From: Poole, Justin
Sent: Wednesday, May 19, 2010 2:24 PM
To: 'Hale, Steve'; 'COSTEDIO, JAMES'
Subject: Draft - Request for Additional Information Re: AFW

Steve,

By letter to the U.S. Nuclear Regulatory Commission (NRC) dated April 7, 2009, as supplemented by two letters dated June 17, and September 25, 2009, FPL Energy Point Beach, LLC, submitted a request to change technical specifications due to modifications to the auxiliary feedwater system (AFW). This was originally part of the extended power uprate request, but was separated out by the NRC staff.

The NRC staff has reviewed the information provided and determined that in order to complete its evaluation, additional information is required. We would like to discuss the questions, in draft form below, with you in a conference call.

This e-mail aims solely to prepare you and others for the proposed conference call. It does not convey a formal NRC staff position, and it does not formally request for additional information.

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DRAFT

Technical Specification Branch:

1. In addition to the request for additional information in items 2 through 4 below, please provide a safety analysis to justify TS 3.7.5, Auxiliary Feedwater changes proposed by this license amendment request.

2. For the proposed TS 3.7.5 Condition described as one motor-driven auxiliary feedwater (MDAFW) pump inoperable concurrent with the turbine-driven auxiliary feedwater (TDAFW) pump inoperable due to one inoperable steam supply, show that the PBNP design still provides for 100% of the AFW flow rate required by the safety analysis for the Feed Line Break or Main Steam Line Break, assuming no additional single failure.

   Background: TS changes are proposed based on plant modifications that replace two shared unit MDAFW with unit-specific MDAFW pumps configured to operate with the unit-specific TDAFW pump as a single system. Currently, TS 3.7.5 Condition A for one steam supply inoperable to one TDAFW pump system the licensee must restore the steam supply to operable status in 7 days. Accordingly, Condition B requires the licensee to start a 72 hour completion time (CT) clock, when the MDAFW pump becomes inoperable.
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The TS basis for a 72 hour CT for a MDAFW pump credits the redundant train (TDAFW pump) being fully operable with redundant steam supplies. Therefore, for a Condition of the TDAFW pump in a degraded condition with one steam supply inoperable when the MDAFW pump is also inoperable, the plant is operating in a higher risk significant condition which cannot be justified with the proposed 72 hour CT. The proposed 72 hour CT is not justified and a more restrictive CT should be applied.

Technical Specifications Task Force (TSTF) traveler TSTF-412 (ML071230105) provides guidance for a typical Westinghouse four loop pressurized water reactor with two MDAFW pumps and one TDAFW pump. In the event one steam supply is operable to the TDAFW pump and one MDAFW pump is operable, then TSTF-412 directs the licensee to enter a 24 hour or 48 hour LCO depending on whether the design can provide 100% of the required flow with a remaining safety-related MDAFW pump. However, because the TSTF assumes there is a remaining motor driven train capable of feeding the remaining intact steam generator TSTF-412 is not directly applicable for a two loop design like Point Beach.

Regulatory Basis: Title 10 Code of Federal Regulations 50.36(c)(2) *Limiting conditions for operation*. (i) Limiting conditions for operation are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When a limiting condition for operation of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specifications until the condition can be met. When a limiting condition for operation of any process step in the system of a fuel reprocessing plant is not met, the licensee shall shut down that part of the operation or follow any remedial action permitted by the technical specifications until the condition can be met.

3. Proposed TS 3.7.5 Actions Note is revised from "LCO 3.0.4.b is not applicable" to "LCO 3.0.4.b is not applicable when entering MODE 1." Please evaluate the proposed change. Explain why this change is an appropriate limit for when either the AFW pumps or the standby steam generator pumps (SSGs) are depended on for MODE transition from hot standby to entry into MODE 1. Describe any changes to the PBNP current licensing basis SE for incorporating TSTF-359 (Agencywide Document and Management System (ADAMS) Accession No. ML030900056) that would result from incorporating this change. Identify the use and application of the Actions Note concurrent with the Note to SR 3.7.5.1, which allows the AFW pump system to be out of its normal standby alignment and temporarily incapable of automatic initiation without declaring the train(s) inoperable.

Background: The key issue is if a licensee has additional startup pump(s) to supplement the auxiliary feedwater pumps in MODES 2, 3, and 4, then they can limit the non-applicability using the Note "LCO 3.0.4.b is not applicable when entering MODE 1" allowing performance of risk assessments to enter MODE 2 - 4. If an additional startup pump is not available, and AFW is being used for startup, then the Note should be "LCO 3.0.4.b is not applicable" for all MODES.

Background: Current TS 3.7.5, LCO 3.0.4.b Note prohibits application of the LCO 3.0.4.b exception when entering any MODE of TS 3.7.5 Applicability. TSTF-359 guidance is that if the plant does depend on AFW for startup, the Note should state, 'LCO 3.0.4.b is not applicable.' However, if the plant does not depend on AFW for startup the Note should state 'LCO 3.0.4.b is not applicable when entering MODE 1.'

This is due to the increased risk associated with entering a MODE or other specified condition in the Applicability with an AFW train inoperable. The provisions of LCO 3.0.4.b, which allow entry into a MODE or other specified condition in the Applicability with the LCO not met after performance of a risk assessment addressing inoperable systems and components, should not be applied in this circumstance

SR 3.7.5.1 contains a Note is related to the LCO 3.0.4.b Actions Note which allows the AFW system to be out of its normal standby alignment and temporarily incapable of automatic initiation without declaring the train(s) inoperable. This SR Note permits the AFW system to be used during startup, shutdown, hot standby operations, and hot shutdown operations for steam generator level control, and these manual operations are an accepted function of the AFW System, OPERABILITY (i.e., the intended safety function) continues to be maintained. This SR Note is only applicable to Actions Note 'LCO 3.0.4.b is not applicable." It is unclear why the proposed Actions Note should be permitted as a remedial action for inoperable AFW equipment when the standby steam generator pumps (SSGs), which were the former auxiliary feedwater pumps, are used for startup.

