NRR-PMDAPEm Resource

From: Paige, Jason
Sent: Thursday, September 08, 2011 11:15 AM
To: Hale, Steve
Cc: Abbott, Liz; Tiemann, Philip
Subject: Turkey Point EPU - Reactor Systems (SRXB) Request for Additional Information - Round 3

Steve,

Below are follow-up requests for additional information (RAIs) regarding the Turkey Point Extended Power Uprate license amendment request. On September 8, 2011, the Nuclear Regulatory Commission (NRC) staff and Florida Power & Light Company (FPL) discussed draft RAIs to gain a common understanding of the questions. The below RAIs reflect the questions discussed during the September 8, 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.

SRXB-3.1 SRXB-2.6 stated that there appears to be no information that addresses the effect of the EPU on heat exchanger fouling factors. It asked that FPL address the behavior of heat exchanger fouling factors due to the higher heat load, longer cooldown times, and greater differential temperatures. In its response, FPL established that the excess cooling capacity that is illustrated by the need for throttling early in cooldown establishes that fouling is not a concern during early cooldown. Further, the maintenance program and technical specification action requirement verifies that design basis heat loads will be removed at the time of the verification but does not ensure potentially increased fouling will not occur that affects cooldown rate later in the cooldown. FPL has not established that fouling will not extend the Turkey Point predicted cooldown times beyond acceptable limits. Provide information to substantiate that fouling is not a concern.

An example of an acceptable response would include an analysis that introduces fouling into the heat exchangers and establishes the amount of fouling that could be permitted while still achieving acceptable cooldown times. A comparison of this prediction to the existing allowance for fouling and operational experience could provide a quantitative assessment of allowance for fouling to support EPU operation; information that would support a judgment that residual heat removal (RHR) operability is reasonably ensured. A commitment for follow-up assessment based on the first cooldown from EPU conditions would provide substantiating data and margin between prediction and experience.

SRXB-3.2 SRXB-2.7 requested justification for the conclusion that the EPU has no effect on the ability of the RHR system to remove residual heat at reduced reactor coolant system (RCS) inventory, and, therefore, Turkey Point will continue to meet the current licensing basis requirements with respect to NRC Generic Letter 88-17. FPL's conclusion is essentially that a 15 percent increase in decay heat generation rate will have no effect on the RHR system operation during reduced inventory operation. FPL has not justified this conclusion.

As stated in SRXB-2.7, justify this conclusion in light of the increased decay heat generation rate that must be removed after shutdown. Include the effect on temperature, RHR flow rate including any limitations on flow rate as a function of RCS water level, and potential hot leg vortexing in your justification.

SRXB-3.3 SRXB-2.8 asked for a comparison of upper head temperatures predicted to exist during natural circulation cooldown for the existing power level and the proposed power level and requested that saturation temperature at the uppermost upper head elevation be included in the comparison. FPL did not provide this information for Turkey Point. Provide a table or graph that

shows maximum upper head temperature at the head / water interface, RCS pressure, and saturation temperature as a function of time starting at the time of reactor trip and ending at the time of RHR initiation.

SRXB-3.4 FPL states that "Table 2.8.7.2-4 ... shows ... Tavg decreases at approximately 25°F/hr as prescribed in the EOPs to insure head voiding doesn't occur." Table 2.8.7.2-4 illustrates cooldown at 1 hour with T_{ave} = 585 ºF. This corresponds to T_{ave} = 610 ºF at reactor trip at a cooldown rate of 25 ºF/hr; somewhat less than the vessel outlet temperature of 616.8 ºF in Table 2.8.3-1. Describe the reason for the difference in temperatures at the time of reactor trip.

SRXB-3.5 For Licensing Report Section 2.8.5.3.2, Reactor Coolant Pump Rotor Seizure and Reactor Coolant Pump Shaft Break, provide a plot of departure from nucleate boiling ratio versus time.

SRXB-3.6 The current Rotor Seizure analysis, as described in the Turkey Point FSAR, concludes that fewer than 10% of the fuel rods undergo departure from nucleate boiling, while the analysis also conservatively assumes that 10% of the fuel rods fail. The EPU submittal assumes no failed fuel and indicates that a fuel upgrade, an increased minimum measured flow (MMF), and a reduced FΔH are responsible for this reduction. Provide more detail on the changes that lead the EPU analyses to conclude that there is no fuel damage.

SRXB-3.7 Provide Reference 5 from the response to RAI 1.3.22. NS-NRC-89-3466 that contains the detailed summary of the technical analysis and licensing bases for the use of the 2700°F peak clad temperature limit as an acceptable criterion for coolability in non-LOCA events.

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