From: Paige, Jason
Sent: Tuesday, April 19, 2011 9:48 AM
To: Abbatiello, Tom
Cc: Abbott, Liz; Tiemann, Philip; Hoffman, Jack; Tomonto, Bob
Subject: Turkey Point EPU - Mechanical and Civil (EMCB) Request for Additional Information - Round 1

Tom,

Below are requests for additional information (RAIs) regarding the Turkey Point Extended Power Uprate (EPU) license amendment request. On March 31, 2011, the Nuclear Regulatory Commission (NRC) staff and Florida Power & Light Company (FPL) held a public meeting to discuss draft RAIs generated from various NRC technical branches while reviewing the October 21, 2010, EPU application. During the meeting, it was concluded that a follow-up call would be needed to discuss the mechanical and civil engineering (EMCB) RAIs in more detail since the licensee did not receive the RAIs in enough time before the March 31, 2011, meeting. On April 15, 2011, the NRC and FPL held a teleconference to discuss in more detail RAI EMCB-1.13. It was concluded during the call that the NRC staff would need to revise question EMCB-1.13 to be more specific. The below RAIs reflect the questions discussed during the March 31, 2011, meeting and April 15, 2011, teleconference. 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.

EMCB-1.1 In Section 1.0.4.5 of the licensing report (LR), it is mentioned that a supplemental heat exchanger will be added to maintain the design limits for the spent fuel pool (SFP) cooling system for the EPU conditions. The applicant is requested to address if any new piping additions are modifications to the existing piping due to the addition of a supplemental heat exchanger. In addition, the NRC staff requests that the applicant provide a summary of the piping stresses and supporting qualification results along with margins, as applicable.

EMCB-1.2 With respect to Section 1.0.4.6, the NRC staff requests that the applicant clarify if there are any increases in loadings to the emergency diesel generator (EDG) fuel supply and return lines and jacket water supply and cooling lines, due to the increase in EDG loading from the EPU.

EMCB-1.3 In Section 2.6.5.2.1, it was mentioned that the EPU increases the heat available for release to the containment, which increases the subsequent loads on the containment heat removal systems. The applicant is requested to clarify if the normal containment coolers (NCC) will be replaced with new larger capacity cooling units and address if these units are seismically qualified, and also address whether the supporting system for the cooling units will be redesigned. Provide a summary of the results, if this modification is required to support the EPU.

EMCB-1.4 In Section 2.2.1, the applicant is requested to clarify if the criteria for pipe rupture locations and associated dynamic effects for EPU considerations are the same as those of the current licensing basis (CLB). The applicant is also requested to clarify if the piping stresses utilized in break postulations include any local

stresses from integral pipe attachments and stresses from occasional or upset loadings, such as, steam hammer or water hammer, when applicable.

EMCB-1.5 In Section 2.2.2.1.2.3, it is mentioned that the maximum potential earthquake (MPE) seismic analyses performed for the reactor coolant loop (RCL) piping considered various primary equipment support activity. The applicant is requested to describe what is meant by "various primary equipment support activity."

EMCB-1.6 With regards to Table 2.2.2.1.1, the applicant is requested to add a note to describe how the MPE and loss of coolant accident (LOCA) results are combined for RCL (hot leg, cold leg, cross over leg) piping stresses.

EMCB-1.7 In Section 2.2.2.1 under the current licensing basis, it is described that Class I, Class III, and non-safety piping were designed to ASA B31.1-1955, with the exception of the pressurizer surge lines. It was also mentioned that the associated piping supports were designed to the requirements of AISC Manual of Steel Construction 1963 Edition. However, in Section 2.2.2.2.2.1 for EPU, the balance of piping (BOP) was evaluated based on ANSI B31.1 -1973 Edition through winter 1976 Addenda, and the supports were evaluated based on AISC Manual of Steel Construction 8th Edition. The applicant is requested to address if a Code reconciliation was performed for the differences between B31.1-1955 and B31.1-1973-1976, and AISC Manual 1963 Edition and the 8th Edition and its supporting bases.

