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

FPL

September 8, 2011

L-2011-368
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 NRC Request for Additional Information (RAI) Regarding 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) Email from T. Orf (NRC) to C. Wasik (FPL), "St. Lucie 2 draft RAIs on MUR portion (EICB)," August 5, 2011.

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).

By email from the NRC Project Manager dated August 5, 2011 [Reference 2], additional information related to the proposed use of a Cameron CheckPlus leading edge flow meter (LEFM) was requested by the NRC staff in the Instrumentation & Controls Branch (EICB) to support their review of the EPU LAR. The request for additional information (RAI) identified three questions. The response to these RAIs is provided in Attachment 1 to this letter.

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

A001
NRR

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

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

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 08-September-2011

Very truly yours,

Richard L. Anderson
Site Vice President
St. Lucie Plant

Attachment

cc: Mr. William Passetti, Florida Department of Health

Response to Requests for Additional Information

The following information is provided by Florida Power & Light in response to the U.S. Nuclear Regulatory Commission's (NRC) Request for Additional Information (RAI). This information was requested to support Extended Power Uprate (EPU) License Amendment Request (LAR) for St. Lucie Nuclear Plant Unit 2 that was submitted to the NRC by FPL via letter (L-2011-021), February 25, 2011, Accession No. ML110730116.

In an email dated August 5, 2011 from NRC (Tracy Orf) to FPL (Chris Wasik), Subject: St. Lucie 2 EPU – draft RAIs on MUR portion (EICB), the NRC staff requested additional information regarding FPL's request to implement the Extended Power Uprate. The RAI consisted of three (3) questions from the NRC's Instrumentation and Controls Branch (EICB). These three RAI questions and the FPL responses are documented below.

EICB-5

Second paragraph in page 2.4.4-7 addresses NRC RIS 2002-03 item I.1.F.ii "controlling software and hardware configuration." However, the licensee only describes the hardware and software configuration program of the Cameron LEFM CheckPlus system. Provide a brief description of your plant configuration programs and address how you plan to control this hardware and software configuration at the plant during installation, post-testing and maintenance.

Response

This response is focused on software control as applicable to RIS 2002-03 Guidance on the Content of Measurement Uncertainty Recapture Power Uprate Applications.

Software is controlled in accordance with FPL's Software Quality Assurance Program. This program utilizes a graded approach to provide software control requirements that are commensurate with importance to plant safety, regulatory commitments and corporate responsibility. Four Software Quality Assurance (SQA) classifications are defined: Level A pertaining to Safety Related functions, Level B pertaining to Regulatory and Quality Related functions, Level C pertaining to business critical or plant reliability functions and Level D pertaining to other less critical functions. Calorimetric power calculations are performed by the Distributed Control System (DCS) computer system. The results of the calorimetric are used to adjust the Nuclear Instrumentation Power Range channels in accordance with the Technical Specification Table 4.3-1, and to comply with the Operating License limits on reactor core power levels. In accordance with the grading scheme defined in the program, the DCS calorimetric software is classified as Level B. SQA program requirements for Level B software include: configuration control via the Master Software Index, Software Classification Determination, Software Quality Assurance Plan, Software Requirements Specification, Software Design Description, Software Verification and Validation Plan, Backup / Recovery Contingency Planning and QA Record Storage.

Hardware changes are controlled by a design change program. A computer based process governs it. The process applies to the development, processing, and control of Engineering Change - Design Change Packages for changes/modifications to power plant related Systems, Structures and Components (SSC). This program states that any DCP that introduces new software/firmware or modifies the digital configuration of an existing SSC is processed in accordance with the requirements outlined in the Software Quality Assurance Program, as

supplemented by applicable site-specific procedures. Any DCP that introduces new digital equipment or modifies the digital configuration of an existing SSC shall be processed in accordance with defined Cyber Security program requirements.

EICB-6

Page 2.4.4-15, Table 2.4.4-1 indicates that the steam enthalpy uncertainty is 0.0225% by pressure and 0.0087% by moisture carryover. The sum of these two values (0.0312%) is less than the minimum uncertainty value [0.07%] listed in the ER-157P, Revision 5, which assumed zero moisture carryover. What assumptions are made and what is the value of steam quality used in the calorimetric uncertainty calculation? Explain and justify why the uncertainty value of steam enthalpy is conservative in the calorimetric uncertainty calculation with your steam quality assumption.

Response

Uncertainty associated with steam generator moisture carryover (MCO) has been conservatively addressed in the LEFM based calorimetric uncertainty analysis. Actual moisture carryover for the Unit 2 steam generators, following their replacement, was measured using tracer gas test methodology. The measured MCO was 0.032% and 0.007% for the 2A and 2B steam generators respectively. The uncertainty of the MCO test results was calculated by the tracer gas test vendor to be 0.011% and 0.005% for the 2A and 2B steam generators respectively. The measured MCO values as discussed above are used in the calorimetric calculations to compute steam enthalpy. A MCO uncertainty value of 0.01% is used. Thus, the basis of the MCO uncertainty term is greater than the tracer gas test uncertainty and is approximately half as large as the actual combined MCO for two steam generators (i.e., the average MCO of the two steam generators is 0.0195%).

In summary, the uncertainty analysis includes an assumption of 0.01% for MCO uncertainty, which is greater than the documented uncertainty from the tracer gas testing.

