Florida Power & Light, 9760 S.W. 344 St. Homestead, FL 33035

FPL.

SEP 30 2011

L-2011-415
10 CFR 50.90

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555-0001

Re: Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251
Response to NRC Nuclear Performance and Code Review Branch
Request for Additional Information Regarding Extended Power Uprate
License Amendment Request No. 205

References:

(1) M. Kiley (FPL) to U.S. Nuclear Regulatory Commission (NRC) (L-2010-113), "License Amendment Request for Extended Power Uprate (LAR-205)," Accession No. ML103560169, October 21, 2010.

(2) Email from J. Paige (NRC) to T. Abbatiello (FPL), "Turkey Point EPU - Nuclear Performance and Code Review (SNPB) Request for Additional Information - Round 1.2 (Part 2)," Accession No. ML11111A150, April 19, 2011.

(3) M. Kiley (FPL) to U.S. Nuclear Regulatory Commission (L-2011-170), "Response to NRC Request for Additional Information Regarding Extended Power Uprate License Amendment Request No. 205 and Nuclear Performance and Code Review Issues," Accession No. ML11143A010, May 19, 2011.

(4) M. Kiley (FPL) to U.S. Nuclear Regulatory Commission (L-2011-278), "Response to NRC Request for Additional Information Regarding Extended Power Uprate License Amendment Request No. 205 and Nuclear Performance and Code Review (SNPB) Issues," Accession No. ML11214A103, July 29, 2011

(5) Email from J. Paige (NRC) to S. Hale (FPL) "Turkey Point EPU - Nuclear Performance and Code Review (SNPB) Request for Additional Information - Round 2.2 (Part 2)," Accession No. ML11236A286, August 24, 2011.

(6) M. Kiley (FPL) to U.S. Nuclear Regulatory Commission (L-2011-350), "Response to NRC Request for Additional Information Regarding Extended Power Uprate License Amendment Request No. 205 and Nuclear Performance and Code Review (SNPB) Issues," September 14, 2011.

By letter L-2010-113 dated October 21, 2010 [Reference 1], Florida Power and Light Company (FPL) requested to amend Renewed Facility Operating Licenses DPR-31 and DPR-41 and revise Turkey Point (PTN) Units 3 and 4 Technical Specifications (TS). The proposed amendment will increase each unit's licensed core power level from 2300 megawatts thermal (MWt) to 2644 MWt and revise the Renewed Facility Operating Licenses and TS to support operation at this increased core thermal power level. This represents an approximate increase of 15% and is therefore considered an extended power uprate (EPU).

By email dated April 19, 2011 [Reference 2], the NRC Project Manager (PM) requested additional information to support continued review of the EPU LAR by NRC SNPB staff. The Request for Additional Information (RAI) consisted of five questions regarding detailed technical inputs and design information related to the EPU boron precipitation analysis. FPL responded to the NRC RAI via letter L-2011-170, dated May 19, 2011 [Reference 3].

A001
NRR

During an NRC audit of the calculations for the PTN boric acid precipitation analyses held on July 11, 2011, the NRC requested additional information pertaining to assumptions and modeling techniques. FPL provided the requested information in letter L-2011-278, dated July 29, 2011 [Reference 4].

By email dated August 24, 2011 [Reference 5], the NRC PM provided a follow-up RAI to FPL's Reference 3 response. The RAI consisted of one question with five parts pertaining to redundancies available in PTN's safety injection system and to probabilistic risk assessment (PRA) modeling details of long term core cooling with repeated transitions between hot leg and cold leg recirculation. FPL responded to the NRC requests via letter L-2011-350, dated September 14, 2011 [Reference 6].

During a follow-up NRC audit of the calculations for the PTN boric acid precipitation analyses held on September 20, 2011, the NRC requested further information pertaining to assumptions and modeling techniques. FPL's response to the NRC's question is presented in the Attachment to this letter.

This submittal does not alter the significant hazards consideration or environmental assessment previously submitted by FPL letter L-2010-113 [Reference 1].

