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

April 16, 2012

L-2012-163
10 CFR 50.90

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

Re: St. Lucie Plant Unit 1
Docket No. 50-335
Renewed Facility Operating License No. DPR-67

Response to NRC Nuclear Performance and Code Review Branch Request for Additional Information Regarding Extended Power Uprate License Amendment Request

References:

(1) R. L. Anderson (FPL) to U.S. Nuclear Regulatory Commission (L-2010-259), "License Amendment Request (LAR) for Extended Power Uprate," November 22, 2010, Accession No. ML103560419.

(2) Email from T. Orf (NRC) to C. Wasik (FPL), "SL1," April 5, 2012.

By letter L-2010-259 dated November 22, 2010 [Reference 1], Florida Power & Light Company (FPL) requested to amend Renewed Facility Operating License No. DPR-67 and revise the St. Lucie Unit 1 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 their review and as provided in the April 5, 2012 email [Reference 2], NRC staff in the Nuclear Performance and Code Review Branch requested information to support their review of the EPU License Amendment Request (LAR). The attachment to this letter transmits the requested information.

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-2010-259 [Reference 1].

A001
NRR

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 April 16, 2012

Very truly yours,

FOR RLA

Richard L. Anderson
Site Vice President
St. Lucie Plant

Attachment

cc: Mr. William Passetti, Florida Department of Health

Response to NRC Nuclear Performance and Code Review Branch Request for Additional Information

By letter L-2010-259, dated November 22, 2010, Accession Number ML103560419, Florida Power & Light (FPL) requested to amend the St. Lucie Unit 1 Renewed Facility Operating License to increase the licensed core thermal power level from 2700 megawatts thermal (MWt) to 3020 MWt, which constitutes an extended power uprate (EPU).

By email from T. Orf (NRC) to C. Wasik (FPL), "SL1," dated April 5, 2012, NRC staff in the Nuclear Performance and Code Review Branch requested information to support their review of the EPU License Amendment Request (LAR). One new request was transmitted in the email. The NRC's request, paraphrased by FPL, and response are provided below.

Request

As part of the NRC review of the St. Lucie Unit 1 EPU submittal, NRC staff requests information similar to that provided in St. Lucie Unit 2 LR Section 2.8.5.6.3.6, specifically including LR Figure 2.8.5.6.3-75 for St. Lucie Unit 1.

Response

St. Lucie Unit 2 LAR Attachment 5, Section 2.8.5.6.3.6 documents the Realignment Guideline Procedures, i.e., the decay heat removal portion of the long term cooling analysis. Portions of the information contained in this section have previously been provided to the NRC in the response to RAI SNPB-15 (FPL letter L-2011-442, dated October 20, 2011, Accession Number ML11297A198). The following information is provided in this response, to fulfill the NRC request to provide information for St. Lucie Unit 1 similar to the information contained in St. Lucie Unit 2 LR Section 2.8.5.6.3.6:

1. A write-up containing the same type of information provided in the results of St. Lucie Unit 2 LR Section 2.8.5.6.3.6, beyond what has previously been provided for St. Lucie Unit 1 in the response to SNPB-15;

2. Table 1 documents information for St. Lucie Unit 1 similar to what is provided in LR Table 2.8.5.6.3-16 for St. Lucie Unit 2;

3. Table 2 documents information for St. Lucie Unit 1 similar to what is provided in LR Table 2.8.5.6.3-17 for St. Lucie Unit 2;

4. Figure 1 documents information for St. Lucie Unit 1 similar to what is provided in LR Figure 2.8.5.6.3-75 for St. Lucie Unit 2.

The long term cooling plan for the EPU analysis included the selection of the largest small break and the smallest large break at the decision time for a 2 atmospheric dump valve (ADV) steam generator (SG) cooldown with a cooldown rate of ≥30 °F/hr. For a cooldown rate of 30 °F/hr, the time that the shutdown cooling (SDC) entry temperature of 325 °F was reached was 11.5 hours. The associated Condensate Storage Tank (CST) inventory used at 11.5 hours was 209,500 gallons. These results can be found in Table 1.

Using these results, the two criteria to show acceptable results for long term cooling (i.e., cooling of small breaks and cooling of large breaks, as discussed below) were fulfilled. The following paragraphs describe the successful fulfillment of these two criteria.