EMCB-1.8 In Section 2.2.2.2.2.3 (a), it is mentioned that plant walkdowns were performed on portions of the BOP piping systems to review the piping layouts and support configurations to assess the adequacy of the dead weight spans and thermal flexibility. The applicant is requested to clarify if the above mentioned walkdowns are for non-analyzed or cook book supported or field routed small bore piping. (b) Five different computer programs, namely NUPIPE-SWPC, PC-PREPS, STEHAM-PC, WATHAM-PC, and ANSYS/Mechanical not currently described in the UFSAR were used to perform the EPU piping stress evaluation, piping welded attachment stress evaluation, and for the generation of fluid transient forcing functions. The applicant is requested to describe whether these programs are widely used in the nuclear industry or NRC-endorsed programs for similar applications. In addition, the applicant is requested to address which one of the above computer programs was utilized for the piping welded attachment local stress evaluation.

EMCB-1.9 Section 2.2.2.2.2.5 does not address the impact of EPU on containment penetration anchor qualification for any increase in loads due to thermal expansion, water hammer, steam hammer from temperature and flow rate increases, as applicable, in the affected systems, such as, main steam, feedwater, and component cooling water. The applicant is requested to address the qualification of containment penetration anchors, as applicable.

EMCB-1.10 With regards to Table 2.2.2.2-1 (PTN-3), (a) The applicant is requested to clarify if the stresses due to steam hammer fluid transient (FT) loading for the main steam line are based on a time history analysis; (b) In the second column of the table, under stress combination or as a note to the table, the applicant is

requested to provide the applicable allowable stress criteria (for example, similar to those allowable limits shown in Column 1 of Table 2.2.2.1-1); (c) In the second column of the table, there are several rows showing stress combination G+E (for stresses due to gravity G and thermal expansion E) and not P+G+E, and it is not clear why the pressure stress (P) is not included in this pipe stress combination, per the applicable code. The applicant is requested to explain this discrepancy; (d) The applicant is requested to clarify the allowable stresses and its reference for the pipe stress combinations G+P+ SRSS (OBE, FT), G+P+ SRSS (SSEE,FT), E; G+E. The applicant is requested to verify whether the allowable stress values listed in the 5th column of the table are in accordance with the criteria and the code specified limits; (e) The applicant is requested to clarify if there is no fluid transient (FT) due to water hammer for the feedwater system; and (f) In Column 3 of the table for the component cooling problems SP-016 & SP-017, Note 3 was mentioned for the G+E combination. The applicant is requested to address if this note is really applicable here for the stress combination.

EMCB-1.11 With regards to Table 2.2.2.2-2 (PTN-4), (a) the applicant is requested to clarify if the stresses due to steam hammer fluid transient (FT) loading for the main steam line are based on a time history analysis; (b) In the second column of the table under stress combination or as a note to the table, the applicant is requested to provide the applicable allowable stress criteria (for example, similar to those allowable limits shown in Column 1 of Table 2.2.2.2-2); (c) In the second column of the table, there are several rows showing stress combination, G+E (for stresses due to gravity G and thermal expansion E) and not P+G+E, and it is not clear why the pressure stress (P) is not in this pipe stress combination per the applicable code. The applicant is requested to explain this discrepancy; (d) The applicant is requested to clarify the allowable stresses and any associated references for the pipe stress combinations, G+P+ SRSS (OBE, FT), G+P+SRSS (SSEE, FT), E; G+E, & P+G+E. The applicant is requested to verify whether the allowable stress values listed in the 5th column of the table are in accordance with the criteria and the code specified limits; (e) The applicant is requested to clarify whether there is any fluid transient (FT) due to water hammer for feedwater system; (f) In Column 3 of the table for component cooling problems CCW-18, Note 3 was mentioned for the G+E combination. The applicant is requested to address if this note is really applicable here for the stress combination.

EMCB-1.12 In Section 2.2.2.3.2.1, Reactor Vessel (RV) and Supports, it is mentioned that four of the RV supports have one cantilever beam skewed to clear ex-core detectors in the reactor cavity concrete. The applicant is requested to clarify the total number of RV supports.

EMCB-1.13 The LAR mentions various editions of the following Codes:

ASME Boiler and Pressure Vessel (B&PV) Code, Section III 2004 Edition Appendix-F,
ASME B&PV Code, Section III 1965 Edition – summer 1965 addenda,
ASME B&PV Code, Section III 1971 Edition,
ASME B&PV Code, Section III 1974 Edition through Summer 1976 Addenda,
ASME B&PV Code, Section III 1986 Edition,

ASME B&PV Code, Section III 1989 Edition,
ASME B&PV Code, Section III 1998 Edition through 2000 Addenda,
ASME B&PV Code, Section III 1998 Edition, Subsection NF,
American Standards Association (ANSI) B31.1-1973 Edition through Winter 1976 Addenda,
American National Standards (ASA) B31.1-1955 Edition,
AISC Manual of Steel Construction -1963 Edition, and
AISC Manual of Steel Construction - 8th Edition.

