Florida Power & Light Company, 6501 S. Ocean Drive, Jensen Beach, FL 34957

March 17, 2012

L-2012-113
10 CFR 50.90

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Re: St. Lucie Plant Unit 2
Docket No. 50-389
Renewed Facility Operating License No. NPF-16

Response to Request for Additional Information Identified During Audit of the Loss of Coolant Accident Safety Analyses Calculations for the Extended Power Uprate License Amendment Request

References:

(1) R. L. Anderson (FPL) to U.S. Nuclear Regulatory Commission (L-2011-021), "License Amendment Request for Extended Power Uprate," February 25, 2011, Accession No. ML110730116.

(2) NRC Reactor Systems Branch Audit Conducted at Westinghouse Electric Company Facilities in Rockville, MD, February 22 and 23, 2012.

By letter L-2011-021 dated February 25, 2011 [Reference 1], Florida Power & Light Company (FPL) requested to amend Renewed Facility Operating License No. NPF-16 and revise the St. Lucie Unit 2 Technical Specifications (TS). The proposed amendment will increase the unit's licensed core thermal power level from 2700 megawatts thermal (MWt) to 3020 MWt and revise the Renewed Facility Operating License and TS to support operation at this increased core thermal power level. This represents an approximate increase of 11.85% and is therefore considered an extended power uprate (EPU).

During the course of the NRC staff audit conducted at the Westinghouse Electric Company (Westinghouse) facilities in Rockville, MD on February 22 and 23, 2012 [Reference 2], the NRC staff requested additional information related to the loss of coolant accident (LOCA) safety analyses calculations used in the St. Lucie Unit 2 EPU license amendment request (LAR).

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Additional information related to the small break LOCA and large break LOCA events was requested. The attachment to this letter contains the responses to the requests for additional information for these events.

This submittal contains no new commitments and no revisions to existing commitments.

This submittal does not alter the significant hazards consideration or environmental assessment previously submitted by FPL letter L-2011-021 [Reference 1].

In accordance with 10 CFR 50.91(b)(1), a copy of this letter is being forwarded to the designated State of Florida official.

Should you have any questions regarding this submittal, please contact Mr. Christopher Wasik, St. Lucie Extended Power Uprate LAR Project Manager, at 772-467-7138.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge.

Executed on 17-March-2012

Very truly yours,

Richard L. Anderson
Site Vice President
St. Lucie Plant

Attachment

cc: Mr. William Passetti, Florida Department of Health

**Response to Request for Additional Information
Identified During Audit of the EPU LAR
Loss of Coolant Accident Safety Analyses Calculations**

The following information is provided by Florida Power & Light (FPL) in response to the U. S. Nuclear Regulatory Commission's (NRC) Request for Additional Information (RAI). This information was requested to support the review of the Extended Power Uprate (EPU) License Amendment Request (LAR) for St. Lucie Unit 2 submitted to the NRC by FPL via letter L-2011-021 dated February 25, 2011, Accession Number ML110730116.

The NRC Reactor Systems Branch conducted an audit of the St. Lucie Unit 2 EPU loss of coolant accident (LOCA) safety analyses calculations at the Westinghouse Electric Company (Westinghouse) facility in Rockville, MD on February 22 and 23, 2012. Additional information related to the small break loss of coolant accident and large break loss of coolant accident events was requested.

The responses to the request for additional information related to these events are provided below.

Small Break Loss of Coolant Accident (SBLOCA) Break Spectrum

Perform a sensitivity study with additional break sizes to demonstrate the adequacy of the break spectrum reported in LAR Attachment 5, Section 2.8.5.6.3.3. The additional break size results are to be reported and compared to the LAR break size results.

Response

A spectrum of three break sizes, 0.04, 0.05, and 0.06 ft^2 breaks in the reactor coolant pump (RCP) discharge leg, was analyzed in the SBLOCA EPU analysis. The RCP discharge leg is the limiting break location because it maximizes the amount of spillage from the emergency core cooling system (ECCS). The limiting SBLOCA, the 0.05 ft^2/pump discharge (PD) break, is the largest break size for which the hot rod cladding heatup transient is terminated solely by injection from a high pressure safety injection (HPSI) pump and a charging pump. The analysis of the 0.04 ft^2/PD break demonstrates that break sizes smaller than the limiting break experience less and later core uncovery and, therefore, are less limiting. The analysis of the 0.06 ft^2/PD break demonstrates that breaks larger than the limiting break size are sufficiently large to allow injection from the safety injection tanks (SITs), in conjunction with the injection from a HPSI and charging pump, to recover the core and terminate the heatup of the cladding before the cladding temperature approaches the peak cladding temperature (PCT) of the limiting 0.05 ft^2/PD break SBLOCA.

