NRR-PMDAPEm Resource

From: Klett, Audrey
Sent: Monday, July 21, 2014 11:05 AM
To: Tomonto, Bob (Bob.Tomonto@fpl.com); Czaya, Paul (Paul.Czaya@fpl.com); 'Hanek, Olga' (Olga.Hanek@fpl.com)
Subject: Turkey Point 3 and 4 Request for Additional Information - LAR 231 (TACs MF4392 and MF4393)

Follow Up Flag: Follow up
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Bob, Paul, Olga,

By letter dated July 10, 2014, as supplemented by letter dated July 17, 2014, Florida Power & Light Company (the licensee) submitted a license amendment request for the Turkey Point Nuclear Generating Unit Nos. 3 and 4 (Turkey Point). The licensee requested revisions to the Turkey Point Technical Specifications (TSs), Section 3/4.7.4, "Ultimate Heat Sink [UHS]."

The U.S. Nuclear Regulatory Commission (NRC) staff reviewed the information provided by the licensee and determined that it needs additional information to complete the review. The NRC staff's request for additional information (RAI) is as follows.

BACKGROUND

In its letter dated July 10, 2014, the licensee stated that Turkey Point Units 1, 2, 3, and 4 use a closed system of cooling canals to support operation of the power plants. For nuclear units 3 and 4, the cooling canal system provides the coolant for the circulating water (CW) system and the UHS for the intake cooling water (ICW) system. The CW system provides cooling water to the main plant condensers. The ICW system removes heat loads from the component cooling water (CCW) system during normal and accident conditions to support both reactor and containment heat removal requirements and spent fuel cooling requirements.

The licensee proposed to revise the Turkey Point TSs to incorporate an increase in the maximum allowable UHS temperature contained in TS 3/4.7.4. Specifically, the proposed change would revise the UHS temperature limit in Technical Specification (TS) 3/4.7.4, Ultimate Heat Sink, from 100 degrees Fahrenheit (°F) to 104 °F. In addition, a new Surveillance Requirement (SR) would require more frequent UHS temperature monitoring (at least once per 6 hours) when UHS temperature exceeds 100ºF.

BALANCE OF PLANT (BOP) RAI-1

The licensee stated that the Turkey Point HX3/HX4 computer program determines CCW heat exchanger performance based on the conservation of energy equations for heat transfer between the ICW and CCW systems, and the performance equation for the heat exchanger. The heat gain to the ICW system is equal to the heat lost from the CCW system and is also equal to the heat transferred within the heat exchanger as described by the total surface area, the heat exchanger heat transfer coefficient, and the logarithmic mean temperature difference, LMTD.

The licensee further stated that in order to develop the HX3/HX4 computer program, a design basis case needs to be established. The program requires four inputs to define a design basis case: (1) CCW inlet temperature, (2) CCW outlet temperature, (3) ICW flow rate, and (4) heat load. The design basis case is determined by first finding the most limiting safety analysis case. Once the most limiting case is found, several iterations are performed on calculating the TR and maximum allowable temperatures. The design basis cases embedded in the program and verification cases are created to verify the CCW heat exchangers, at a minimum, remove the necessary heat for the corresponding safety and cool down scenarios at a given UHS temperature.

A. What is the peak required heat removal rate for the CCW heat exchangers from all accident analyses? Explain the peak heat removal rate in terms the removal rate per CCW heat exchanger and in terms of combined heat removal rate for the two CCW HX required per TS 3/4.7.2 Limiting Condition for Operation (LCO).

B. Does the HX3/HX4 program determine tube resistance (TR) for each CCW HX, or does it determine a combined TR for the two CCW HXs in service? Do the Turkey Point TR limits shown in Figure 3.5-1 of your submittal represent the TR per CCW HX or a combined effective TR for the two CCW HX in service? Explain this response in terms of inputs to the HX3/HX4 program (i.e., is Turkey Point inputting ICW flow and CCW flow to each CCW heat exchanger, or are the inputs for total flow?).

C. Is the HX3/HX4 Program Line as shown in Figure 3.5-1 of the submittal determined by the peak required heat removal rate provided in RAI-1.A above?

D. What is the tolerance, accuracy, or margin-of-error for the TR calculated by Turkey Point's HX3/HX4 program?

E. Are the CCW and ICW flow rates used as input to the HX3/HX4 program measured values in the field, or are they calculated values from flow analysis? In either case, what is the tolerance, accuracy, or margin-of-error for the CCW and ICW flow rates that are used?

F. For the TR limits shown in Figure 3.5-1, define how many CCW and ICW pumps are running.

G. What has been the typical TR immediately after putting a clean CCW heat exchanger in service during this current season for which the licensee is requesting an emergency TS change?

H. Is the HX3/HX4 program a safety-related program, and does it meet the quality assurance requirements of Title 10 of the *Code of Federal Regulations*, Part 50, Appendix B?

I. Describe the current Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment," program for the CCW heat exchangers. Explain how the licensee will continue to meet the acceptance criteria or performance monitoring criteria of the program for the increase in UHS to 104°F.

J. Discuss CCW HX tube plugging allowed, how the licensee controls the amount of tubes plugged, and how the licensee programmatically factors that into HX3/HX4.

K. Does this amendment request affect any other safety-related HX tube plugging allowances? Explain.

L. Section 9.3 of the Updated Final Safety Analysis Report states, "[T]he GOTHIC Computer Code, which was used in containment integrity analyses, was also used to conservatively calculate limiting CCW system and ICW system post-accident operating temperatures." Discuss the relationship between the calculation results of Gothic and HX3/HX4 for determining CCW HX performance and limits.