Steam Enthalpy (Pressure and Moisture) uncertainty terms are shown in Table B-1 of Cameron Engineering Report ER-740, Rev. 0 (provided as Appendix F to Attachment 5 of the LAR). They are 0.0087% for Steam Enthalpy/Moisture and 0.0225% for Steam Enthalpy/Pressure. The Steam Enthalpy/Moisture uncertainty is calculated by multiplying the assumed MCO uncertainty by the calorimetric power calculation MCO sensitivity factor. The Steam Enthalpy/Pressure uncertainty is calculated by multiplying the steam pressure measurement uncertainty by the calorimetric power calculation steam pressure sensitivity factor.

As documented in footnote 8 of Table A-1 of Cameron Engineering Report ER-157P, Revision 5, the "example" Steam Enthalpy/Pressure uncertainty of ±0.07% is based on an assumed steam pressure measurement uncertainty of ±15 psi. The difference in the Steam Enthalpy/Pressure uncertainty between the topical report (ER-157P) and the St. Lucie specific analysis is primarily the result of the reduced steam pressure measurement uncertainty (i.e., 5.4 psi versus15 psi). The lower St. Lucie specific steam pressure measurement uncertainty is attributable to utilizing three independent measurement channels on each of two steam headers (one transmitter is assumed to be out of service for the uncertainty calculation), with each loop limited to a Rosemount transmitter and a high accuracy computer I/O card. The difference in the Steam Enthalpy/Pressure uncertainty between the topical report (ER-157P) and the St. Lucie specific analysis also results from the use of independent instrumentation for each of the

two feedwater and steam headers at St. Lucie versus the single header considered in the topical report. The use of independent instrumentation for a two header configuration reduces the calorimetric power calculation steam pressure sensitivity factor due to the statistical combination of uncertainties. Also, as can be seen from the Mollier Diagram, the change in enthalpy for a change in pressure along the saturation line is smaller for the nominal St. Lucie steam pressure (894 psia) than for the pressure condition assumed in ER-157P (1000 psia). Thus, the plant specific calorimetric power calculation sensitivity to steam pressure measurement uncertainty is lower than the value used in ER-157P.

EICB-7

In page 2.4.4-7, Section I.5 "Out of Service Requirements," the licensee stated that allowed outage time [AOT] with the Cameron LEFM CheckPlus system out of service (OOS) will be 48 hours provided steady-state conditions persist. The licensee then described the LEFM CheckPlus system uncertainties under two conditions with LEFM system failure (with 0.46% and 0.5% uncertainties in page 2.4.4-9) and stated "If the 48-hour outage period is exceeded, then the plant will operate at a power level consistent with the accuracy of the alternate plant instruments" in page 2.4.4-10.

a. Provide a list of all OOS conditions in detail.

Response

The following LEFM Meter conditions are identified in the vendor user manual:

1. The following are conditions where an LEFM Meter Section (Plane) is considered in Maintenance (OOS) in which the minimum uncertainty (+/-0.30%) cannot be guaranteed, but increased uncertainties are applicable (see table in response "c" below):

- Meter Flatness Ratio (FR) out of bounds,
- Meter Swirl out of bounds,
- Feedwater pressure deviation out of limits,
- Feedwater Temperature deviation out of limits,
- Single Plane Failures:
  - Path Reject Failure,
  - Velocity of Sound (VOS),
  - High Gain,
  - Low Impedance,
  - Velocity Outlier,
  - Oscillator Failure,
  - Timing Errors,
  - No Program Setup found,
  - Bad Program Checksum Validation.

2. The following are conditions where an LEFM Meter is considered Out Of Service in which the minimum uncertainty (+/-0.30%) cannot be guaranteed:

   - Dual Plane Feedwater Pressure Lo/Hi,
   - Dual Plane Failure.

   In addition, loss of communication between the LEFM Central Processing Units (CPUs) and Distributed Control System (DCS) is considered another OOS condition.

3. The following are conditions that require investigation, but do not degrade the minimum calorimetric uncertainty:

   - Single Plane Failure (see above) and opposite Plane RTD Lo/Hi,
   - Dual Plane RTD Lo/Hi.

b. Clarify that you have same AOT (48 hours) with all OOS conditions, and will restrict plant power to less than or equal to 2968 MWt (98.30% of the proposed licensed power) if the plant experience a power change of greater than 10% during the 48-hour AOT period.

Response

The same AOT (48 hours) will be utilized for all failure modes as described in item 2a above. Plant power will be restricted to less than or equal to 2968 MWt (98.3% of the proposed licensed power of 3020 MWt) if the plant experiences a power change of greater than 10% during the 48-hour AOT period.

c. Provide detail information (prefer with a table) with the proposed licensed power percentage and maximum MWt under each OOS condition after the 48-hour outage period is exceeded.

Response

The 3020 MWt power is based on 0.30% uncertainty.

Maximum MWt	Total Power Uncertainty %	LAR Table 2.4.4-1
3020	0.30	System Fully Functional
3015▲	0.46	One Section of One LEFM in Maint.
3013▲	0.50	One Section of Both LEFMs in Maint.

Additionally, with any one of the two LEFM Meters OOS, the maximum MWt is limited to 2968 MWt following the 48 hour AOT.

▲ - Calculated by decreasing Maximum MWt by the additional uncertainty %.
e.g., (0.3% - 0.46%)* 3020= (- 0.16%)*3020= - 4.832.MWt, then rounded up to - 5.0 MWt for conservatism.