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

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

Should you have any questions regarding this submittal, please contact Mr. Robert J. Tomonto, Licensing Manager, at (305) 246-7327.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on September 30, 2011.

Very truly yours,

Michael Kiley
Site Vice President
Turkey Point Nuclear Plant

Attachment

cc: USNRC Regional Administrator, Region II
USNRC Project Manager, Turkey Point Nuclear Plant
USNRC Resident Inspector, Turkey Point Nuclear Plant
Mr. W. A. Passetti, Florida Department of Health

Turkey Point Units 3 and 4

RESPONSE TO NRC NUCLEAR PERFORMANCE AND CODE REVIEW BRANCH
RAI REGARDING EPU LAR NO. 205

ATTACHMENT

RAI RESPONSE

Response to Request for Additional Information

The following information is provided by Florida Power and Light Company (FPL) in response to the U. S. Nuclear Regulatory Commission's (NRC) Request for Additional Information (RAI). This information was requested to support License Amendment Request (LAR) 205, Extended Power Uprate (EPU), for Turkey Point Nuclear Plant (PTN) Units 3 and 4 that was submitted to the NRC by FPL via letter (L-2010-113) dated October 21, 2010 [Reference 1].

By email dated April 19, 2011 [Reference 2], the U.S. Nuclear Regulatory Commission (NRC) Project Manager (PM) requested additional information to support the continued review of the EPU LAR by NRC staff in the Nuclear Performance and Code Review Branch (SNPB). The RAI consisted of five questions regarding detailed technical inputs and design information related to the EPU boron precipitation analysis. FPL responded to the NRC requests via letter L-2011-170, dated May 19, 2011 [Reference 3].

During an NRC audit of the calculations for the PTN boric acid precipitation analyses held on July 11, 2011, the NRC requested additional information pertaining to assumptions and modeling techniques. FPL provided the requested information in letter L-2011-278, dated July 29, 2011 [Reference 4].

By email dated August 24, 2011 [Reference 5], the NRC PM provided a follow-up RAI to FPL's response in Reference 3. The RAI consisted of one question with five parts, pertaining to redundancies available in PTN's safety injection system and to probabilistic risk assessment (PRA) modeling details of long term core cooling with repeated transitions between hot leg and cold leg recirculation. FPL responded to the NRC requests via letter L-2011-350, dated September 14, 2011 [Reference 6].

During a follow-up NRC audit of the calculations for the PTN boric acid precipitation analyses held on September 20, 2011, the NRC requested further information pertaining to assumptions and modeling techniques. FPL's response to the NRC's question is presented below.

SNPB Technical Review Question

Please describe how boric acid precipitation is precluded for the spectrum of small breaks by using the alternating hot leg and cold leg injection strategy. The response should include the following elements:

- **At the limiting time of 5½ hours, switching all injection flow from cold leg to hot leg will flush the boric acid in the core.**
- **Provide the maximum pressure for adequate flushing flow at the time of HLSO.**
- **Assuming depressurization and cooldown was limited at 1 hour after event initiation to 50°F/hr cooldown rate, what is the maximum pressure you would expect to be at the time of hot leg switchover? Also show that the minimum injection flow is met.**

Turkey Point Unit 3 and Unit 4 utilize high head safety injection (HHSI) for cold leg and hot leg recirculation. For the EPU, there will be two HHSI pumps injecting into the cold legs during cold leg recirculation and two HHSI pumps injecting into the hot legs during hot leg recirculation. The cycling initiation times for alternating between cold leg recirculation and hot leg recirculation are provided in Table 1.

In order to assess the adequacy of the HHSI pump flow to flush the core of boric acid at the initial hot leg switchover time (HLSO) time of 5.5 hours for the entire spectrum of break sizes, hot leg recirculation flow for a cold leg break was assessed for elevated pressures. It is shown that at a reactor coolant system (RCS) pressure of ~1200 psia or less there is adequate hot leg recirculation flow to flush the boric acid in the core (Table 2).