BOP RAI-2

The licensee stated that in June 2014, UHS temperatures almost approached the currently analyzed maximum temperature of 100 °F. Engineering and environmental analyses has determined that the cooling water heat transfer capability is diminished because of the presence of a higher-than-normal algae content. While immediate eradication of the algae is possible, there are biological impacts from a sudden algae die off and decay that must be mitigated and/or avoided. Thus, a controlled chemical treatment of the canal system over the course of several weeks is planned to gradually reduce the near-term algae content and improve heat transfer efficiency.

Surveillance Requirement 4.7.2 requires CCW HX performance testing at least once per 31 days. However, as described above, cooling water heat transfer capability is diminished because of the presence of a higher-than-normal algae content. Required testing every 31 days seems insufficient with higher than normal algae content.

A. Explain how often this SR should be performed under current algae conditions and what changes to SR 4.7.2 are needed.

B. How often during this season of higher than normal algae and the time of the request for an emergency TS change has the licensee found it necessary to clean and switch CCW HXs?

C. Explain how the licensee will account for the diminished heat transfer capability caused by the higher-than-normal algae concentration during the controlled chemical treatment that will last for several weeks.

D. Provide a discussion related to any possible negative effects on the plant's safety-related component, structures, and or systems caused by the higher-than-normal algae content.

BOP RAI-3

The licensee stated that a technical evaluation of the component cooling water system was also performed to determine if emergency containment cooling (ECC) system and containment spray (CS) system performance would be affected by the proposed change in UHS temperature. It was determined that adequate margin (emphasis added) exists in the CCW system such that post-accident CCW system supply and return temperatures would remain as currently analyzed in the containment integrity analyses. This ensures that the peak containment pressure is not altered by the proposed TS change. The technical evaluation confirmed that adequate CCW design margin (emphasis added) would remain under the proposed operating conditions to allow a reasonable degree of equipment degradation to occur while demonstrating that the affected safety-related components on the accident unit could continuously perform their design function as currently analyzed.

A. Describe the post-accident CCW supply and return temperature profiles as determined in Turkey Point's current Maximum Hypothetical Accident (MHA; loss-of-coolant accident (LOCA) and main steam line break (MSLB)) analysis when the UHS (ICW) is at 100 °F and in the MHA for the UHS (ICW) at 104 °F. Identify all differences between the two analyses including changes or additions in design inputs, assumptions, methodology, and conclusions.

B. Provide additional discussion related to the "adequate margin exists" terminology throughout the amendment request (for example, but not limited too), as it applies to pump net positive suction head). Please provide numerical values and specifically address those statements (for example, "the existing margin was 'x' and the new margin is now 'y'").

BOP RAI-4

The licensee stated that the proposed TS change increases the maximum allowable (measured) ICW system supply temperature from 100 °F to 104 °F. This change does not alter any assumptions on which the plant safety analysis is based. The affected components were originally designed with margin that allows for cooling water temperatures greater than the plant design basis of 100 °F, although no credit had previously been taken for this margin. A review of ICW system components between the ICW pumps and the CCW and turbine plant cooling water (TPCW) HXs was performed for the increased UHS analytical temperature of 104 °F. The specified design temperature for many of the components is 100 °F, which corresponds to the current UHS TS temperature limit. However, a review of information specific to the affected components indicates that all ICW components between the pump and the heat exchangers are rated for service temperatures well in excess of 100 °F. A review of ICW pump materials indicates that the projected 4 °F increase in process fluid would have an insignificant effect on the materials in contact with the fluid, including thermal expansion and material temperature service rating.

A. Provide additional discussion related to the specified design temperature of the ICW system. Specifically, provide a discussion that includes that an increased temperature review was performed on associated pumps seals, piping supports, spring cans, and pipe snubbers.

B. Provide additional justification relating to an increase in UHS/ICW temperature to non-safety-related components and systems that could lead to a reactor trip or cause flooding from components that are cooled by UHS/ICW.

BOP RAI-5

The licensee stated that the proposed TS change increases the maximum allowable UHS temperature for operation of Units 3 and 4. Adoption of the proposed TS change would allow continued plant operation provided the measured UHS/ICW temperature does not exceed 104 °F. The maximum allowable canal temperature would be 104 °F (analytical limit) minus the measurement instrument uncertainty.

The licensee uses the analytical limit as the TS measured limit, which does not account for measurement instrument uncertainty. Therefore, the actual UHS/ICW temperature may be greater than 104 °F. Justify or correct the proposed TSs.

Audrey Klett
Project Manager
NRR/DORL/LPLII-2
301-415-0489

Hearing Identifier: NRR_PMDA
Email Number: 1443

Mail Envelope Properties (Audrey.Klett@nrc.gov20140721110400)

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From: Klett, Audrey

Created By: Audrey.Klett@nrc.gov

Recipients:
"Tomonto, Bob (Bob.Tomonto@fpl.com)" <Bob.Tomonto@fpl.com>
Tracking Status: None
"Czaya, Paul (Paul.Czaya@fpl.com)" <Paul.Czaya@fpl.com>
Tracking Status: None
"'Hanek, Olga' (Olga.Hanek@fpl.com)" <Olga.Hanek@fpl.com>
Tracking Status: None

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