The PCTs in Table SBLOCA-1 for the 0.04, 0.05, and 0.06 ft^2/PD breaks are based on the rod internal pressure which maximizes PCT by initiating clad rupture around the time of no rupture PCT. The calculated maximum PCT includes the adverse effect of clad rupture. Additional rupture PCT sensitivity cases were performed for a 0.045 ft^2/PD break (with SIT injection not credited) and for a 0.055 ft^2/PD break (with SIT injection credited). The PCT reported in Table SBLOCA-1 for the 0.045 ft^2/PD falls between the PCT for the 0.04 ft^2/PD and 0.05 ft^2/PD breaks. Likewise, the PCT for the 0.055 ft^2/PD falls between the PCT for the 0.05 ft2/PD and 0.06 ft^2/PD breaks.

Prior to the rupture cases that determined the PCTs that included the adverse effect of clad rupture for the 0.04, 0.05, and 0.06 ft^2/PD breaks, preliminary no rupture PCT cases were performed in the SBLOCA EPU analysis. The preliminary no rupture PCT break spectrum cases were performed for 0.040, 0.045, 0.050, 0.055, and 0.060 ft^2/PD break sizes. These no rupture cases were used to define the break sizes and SIT actuation condition (credited or not credited) used in the rupture PCT cases. This spectrum includes the limiting break and break sizes, smaller and larger, that have results that support the determination of the limiting break size. Additional no rupture PCT sensitivity cases were performed for a 0.03 ft^2/PD break (with SIT injection not credited) and for a 0.07 ft^2/PD break (with SIT injection credited). The PCT reported in Table SBLOCA-2 for the 0.03 ft^2/PD falls below the PCT for the 0.04 ft^2/PD break. Likewise, the PCT for the 0.07 ft^2/PD falls below the PCT for the 0.06 ft^2/PD break.

The results presented in Tables SBLOCA-1 and SBLOCA-2 confirm that the break sizes of 0.04, 0.05, and 0.06 ft^2/PD used in the analysis are appropriate for the break spectrum analysis and the 0.05 ft^2/PD break is the limiting break size for the EPU SBLOCA.

TABLE SBLOCA-1
SBLOCA ECCS PERFORMANCE ANALYSIS RESULTS
EPU ANALYSIS (WITH CLADDING RUPTURE)

Break Size ft^2/PD	Peak Cladding Temperature (PCT) °F
0.04	1810
0.045	1846
0.05	1903
0.055	1896
0.06	1839

TABLE SBLOCA-2
SBLOCA ECCS PERFORMANCE ANALYSIS
SUMMARY OF BREAK SPECTRUM RESULTS FOR NO RUPTURE PCT STUDY(1)

	Break Size - ft^2/PD							
	0.030	**0.040**	**0.045**	**0.050**	**0.050**	**0.055**	**0.060**	**0.070**
PCT (°F)	1576.34	1765.96	1792.38	1832.97	1830.84	1820.03	1778.50	1563.37
Time of PCT (sec)	2899.20	2084.21	1915.10	1808.41	1768.31	1567.41	1399.60	1199.61
SIT Injection Time (sec)(2)	N/A not credited	~2488.9 not credited	~2036.7 not credited	~1766.1 not credited	~1766.1 credited	~1564.9 credited	~1397.4 credited	~1197.0 credited

NOTES

(1) PCT does not include the adverse effect of clad rupture.

(2) Reactor coolant system pressure is 499.7 psia for SIT actuation.

Large Break Loss of Coolant Accident (LBLOCA)

Submit a sensitivity study by means of a fuel rod thermal conductivity penalty to increase the initial stored energy in the core to determine the change in the initial stored energy that is needed to bring the first peak of the cladding temperature response (blowdown peak cladding temperarure (PCT)) to the level of the reflood PCT.

Response

The end of life LBLOCA limiting case is the 0.6 DEG/pump discharge (PD). The blowdown PCT is 1425°F. The reflood PCT is 2057°F. The FATES3B data corresponding to this limiting case is at 41 GWd/MTU. The FATES3B data used for the fuel rod thermal conductivity parametric studies documented in this letter correspond to 65 GWd/MTU.

Gradual reduction of the fuel rod thermal conductivity from the reference case by means of a multiplier on the fuel rod thermal conductivity calculated with a Lyon's type correlation yields the blowdown PCT results, hot spot initial fuel average temperature, and initial centerline temperature shown in Table LBLOCA-1.

TABLE LBLOCA-1
THERMAL CONDUCTIVITY DEGRADATION (TCD)
PARAMETRIC STUDY

TCD %	Blowdown PCT °F	Initial Fuel Average Temperature °F	Initial Centerline Temperature °F
0	1425	1856	2931
5	1447	1915	3065
10	1476	1981	3213
15	1509	2056	3380
20	1553	2141	3566
25	1604	2238	3775
30	1671	2349	4008
35	1802	2476	4268

The maximum fuel rod thermal conductivity degradation used in the parametric study was 35%. Calculations were not performed beyond this value due to code problems encountered during initialization. The results of the calculations presented in Table LBLOCA-1 show that the blowdown PCT remains well below the reflood PCT, even with 35% degradation of thermal conductivity.