The licensee is requested to provide a table that shows the item (SSC structure, system, or component, e.g., piping and pipe supports, components (vessels, pumps) supports), code edition used for EPU (ASME Section III, B31.1, AISC Manual, etc.), code used in design basis, and justification (whether reconciliation was performed). This table needs to include only those specific items (SSC) that use a different code edition/addenda (ASME Section III, B31.1, AISC Manual, etc.) during EPU, other than the codes used in the design basis calculations.

EMCB-1.14 In Section 2.2.2.3.2.2, Reactor Vessel (RV) and Supports, the applicant is requesting NRC approval for the use of Appendix-F of the ASME B&PV Code 2004 Edition in evaluating the Normal plus LOCA load combination. The applicant is requested to provide information to clarify what Code was used by the applicant previously for this Normal plus LOCA load combination along with the corresponding computed stresses and the allowable stresses.

EMCB-1.15 With regards to Table 2.2.2.3-1, (a) the applicant is requested to provide a clarification note that for those cases with EPU values that are lower than the current values, provide details to explain the lower EPU values; (b) The applicant is also requested to provide a note to address whether the cumulative fatigue usage factor for the inlet and outlet nozzles for EPU is based on 40 years or 60 years life; (c) The applicant is also requested to provide a note on the value of the Ke factor used in the computation of the cumulative fatigue usage factor for the bottom mounted instrumentation nozzles for EPU; (d) The applicant is also requested to clarify that the cumulative fatigue usage factor of 0.478 for EPU for shell at core support pads is conservatively used instead of the values shown under Note 3.

EMCB-1.16 With regards to Table 2.2.2.3-2, Bottom Mounted Instrumentation Nozzle Simplified Elastic Plastic Results, the NRC staff requests that the applicant provide a note showing the magnitudes of the thermal bending stress and the total bending stress.

EMCB-1.17 In Table 2.2.2.3-4 for EPU conditions, the RV support loads are shown separately for inlet and outlet, while for the existing design basis, the loads for inlet and outlet are not shown in Table 2.2.2.3-3. The applicant is requested to clarify whether the existing design basis loads represent bounding loads for the inlet and outlet.

EMCB-1.18 With regards to Table 2.2.2.3-4, Revised Design Basis RV Support Loads at EPU, Note 1 to this table is not clear. (a) The applicant is requested to clarify whether the revised loads E (Design Earthquake), E' (Maximum Hypothetical Earthquake), and R (LOCA) include loads from D (dead weight), T (Normal

thermal expansion), and L (Live load); and (b) The applicant is also requested to clarify why the E' load for EPU is smaller than E' for existing design basis.

EMCB-1.19 With regards to Table 2.2.2.3-6, the applicant is requested to clarify how the allowable loads in this table were obtained.

EMCB-1.20 Table 2.2.2.4-1 provides only cumulative fatigue usage factors. The applicant is requested to provide a summary of primary and primary plus secondary stresses for the control rod drive mechanism (CRDM).

EMCB-1.21 With regards to Section 2.2.2.5.2.3, the applicant is requested to discuss whether thermal stratification is significant for the steam generator's feedwater nozzle.

EMCB-1.22 With regards to Section 2.2.2.5.5.2, the applicant is requested to provide a summary of the basis for the assumptions regarding the fluid elastic instability, turbulence, and wear.

EMCB-1.23 With regards to Section 2.2.2.5.5.5, (a) the applicant is requested to provide the maximum cross flow velocity for the steam generator tube bend region and the calculated critical velocity of the fluid to initiate fluid elastic instability; (b) The applicant is requested to briefly explain how the FIV stress of 0.45 ksi was obtained; and (c) The applicant is also requested to clarify if the drilled holes in the stainless steel support plates for the steam generator tubes are broached.

EMCB-1.24 With regards to Section 2.2.2.5.5.5 of the LAR, the applicant did not address flow-induced vibration (FIV), and the potential for acoustic resonance due to standing waves in any stagnant side branches in the main steam and feedwater lines, and the potential to generate loose parts that could impact any safety related components. The applicant is requested to address the items mentioned above.

