15651	Vertical spacing between louvers, in.	N/A
15651	Blade angle from horizontal, degrees	45
15651	<b>Fill</b>	
15651	Type	Low Fouling Film
15651	Manufacturer	Brentwood
15651	Model No.	AFE20
15651	Volume of fill, per tower, ft3	331569
15651	Net fill plan area (cell plan area minus column and support obstructions), ft2	66044
15651	Maximum allowable continuous operating temperature, °F	135
15651	Minimum opening dimension, in.	0.787 x 2
15651	Effective cooling volume, per tower, ft3	324937
15651	Fill area density, ft2/ft3	48
15651	Estimated life of fill pack, years	20
15651	Guaranteed life of fill pack, years	5
15651	Support method	Bottom
15651	Support size, in. by in.	2 x 6
15651	Support coating	N/A
15651	Fill height	4.92
15651	Counterflow tower	
15651	Fill air	
15651	Splash type	
15651	Width, in.	N/A
15651	Thickness, in.	N/A
15651	Number of fill layers	N/A
15651	Fill orientation	N/A
15651	Film type	
15651	Individual fill pack dimensions, in. by in.	72 x 1.64 x 12
15651	Nominal sheet thickness before forming, in.	19 & 14
15651	Nominal sheet thickness after forming, in.	15 & 10
15651	Sheet spacing, in.	0.79
15651	Surface area, per tower, ft2	15915295
15651	<b>Drift Eliminators</b>	
15651	Type	Cellular
15651	Manufacturer	CE Shepherd
15651	Model No.	SDRU-Plus (DRU 1.5)
15651	Total area, per tower, ft2	67392
15651	Number of passes per layer	3
15651	Number of layers	1
15651	Depth per layer, in.	5.5
15651	Support method	Bottom
15651	Support size, in. by in.	2 x 4
15651	Support coating	N/A
15651	<b>Fire Spread Rating</b>	
15651	Fill	<5
15651	Drift eliminators	<5

Reference Tech Section	Technical Data Required	Tech Fill-In Data
15651	Fan deck and hot water basin	<25
15651	Fill supports	<25
15651	Fire wall partitions	<25
15651	Fan stacks	<25
15651	<b>Fans</b>	
15651	Manufacturer	Hudson
15651	Type	Axial
15651	Number of fans	26
15651	Blade diameter, in.	393.6
15651	Number of blades per fan	10
15651	Speed, rpm	115
15651	Tip speed, ft/min	11850
15651	First critical speed, rpm	36
15651	Second critical speed, rpm	72
15651	Estimated weight of each fan and hub assembly, lb	3220
15651	Design blade angle, degrees	11.8
15651	Maximum blade angle, degrees	Fan Power Limited
15651	Hub cover diameter, in.	72
15651	Inertia referred to motor, lb-ft <sup>2</sup>	59992
15651	Fan stack inlet diameter, in.	432
15651	Fan stack exit diameter, in.	419.6
15651	<b>Speed Reducers</b>	
15651	Manufacturer	Amarillo
15651	Model No.	1712
15651	Gear type	Right Angle
15651	Gear ratio	15.5:1
15651	Input speed, rpm	1780
15651	Efficiency, percent at full load	96%
15651	Zero load fraction at rated speed, hp	8
15651	Power rating, continuous, hp	414
15651	Service factor, AGMA	2.07
15651	Type of oil lubrication system	Mechanical Pump
15651	Case protective coating	Marine Grade Epoxy
15651	Minimum L-10 bearing life, hours	130,000
15651	Inertia of gearbox at highest motor speed, lb-ft <sup>2</sup>	250
15651	Inertia of gearbox at lowest motor speed, lb-ft <sup>2</sup>	N/A
15651	Weight of speed reducer, lb	2125
15651	<b>Drive Shaft Assembly</b>	
15651	Manufacturer	Addax
15651	Model No.	LRH850.825SS
15651	Diameter, in.	8.25
15651	Weight, lb (kg)	100
15651	Rated power at motor nameplate, hp	>400
15651	Shaft coupling manufacturer	Addax
15651	Shaft coupling type	Full Floating
15651	<b>Construction Crane Requirements</b>	
15651	Number of cranes	Cranes by Supplier
15651	<b>Construction Air Requirements</b>	
	Minimum pressure, psi	Construction air by Supplier
15651	<b>PERFORMANCE DATA</b>	The following performance data will be used in comparison and evaluation of bids and for the information of the Purchaser. The performance indicated shall be guaranteed.
15651	<b>Guaranteed Conditions (Heat Rate)</b>	
15651	Water loading at design flow conditions, gpm/ft <sup>2</sup>	4.51
15651	Design inlet wet-bulb temperature, F	67.31