All small break LOCAs large enough to lose single or two-phase natural circulation in the RCS will depressurize to the main steam safety valve (MSSV) setpoint within one hour after event initiation. The MSSV setpoint for the Turkey Point units is 1144.7 psia (1130 psig) which is lower than the pressure (1214.7 psia) for which sufficient hot leg recirculation flushing flow is assured for cold leg breaks. Assuming the RCS is at the MSSV setpoint pressure of 1144.7 psia (561°F saturation temperature) at one hour after event initiation and assuming a 50°F/hr cooldown rate, the RCS would be at 111.8 psia (336°F saturation temperature) 5.5 hours after event initiation. The relief system will choke at low pressures; however, this is well below the maximum pressure (1214.7 psia) for which sufficient flushing flow is assured.

It has been concluded that:

- At the limiting time of 5½ hours, switching all injection flow from cold leg to hot leg flushes the boric acid in the core.
- The maximum pressure for adequate flushing flow at the time of HLSO is 1214.7 psia.
- Assuming depressurization and cooldown was limited at 1 hour after event initiation to 50°F/hr cooldown rate, the maximum pressure would be ~112 psia and the minimum injection flow requirement for flushing boric acid from the core is met.

Table 1 Cycling Initiation Times for Cold Leg and Hot Leg Recirculation

	CLR #1	HLR #1	CLR #2	HLR #2	CLR #3
Cycling Time[1]	**45 min**	**5.5 hrs**	**17 hrs**	**33 hrs[2]**	**49 hrs[2]**

(1) All cycling times reported from the start of the transient.

(2) Cycling shall occur on a maximum of 16 hour intervals for the remainder of the transient.

Table 2 Hot Leg Recirculation Flushing Flow at a HLSO time of 5.5 Hours

Pressure (psia)	Boil-off[1] (gpm)	Available Flow[2] (gpm)	Flushing Flow[3] (gpm)	Ratio[4]
1214.7	**205**	**228**	**23**	**1.1**

(1) Generated using Appendix K decay heat. The recirculation fluid temperature is assumed to be 212°F at the associated pressure.

(2) Available flow is based on the limiting precipitation scenario (i.e., cold leg break) for hot leg recirculation. The hot leg recirculation flow represents two HHSI pumps taking suction from the RHR discharge and injecting into hot leg A and hot leg B with no lines spilling.

(3) (Flushing Flow) = (Available Flow) – (Boil-off).

(4) A ratio of 1.1 or greater assures that the flushing flow is sufficient to flush the core of high concentration boric acid.

References

1. M. Kiley (FPL) to U.S. Nuclear Regulatory Commission (L-2010-113), "License Amendment Request for Extended Power Uprate (LAR 205)," Accession No. ML103560169, October 21, 2010.
2. Email from Jason Paige (NRC) to Tom Abbatiello (FPL), "Turkey Point EPU - Nuclear Performance and Code Review (SNPB) Request for Additional Information - Round 1.2 (Part 2)," Accession No. ML11111A150, April 19, 2011.
3. M. Kiley (FPL) to U.S. Nuclear Regulatory Commission (L-2011-170), "Response to NRC Request for Additional Information Regarding Extended Power Uprate License Amendment Request No. 205 and Nuclear Performance and Code Review Issues," Accession No. ML11143A010, May 19, 2011.
4. M. Kiley (FPL) to U.S. Nuclear Regulatory Commission (L-2011-278), "Response to NRC Request for Additional Information Regarding Extended Power Uprate License Amendment Request No. 205 and Nuclear Performance and Code Review (SNPB) Issues," Accession No. ML11214A103, July 29, 2011.
5. Email from Jason Paige (NRC) to Steve Hale (FPL) "Turkey Point EPU - Nuclear Performance and Code Review (SNPB) Request for Additional Information - Round 2.2 (Part 2)," Accession No. ML11236A286, August 24, 2011.
6. M. Kiley (FPL) to U.S. Nuclear Regulatory Commission (L-2011-350), "Response to NRC Request for Additional Information Regarding Extended Power Uprate License Amendment Request No. 205 and Nuclear Performance and Code Review (SNPB) Issues," September 14, 2011.