UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 23, 2010

Mr. Mano Nazar
Executive Vice President and
Chief Nuclear Officer
Florida Power and Light Company
P.O. Box 14000
Juno Beach, Florida 33408-0420

SUBJECT: ST. LUCIE PLANT UNIT NO. 1 – SUPPLEMENTAL INFORMATION NEEDED FOR ACCEPTANCE OF REQUESTED LICENSING ACTION REGARDING EXTENDED POWER UPRATE (TAC NO. ME3699)

Dear Mr. Nazar:

By letter dated April 16, 2010, Florida Power & Light Company (FPL) submitted a license amendment request for St. Lucie Unit 1 for a proposed amendment that would increase the licensed core power level from 2700 megawatt thermal (MWt) to 3020 MWt. The purpose of this letter is to provide the results of the U.S. Nuclear Regulatory Commission (NRC) staff's acceptance review of this amendment request that was performed to determine if there is sufficient technical information in scope and depth to allow the NRC staff to complete its detailed technical review. The acceptance review is also intended to identify whether the application has any readily apparent information insufficiencies in its characterization of the regulatory requirements or the licensing basis of the plant.

Consistent with Section 50.90 of Title 10 of the *Code of Federal Regulations* (10 CFR), an amendment to the license (including the technical specifications) must fully describe the changes requested, and following as far as applicable, the form prescribed for original applications. Section 50.34 of 10 CFR addresses the content of technical information required. This section stipulates that the submittal address the design and operating characteristics, unusual or novel design features, and principal safety considerations.

The NRC staff has reviewed your application and concluded that the information delineated in the enclosure to this letter is necessary to enable the staff to make an independent assessment regarding the acceptability of the proposed amendment in terms of regulatory requirements and the protection of public health and safety and the environment.

In order to make the application complete, the NRC staff requests that FPL supplement the application to address the information requested in the enclosure by July 30, 2010. This will enable the NRC staff to begin its detailed technical review.

On July 14, 2010, a telephone conference was held with your staff to provide clarification to the questions in the enclosure. An alternative response to questions Att. 8-2 and Att. 8-3 of the enclosure was discussed. With the alternative, FPL would provide bounding analyses and/or a discussion of current compensatory measures that will be in place until a revised criticality analysis can be completed and reviewed by the NRC staff. These bounding analyses and/or discussion of current compensatory measures would be conservative in approach so that they

would provide reasonable assurance of FPL's current compliance with 10 CFR 50.68 and allow the NRC staff to continue with its acceptance review of the license amendment request.

If the information responsive to the NRC staff's request is not received by the above date, the application will not be accepted for review pursuant to 10 CFR 2.101, and the NRC will cease its review actives associated with the application. Your response must include an acceptable alternative response to questions Att. 8-2 and Att. 8-3 as well as an acceptable response to all remaining questions in the enclosure. If the application is subsequently accepted for review, you will be advised of any further information needed to support the NRC staff's detailed technical review by separate correspondence.

The information requested and associated timeframe in this letter were discussed with Liz Abbott and Jim Connolly of your staff on June 17, June 24, July 6, and July 14, 2010.

If you have any questions, please contact the Project Manager, Tracy Orf, at (301) 415-2788.

Sincerely,

Tracy J. Orf, Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-335

Enclosure:
Request for Supplemental Information

cc w/encl: Distribution via Listserv

SUPPLEMENTAL INFORMATION NEEDED

AMENDMENT REQUEST

FLORIDA POWER & LIGHT COMPANY

ST. LUCIE PLANT UNIT NO. 1

DOCKET NO. 50-335

Electrical systems questions:

1. The licensee states in License Amendment Request (LAR) Attachment 5, page 2.3.1-10, that as a result of EPU [extended power uprate], localized areas located on the 43 foot elevation RAB [reactor auxiliary building] HVAC [heating, ventilation, and air conditioning] area have changed from a mild environment to a harsh environment. This change results in motor for supply fan (HVS-4A), motor for exhaust fan (HVE-6A), motor for damper (D-23) and motor for damper (D-24) in the RAB HVAC area requiring additional evaluation, or modification to resolve the EQ [environmental qualification] issue. The qualification issues related to the above items will be resolved prior to EPU implementation. The staff needs the EQ Analysis that shows the subject equipments are qualified in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.49 prior to commencing the detailed review.

2. The licensee states in LAR Attachment 5, Section 2.3.2.2.4.1 "Grid Stability," that a system impact study was performed in accordance with Florida Power & Light Company and Florida Reliability Coordinating Council requirements and North American Electric Reliability Corporation's Planning Standards. The staff needs supporting documentation to show that the offsite power system will continue to meet the requirements of General Design Criterion-17 following implementation of the proposed EPU.