Reference Tech Section	Technical Data Required	Tech Fill-in Data
15651	Design hot water temperature, F	91.9
15651	Design cold water temperature, F	75.76
15651	Design heat load, per tower, MMBtu/h	2388.95
15651	Design water flow, per tower, gpm	303810
15651	Maximum water flow, per tower, gpm	404067
15651	<b>Guaranteed Conditions (Output)</b>	
15651	Water loading at design flow conditions, gpm/ft2	4.51
15651	Design inlet wet-bulb temperature, F	81.04
15651	Design hot water temperature, F	105.11
15651	Design cold water temperature, F	86.14
15651	Design heat load, per tower, MMBtu/h	2807.83
15651	Design water flow, per tower, gpm	303810
15651	Maximum water flow, per tower, gpm	404067
15651	Average air velocities, ft/min	
15651	Through inlet	870
15651	Fill	516
15651	Drift eliminators	516
15651	Fan stack outlet	1414
15651	Fan ring	1607
15651	Water-to-air ratio (L/G) at design flow conditions	1.1310
15651	Cooling tower characteristic (KaV/L or KaY/L) at above stated water-to-air ratio (CTI basis for counterflow towers, Kelly basis for cross-flow towers)	2.1497
15651	Characteristic slope	0.6680
15651	Water losses, maximum guaranteed as a percent of design flow conditions, percent	
15651	Evaporation	1.72%
15651	Drift	0.0005%
15651	Total	1.72%
15651	Maximum allowable basin level fluctuation	N/A
15651	Static head measured between elevation of nozzle discharge orifice and normal operating water level, ft	37
15651	Distribution system losses, including friction, entrance, exit, and turning losses, ft	4
15651	Total pumping head measured above normal operating water level, ft	41
15651	Fan performance, each fan at design conditions	
15651	Motor terminal input power required (including allowance for fan, speed reducer, and motor inefficiencies), hp	207.3
15651	Motor shaft power, hp	198
15651	Airflow, cfm	1357912
15651	Air density at fan, lb/ft3	0.0698
15651	Total dynamic fan pressure	0.7454
15651	Static pressure drop, in. H2O	
15651	Inlet	0.2856
15651	Fill	0.2448
15651	Drift eliminators	0.0468
15651	Fan ring	0.0000
15651	Plenum	0.0332
15651	Velocity recovery	0.0410
15651	Other	0.0000
15651	Total	0.6104
15651	Fan discharge velocity head	0.1760
15651	Fan static efficiency, percent	63.9%
15651	Fan total efficiency, percent	84.1%

Reference Tech Section	Technical Data Required	Tech Fill-In Data
15651	Enthalpy of inlet air at design conditions on a dry air basis, Btu/lb	44.489
15651	Enthalpy of exit air at design conditions on a dry air basis, Btu/lb	64.218
15651	Temperature of exit air at design conditions, F	96.9
15651	Fan performance, each fan at off design conditions	
15651	Motor terminal input power required, kW	154.6
15651	Motor shaft power, hp	198
15651	<b>Acoustical Performance</b>	
15651	Guaranteed Overall A-Weighted Limits	
15651	Maximum overall A-weighted sound pressure level, dBA (re: 20 µPa), at any location measured at a distance as indicated on the Procurement Data Sheets from an end of the cooling tower	64 at 400 ft
		59 at 800 ft
15651	Maximum overall A-weighted sound pressure level, dBA (re: 20 µPa), at any location measured at a distance as indicated on the Procurement Data Sheets from a longitudinal side of the cooling tower	64 at 400 ft
		59 at 800 ft
15651	Expected Overall A-Weighted Limits	
15651	Maximum overall A-weighted sound pressure level, dBA (re: 20 µPa), at any location measured at a distance as indicated on the Procurement Data Sheets from an end of the cooling tower	64 at 400 ft
		59 at 800 ft
15651	Maximum overall A-weighted sound pressure level, dBA (re: 20 µPa), at any location measured at a distance as indicated on the Procurement Data Sheets from a longitudinal side of the cooling tower	64 at 400 ft
		59 at 800 ft
15651	<b>Construction Area</b>	
15651	Estimated onsite area, in addition to tower basin, required for laydown of material assuming optimum scheduling of component erection, ft <sup>2</sup>	101088
16501	<b>Lighting</b>	
16501	Type / Manufacturer / Model	
16501	Receptacles (if alternate to the specified types)	As specified
16501	Cordsets (if alternate to the specified types)	As specified
16501	Switches (if alternate to the specified types)	As specified
16501	Lighting fixtures (if alternate to the specified types)	As specified
16935	<b>Lightning Protection</b>	
16935	Structure to be protected	Cooling Tower
16935	Air terminals	
16935	Description	Aluminum Rod
16935	Quantity	TBD / As required by code
16935	Conductor	
16935	Description	Aluminum
16935	Quantity	TBD / As required by code
16935	All other hardware and connectors included in the lightning protection system for the structure	<b>Description/Manufacturing/Model No./Quantity</b>
16935	Item	
16935	1	
16935	2	
16935	3	