Fulfilling Criteria 1 / Small Breaks

The CST emptied after 14 hours post-LOCA, and SGs were conservatively modeled to be lost as heat sinks at 14 hours, with a decision time of 12 hours. Furthermore, the SDC entry temperature of 325 °F was met at 11.5 hours, which occurred before the decision time. Thus, any break which refills prior to 12 hours was small enough such that SDC could be entered successfully. From Table 2, breaks 0.024 ft2 and smaller were shown to have refilled prior to 12 hours, thus employing the SDC system was the appropriate success path. The difference between 12 hours and 14 hours (time that the SGs are lost as heat sinks) preserved time for operators to initiate SDC. It should be noted that per plant Emergency Operating Procedures (EOPs), the operator is directed to ensure that pressurizer level is at least 30% prior to entering SDC. Thus, this analytical approach is conservative relative to the EOPs, since the analytical approach assumes that the pressurizer is water solid, not just 30% full.

Fulfilling Criteria 2 / Large Breaks

In order to demonstrate that this analytical approach covered all break sizes, it was shown that breaks 0.013 ft2 and larger are large enough such that the break flow and simultaneous hot and cold side injection is adequate to remove decay heat and prevent boric acid precipitation in the long term. Decay heat removal for the long term was shown for the break sizes for which the core does not uncover after the SGs are lost as heat sinks. (The reactor coolant system (RCS) begins to increase in pressure and temperature after the SGs are lost as heat sinks, i.e., termination of heat transfer to the SGs. A break that is too small to fulfill Criteria 2 is characterized by the core uncovering due to this pressurization and the resulting reduction in safety injection (SI) flow.)

From Table 2, break sizes 0.013 ft2 and larger showed that the core does not uncover after 14 hours, and thus these breaks fulfill Criteria 2.

From the analytical approach presented above, decay heat removal and boric acid precipitation prevention was achieved by the SDC system for breaks 0.024 ft^2 and smaller, and by simultaneous hot and cold side injection for breaks 0.013 ft^2 and larger. Hence, using the results of RCS inventory / pressurizer level, there is an overlap of break sizes such that an acceptable path was assured (i.e., either SDC or maintaining hot and cold side injection), as shown in Figure 1.

Table 1

SUMMARY OF RESULTS FOR THE DECAY HEAT REMOVAL ANALYSIS

EPU Analysis

CENPD-254-P-A Methodology Modified by the Waterford Approach

Parameter	EPU Result
Minimum SG/RCS cooldown rate	30 °F/hr
Shutdown cooling entry temperature	325 °F
Minimum time CST empties/SGs are lost as heat sinks	14 hours
Maximum time that Shutdown Cooling entry temperature can be reached	11.5 hours
CST inventory used at time SDC entry temperature was reached	209,500 gallons
Break Spectrum	
Smallest Large Break	0.013 ft^2
Largest Small Break	0.024 ft^2
Decision time	12 hours

Table 2

SUMMARY OF RESULTS FOR CELDA BREAK SPECTRUM For The Decay Heat Removal Analysis

CELDA Case No.	Break Size (ft^2)	Refill Time (sec / hr)[1]	Core Uncovers after 14 hr?[2]
11B	0.035	(3)	No
1B	0.030	49617 / 14.1	No
2B	0.025	42923 / 12.2	No
3B	**0.024**	**41811 / 11.9**	**No**
4B	0.020	37740 / 10.8	No
5B	0.015	32846 / 9.4	No
6B	0.014	31798 / 9.1	No
7B	**0.013**	**30691 / 8.8**	**No**
10B	0.012	29542 / 8.5	Yes
8B	0.010	27045 / 7.8	Yes
9B	0.005	19667 / 5.7	(4)

Notes:

(1) Refill time is listed in units of seconds after start of CELDA and hours after start of LOCA. The CELDA start time is 1000 seconds after the start of the LOCA.

(2) Fourteen hours is when steam generator heat transfer is terminated in the CELDA cases.

(3) Refill was not calculated to occur.

(4) This case was terminated at 15 hours because the break area is too small for CELDA to handle the re-pressurization that occurs after SG heat transfer is terminated. However, based on the trend, the 0.005 ft^2 break will uncover after 14 hours.

Figure 1

**Overlap of Acceptable LTC Procedures
In Terms of Cold Leg Break Size**