3. The licensee states in LAR 2.3.5.1, "Regulatory Evaluation," for station blackout (SBO) that "during the NRC's [Nuclear Regulatory Commission's] 2007 Component Design Bases Inspection, the NRC concluded that the station must either verify by testing that AAC [alternate alternating current] can be made available within 10 minutes, or submit to the NRC a coping analysis that demonstrates the ability to cope for one hour with no ac power available. The analysis performed in support of this EPU submittal and described herein demonstrates the ability to cope for one hour with no ac power available. The one hour is assumed to start at the actual time of the SBO." The NRC inspection report identified two violations of NRC requirements regarding the lack of coping analysis and adequate testing to demonstrate capability of the cross-tie cables for the AAC source. The coping analysis must be submitted to the NRC for review.

Reactor systems questions:

The following items relate to the completeness of scope and sufficiency of information of the EPU licensing report:

1. Provide a comparison of safety-related mitigating systems available for the feedwater line break and the main steam line break.

Enclosure

2. Provide the analyses performed to demonstrate that reactor coolant system pressure and pressurizer liquid inventory are acceptable during the control rod withdrawal at power event, and that the trips credited in the accident evaluation continue to provide acceptable protection from this type of event at varying power levels under EPU conditions.

   Although the St. Lucie Unit 1 licensing basis indicates that the variable high-power trip will provide acceptable protection from this type of event, previous experience with power uprate requests has demonstrated that the uncontrolled control rod withdrawal at power event presents a challenge to both the departure from nucleate boiling ratio limits and the reactor coolant pressure boundary pressure limits. In particular, the transient has been shown to progress, when initiated from lower power levels, in such a manner that the pressure boundary integrity is challenged, either by overpressurization or by liquid level increases in the pressurizer. In some cases, plants that previously credited high-power trips have been required to credit additional, power dependent reactor trips as well as high pressurizer pressure trips.

3. Clarify whether the pressurizer fills with liquid water during the inadvertent opening of the pressurizer power operated relief valve (PORV) event. Also, describe (1) what terminates this transient and (2) what consideration is given to the long-term consequences of this event.

4. Please provide information to demonstrate that the assumed break geometry used as input to the boric acid precipitation analysis provides a limiting loop pressure drop at EPU conditions. Include comparative studies regarding the pressure drop characteristics of other, less limiting break geometries (e.g., double-ended break versus a slot break).

   The licensing report states that the selection of the height of the mixing volume was justified with supporting calculations accounting for the loop pressure drop between the core and the break. This is consistent with Item 2 of the clarification letter sent to J. A. Gresham, Westinghouse, regarding the withdrawal of NRC approval of CENPD-254-P, which states that the mixing volume is a variable quantity that increases with time, and that the analysis to determine boric acid concentration must account for the variation in the mixing region while considering the pressure drop in the loop. The loop pressure drop is dependent on the assumed break geometry. If a double-ended break on the cold leg were assumed, the loop pressure drop characteristics would be different from those assuming a slot break on the top of the cold leg.

The following questions relate to the completeness of scope, sufficiency of information, and regulatory basis of information provided in Attachment 8 of the EPU LAR:

Att. 8-1. The licensee benchmarked the MCNP4a computer code against critical benchmark experiments. However, none of those experiments included the actinides or fission products important to a spent nuclear fuel criticality analysis. The lack of criticality experiments containing actinides and fission products introduces gaps in the validation. Critical experiments containing actinides have been available to NRC licensees since November 2008, with the publishing of NUREG/CR-6979, "Evaluation of the French Haut Taux de Combustion (HTC) Critical Experiment Data." The NRC staff has stated that license applications submitted after the HTC

data became available would be expected to address the actinides in the validation. Provide information to demonstrate that the actinides have been addressed in the validation, either using the HTC data or data from another source. In addition, provide information to demonstrate that the validation gaps associated with the fission products have been addressed.

Att. 8-2. In Section 4 of HI-2104542, seventh bullet under the heading "Criteria and assumptions applicable to all analyses and storage areas," the text states, "For the initial spent fuel analysis, the bias uncertainty is based on the standard deviation of the mean, based on the guidance in [8]. The later calculations use a larger bias uncertainty, based on the standard deviation of the population." Section 50.68 of 10 CFR imposes a requirement, for both fresh and spent fuel storage, that the estimated k_{eff} must not exceed 0.95 at a 95-percent probability, 95-percent confidence level. The 95/95 requirement provides appropriate statistical assurance when applied not to the mean, but rather to a single calculation. Thus what is needed is the variance of the population about the mean, not the standard deviation of the mean. Provide a revised analysis that incorporates the variance of the population about the mean.