EMCB-1.25 Case 2 of Table 2.2.2.5-3 of the LAR addresses pin connection at the tube sheet to channel head joint. This connection is more like a weld connection or a moment connection, rather than a pinned connection. The applicant is requested to provide a justification for the validity or applicability of Case 2, with respect to treating the connection as a pinned connection.

EMCB-1.26 Table 2.2.2.5-4 of the LAR provides maximum/minimum in-plane tube bending stresses. The applicant is requested to also provide the corresponding allowable stress limits or margins.

EMCB-1.27 Table 2.2.2.5-6 of the LAR provides the integrated tube support plate loads. The applicant is requested to briefly explain how these loads are related to those provided in Table 2.2.2.5-5.

EMCB-1.28 The title of Table 2.2.2.5-7 of the LAR is Steam Generator Support Member Stresses. However, the table contains faulted actual and allowable loads. (a) Clarify if these are loads or stresses, and whether there is a separate table for the stresses. (b) The applicant is also requested to briefly explain how the allowable loads were obtained.

EMCB-1.29 Section 2.2.2.6 of the LAR does not contain the list of references. The applicant is requested to include any applicable references.

EMCB-1.30 With regards to Table 2.2.2.6-1 of the LAR, (a) for comparison purposes, the applicant is requested to show the analysis of record (AOR) values of the stresses and usage factors. (b) The third column of this table for casing points to Note 1 does not seem to be applicable; address this discrepancy. The applicant is also requested to provide the usage factor value for the casing for EPU.

EMCB-1.31 The title of Table 2.2.2.6-2 of the LAR is Reactor Coolant Pump Support Member Stresses. However, the table contains faulted actual and allowable loads. (a) Clarify if these are loads or stresses, and whether there is a separate table for stresses. (b) The applicant is also requested to briefly explain how the allowable loads were obtained.

EMCB-1.32 With regards to Table 2.2.2.7-1 of the LAR, the applicant is requested to clarify with a note to explain why the fatigue usage values for the spray nozzle, upper head, surge nozzle, and safety-relief nozzle for EPU are smaller than those for the current or pre-EPU values.

EMCB-1.33 With regards to Table 2.2.2.7-2 of the LAR, : the applicant is requested to clarify with a note, providing the primary plus secondary stress intensity range, including thermal bending, and the numerical value of the Ke factor for the spray nozzle. The applicant is also requested to clarify whether a check for the thermal ratcheting was performed for the spray nozzle.

EMCB-1.34 With regards to Table 2.2.3-1, (a) the applicant is requested to address why the EPU values decreased significantly in comparison with the current AOR values for the upper support columns. (b) The applicant is also requested to provide the primary plus secondary stress intensity range, including thermal bending, thermal bending stress, numerical value of the Ke factor, ratio pf yield to ultimate strength, and thermal ratcheting evaluation, as applicable, for the upper core plate alignment pins, lower support plate & weld, and outlet nozzle.

EMCB-1.35 With regards to Section 2.2.7.2.2 of the LAR, the applicant is requested to provide the following information regarding the bottom mounted instrumentation (BMI). (a) Explain if the 2-inch interface for the change of temperature from 547^{o}F to 120^{o}F is based on a calculation of the thermal attenuation distance or actual measurement. (b) Address whether the BMI guide tubing is insulated. (c) Address whether the RV connections are qualified for the loads from the BMI guide tubing.

EMCB-1.36 (a) In the second column of Table 2.2.7-1, under loading combination, or as a note to the table, the applicant is requested to provide the applicable allowable stress criteria (for example, similar to those allowable limits provided in Column 1 of Table 2.2.2.1-1). (b) The applicant is requested to clarify if this table is for EPU conditions. (c) The applicant is also requested to supplement this table with the current AOR results. (d) The applicant is requested to explain why the allowable stress of 23,550 psi is the same for the primary stress case and the thermal expansion case.

EMCB-1.37 The applicant is requested to provide a summary of the results of the BMI guide tubing support qualification.

EMCB-1.38 Table 2.5.5.1-2 of the LAR provides a summary and shows that the EPU steam flow velocities exceeding the industry guidance. The applicant is requested to briefly explain the significance of these EPU flow velocities and the impact of these values on flow induced vibration, acoustic resonance due to any side branch stand pipes, and any loose parts that could potentially affect any safety-related components.

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