From: Paige, Jason
Sent: Friday, March 18, 2011 10:46 AM
To: tom.abbatiello@fpl.com
Cc: Abbott, Liz; Tiemann, Philip; Hanek, Olga; jack.hoffman@fpl.com
Subject: Turkey Point EPU - Balance of Plant (SBPB) Request for Additional Information - Round 1

Tom,

Below are requests for additional information (RAIs) regarding the Turkey Point Extended Power Uprate license amendment request. On March 18, 2011, the Nuclear Regulatory Commission (NRC) staff and Florida Power & Light Company (FPL) discussed draft RAIs to gain a common understanding of the questions. During the call, it was concluded that questions SBPB-1.1, SBPB-1.5, and SBPB-1.6 needed clarification. The below RAIs reflect the questions discussed during the March 18, 2011, call. FPL agreed upon providing its responses within 30 days of the date of this email. If you have any questions, feel free to contact me.

SBPB-1.1 Section 2.5.1.2.2 of Attachment 4 to the license amendment request dated October 21, 2010, described protection against potential missiles originating from the turbine generator. Section 10.2.2, "Design Features – Turbine Controls," and Section 14.1.13, "Turbine Generator Design Analysis," of the Turkey Point Updated Final Safety Analysis Report (UFSAR) provided a description of the turbine control system, overspeed protective features, and turbine construction. In Supplements 3 and 8 to the preliminary safety analysis report, Florida Power & Light Company (FPL) discussed the potential for turbine missiles in response to AEC questions. Results of the turbine failure analysis indicated that due to the reliability and redundancy of the turbine overspeed protection system, the probability of turbine overspeed above the design value would be low.

Section 2.5.1.2.2.2.2 of Attachment 4 to the license amendment request specified that the following acceptance criteria would be pertinent to the Turkey Point Units 3 and 4 Turbine-Generator:

- The calculated overspeed at EPU conditions shall be less than the design overspeed value of 120%
- The probability of generating a turbine missile shall remain below the NRC guideline of 1 × 10-5 per year.

Although Attachment 4 included a list of considerations, the method of verifying that these acceptance criteria would be satisfied at EPU conditions was not specified. Describe how FPL determined the probability of generating a turbine missile will remain below the NRC acceptance criteria of 1 × 10-5 per year at EPU conditions.

SBPB-1.2 Section 2.5.1.3 of Attachment 4 to the license amendment request includes the following statement regarding the effect of changes in main feedwater operating conditions on the effects of postulated high energy line breaks:

> Main Feedwater System operating temperature has increased slightly due to the EPU while the previous pressure assumptions bound EPU operating conditions. Additionally, the replacement of the 6th Feedwater Heaters will result in resizing of the discharge piping from 18 inches to 24 inches. As a result, the jet impingement zones of influence are increasing due to EPU.

Explain the general methodology and assumptions used to determine jet impingement zones of influence. Clarify the relative effects of the temperature change and the discharge piping change on the zones of influence defined for the postulate breaks in the feedwater system at EPU conditions.

SBPB-1.3 Section 2.5.4.3 of Attachment 4 to the license amendment request explains that the intake cooling water salinity would increase at EPU conditions and that the maximum analyzed post-accident component cooling water (CCW) temperature would increase from 150°F to 157.8°F for EPU. This section also includes the following statement:

> The computer software, operability curves, and manual calculations used to verify heat exchanger operability, updated to reflect higher design basis accident heat loads at EPU and the effects on water properties due to increased salinity in the ICW water, will continue to ensure that the CCW heat exchangers will remain reliable and operable after the uprate.

Table 2.5.4.3-3, "CCW System Thermal Analysis Parameters for Postulated Accident," indicates a lower total tube heat transfer resistance would be assumed for EPU analyses (0.00285 °F-hr-ft^2/Btu) than was used for current analyses (0.0030 °F-hr-ft^2/Btu).

Explain how the effects of higher temperatures and salinity were considered with respect to potential increased fouling from calcium scale formation on the CCW heat exchanger tubes.

SBPB-1.4 Section 2.5.4.4 of Attachment 4 to the license amendment request explains that the average intake temperature is 2.5°F above the average ambient air temperature. It also describes that the closed cooling water canal system is a 13.2 mile long water circuit that takes 44 hours to transit and services Turkey Point Units 1, 2, 3 & 4. This section also includes the following information:

> The Ultimate Heat Sink will continue to provide the required water supply and heat sink capacity at EPU conditions; the Intake Cooling Water flow requirements for cooling of safety-related heat exchangers either do not change or decrease slightly. The maximum increase in cooled water temperature leaving the cooling canal system to return to the units is approximately 0.9°F, from 91.9°F to 92.8°F.

Since the return temperature is expected to increase, the staff does not consider the heat sink as one with effectively infinite capacity. Explain the methodology and assumptions used to determine the maximum increase in water temperature

supplied to the units. Address how any changes in meteorological conditions since original licensing (especially increases in maximum observed wet and/or dry bulb temperatures) were considered in the analysis.

SBPB-1.5 Section 2.12.1.2.3.2 of Attachment 4 to the license amendment request indicates that FPL will compare transient test data for tests listed in Table 2.12-2, "Large Plant Transient Tests in Turkey Point EPU Power Ascension Test Plan," against predictions provided by the same analytical models used in design verification for EPU. This section also includes the following statement:

> Any significant differences between predictions and test data will be evaluated and reconciled before proceeding with the power ascension.

The tests listed in Table 2.12-2 include a 10 percent ramp load change at 30 and 100 percent EPU power; and steam generator level/feedwater flow dynamic tests at 30, 87, and 95 percent EPU power.

Explain the scope of the analytical models (i.e., assumed boundary conditions, components explicitly modeled, and method of establishing response of individual control systems) and the criteria that would be employed to evaluate reconciliation of test results with model predictions prior to proceeding with power ascension.

SBPB-1.6 Section 2.12.1.2.6.2 of Attachment 4 to the license amendment request provides FPL's justification for exception to performance of certain tests, including the manual turbine trip from 100 percent power, which FPL described as a test to demonstrate that the control systems act together to maintain nuclear steam supply system parameters within design limits post-trip and to demonstrate that main steam safety valves (MSSVs) do not open. This section also includes the following statement:

> An analysis of a manual reactor trip from 100% EPU power was performed using the LOFTRAN code as described in LR Section 2.4.2. The post-trip results of the manual reactor trip are very similar to a manual turbine trip from 100% power conditions. The reactor trip from full power transient is initiated by a reactor trip followed by an automatic turbine trip on reactor trip in less than half a second. As such post-trip results are very similar.

The staff disagrees with the statement that the transient response of the plant to a reactor trip followed by an automatic turbine trip is similar to a transient initiated by a turbine trip. The additional half second of steam flow following the manual reactor trip significantly reduces the stored energy in the reactor coolant system and greatly reduces the likelihood that steam generator pressure would exceed the lowest setpoint of the MSSVs. Explain the measures taken to minimize challenges to the MSSVs for anticipated operational occurrences, such as turbine trips, and commit to additional testing demonstrating the adequacy of the measures or provide the assumptions, methodologies, and results for necessary supporting analyses demonstrating the adequacy of the measures.

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