Att. 8-3. Table 7.6 of HI-2104542 includes information on the pre-EPU fuel. Please provide the following additional information regarding the pre-EPU fuel:

a) The k_{eff} rack-up information is provided for only a single burnup/enrichment point for a given storage configuration. Provide the k_{eff} rack-up information for the other burnup/enrichment points used to generate the loading curves.

b) Table 7.6 of HI-2104542 does not include the depletion uncertainty. Justify this omission.

Att. 8-4. In Table 7.7 of HI-2104542, as is the case for the pre-EPU fuel, the k_{eff} rack-up information is provided for only a single burnup/enrichment point for a given storage configuration. Provide the k_{eff} rack-up information for the other burnup/enrichment points used to generate the loading curves.

Att. 8-5. Section 7.7 of HI-2104542 discusses the effect of distributed enrichments. Provide the results of the analysis that showed that planar average enrichment results in higher reactivity as compared to actual enrichment distribution. Show that the variation in the enrichment distributions used at St. Lucie is covered.

Att. 8-6. Section 7.9 of HI-2104542 describes the axial burnup distribution used in the criticality analysis. From the text, it is not clear whether the assumed axial burnup distribution is based on core average axial burnup distribution or individual assembly burnup distributions. Use of core average axial burnup would minimize the importance of outliers that may have a significantly different axial burnup shape. Confirm that assembly-specific axial burnup distributions were utilized, or justify the use of core average axial burnup distributions. Provide the axial burnup distribution(s) used in the analysis.

Att. 8-7. Section 7.9 of HI-2104542 describes the use of Vessel Flux Reduction assemblies. Provide additional description of the Vessel Flux Reduction assembly including a drawing. Show that depletion of Vessel Flux Reduction assemblies does not result in higher reactivity in the assemblies depleted nearby.

Att. 8-8. Section 7.6 of HI-2104542 discusses the reactivity effects of Gadolinium. Provide the results of the calculation spanning the applicable U-235 enrichments, Gd loadings, Gd concentrations, and burnups. In addition, confirm that other integral (e.g., IFBA) and non-integral (e.g., WABA, WDR, CEA, Pyrex glass burnable absorbers, etc.) reactivity control devices have not been in use at St. Lucie. If they have been used, describe how the analyses address such use.

Att. 8-9. In Section 7.14.4.1 of HI-2104542, the licensee presents the case of a fuel assembly that could be misloaded into cells that were either intended to be empty or occupied by a fuel assembly that has a control element assembly (CEA). Provide an analysis of a case where the CEA might be accidently removed from the fuel assembly, thereby turning a low reactivity assembly into a high reactivity assembly.

would provide reasonable assurance of FPL's current compliance with 10 CFR 50.68 and allow the NRC staff to continue with its acceptance review of the license amendment request.

If the information responsive to the NRC staff's request is not received by the above date, the application will not be accepted for review pursuant to 10 CFR 2.101, and the NRC will cease its review actives associated with the application. Your response must include an acceptable alternative response to questions Att. 8-2 and Att. 8-3 as well as an acceptable response to all remaining questions in the enclosure. If the application is subsequently accepted for review, you will be advised of any further information needed to support the NRC staff's detailed technical review by separate correspondence.

The information requested and associated timeframe in this letter were discussed with Liz Abbott and Jim Connolly of your staff on June 17, June 24, July 6, and July 14, 2010.

If you have any questions, please contact the Project Manager, Tracy Orf, at (301) 415-2788.

Sincerely,

/RA/

Tracy J. Orf, Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-335

Enclosure:
Request for Supplemental Information

cc w/encl: Distribution via Listserv

DISTRIBUTION:

PUBLIC	RidsNrrDorl	RidsNrrPMStLucie
LPL2-2 r/f	RidsNrrDorlDpr	RidsOgcRp
RidsAcrsAcnw_MailCTR	RidsNrrDorlLpl2-2	RidsRgn2MailCenter
RidsNrrDeEeeb	RidsNrrLACSola	RidsNrrDssSrxb

ADAMS Accession No. ML102030096 **NRR-106**

OFFICE	LPL2-2/PM	LPL2-2/LA	LPL2-2/BC	LPL2-2/PM
NAME	TOrf	CSola by (BClayton)	DBroaddus by (EBrown)	TOrf
DATE	7/23/2010	7/23/2010	7/23/2010	7/23/2010

OFFICIAL RECORD COPY