Section 2.5.4.5 of the Attachment 5 submittal (page 2.5.4.5-5) discusses the AFW system and states:

> "The auxiliary feedwater system has no functional requirements during normal, at power, plant operation. It is used during plant startup and shutdown and during hot shutdown or hot standby conditions when chemical additions or small feedwater flow requirements do not warrant the operation of the main feedwater and condensate systems."

Regulatory Basis: 10 CFR 50.36(c)(2)(i) states "limiting conditions for operation are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When a limiting condition for operation of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specifications until the condition can be met."

4. Current TS 3.7.5 Required Action D.2 Note "Entry into MODE 4 is not required unless the MDAFWP is operable when the TDAFW pump is fully capable of performing its function while in MODE 4" is retained as a Note to Required Action C.2. This Note results in delayed entry into MODE 4. Please justify retaining this Note is an appropriate allowance for the PBNP AFW System.

   Background: Proposed TS 3.7.5 Condition "C" requires if Condition "A" or "B" is not met then Required Action C.1 requires be in Mode 3 within 6 hours, and Required Action C.2 requires be in MODE 4 within 18 hours. Required Action C.2 is modified by a Note "Entry into MODE 4 is not required unless the motor driven AFW pump is operable." As proposed if the one MDAFW pump becomes inoperable, 72 hours is allowed to restore the pump. If not restored, then Condition "C" would require entry into MODE 3, not MODE 4, even though the AFW pumps has a 100% operable TDAFW pump. Topical Report WCAP-16294, "Risk-Informed Evaluation of Changes to Technical Specification Required Action Endstates for Westinghouse NSSS PWRs" has determined that operation in MODE 4 is acceptable because of the availability of the TDAFW pump in the upper range. Therefore, the proposed TS note restricting entry into MODE 4 when

the MDAFW pump is not operable is not an acceptable remedial action when the TDAFW pump is available for use.

Electrical Engineering Branch:

1. The licensee provided its responses to the staff's RAI dated February 1, 2010, in its letter dated March 3, 2010 and April 15, 2010. The staff has the following additional questions based on the review of licensee's response.

   a. In Question 1, the staff raised concerns regarding the EDG "A" voltage and frequency being outside the acceptance limits specified in Regulatory Guide 1.9 during sequencing of loads under certain accident loading conditions. In response to the staff's concerns, the AFW pump motor start was changed from a random load to a fixed load block at 32.5 seconds after EDG breaker closure to improve the EDG voltage response profile and motor-operated valve (MOV) response times. The staff notes that the revised transient analysis shows that for Train "A "EDG, the voltage drops to 51% during the initial loading for a postulated large break loss of coolant accident (LOCA) in one unit and loss of offsite power (LOOP) in the other unit case . Also, for non-large break design basis LOCA & LOOP case postulated in the transient analysis, the voltage drops to 51% during the initial loading and between 32 and 36 seconds, the voltage drops to 59% and then overshoots to 140% and the frequency response is + 2.8 and -4 of the nominal frequency. The staff also notes that the frequency dips and overshoot increased from the previous sequencing mode. The staff is concerned that the licensee's EDG dynamic model validation is not conservative since it is compared to the response from an integrated safeguards testing when some of the larger pumps are operating in recirculation mode resulting in faster acceleration time. The EDG response during a worst case accident loading condition may be slower. Verify that the performance capabilities of safe shutdown equipment, when the EDG is operating with fully loaded motor loads for the limiting design basis accident with sufficient margin. Provide an executive summary of the evaluation.

   b. In response to the staff's question 1 regarding the downstream effects on components, the licensee states that "the dynamic EDG loading calculation results show that there is an initial delay in energizing the motor control center (MCC) loads when the EDG output breakers close because the initial voltages are below the pickup requirements of the 480 V MCC contactors. The voltage recovers above the pickup requirements of the contactors to start the required loads. In addition, the MCC contactors on Train "A" also drop below their holding voltage requirements during the loading sequence when two switchgear motors start simultaneously. This occurs only when containment spray pumps have a delayed motor start. The voltage recovers above the pickup requirements of the contactors to re-start the required loads. The loads are capable of restarting and operating to meet design bases requirements." The evaluation also concludes that control fuses will not operate and the protective devices will not trip. Also, the MOVs will complete their valve stroke in the required time with the minimum stroke time margin of 0.77 seconds. Provide clarification, using a specific example, on the logic used to determine that all loads are capable of restarting and operating for the limiting or bounding case.

Typically, MCC circuits have a seal-in contact to maintain circuit continuity during extended operation. Verify that any circuits with seal-in contacts will restart after a low voltage excursion. Some MOVs have design margin of 0.77 seconds. The evaluation indicates that the postulated interrupt time due to contactor drop out was added to name plate stroke time. Provide details on how the combination of varying EDG frequency and voltage affected the stroke time.

c. The licensee states in response to question 1 that for accidents where the containment spray pump (CSP) start may be delayed, the potential simultaneous start of the CSP and the AFW pump has been evaluated and found to be acceptable. According to the EDG loading table, the Safety Injection pump, rated at 700HP, starts at time 0 seconds, the service water pumps, rated at 300HP start at 15.5, 20.5 and 25.75 seconds and for the component cooling water pump, rated at 250HP, start time is not provided. The ability of the EDG to handle large transient loads is dependent on the magnitude of the sequenced load and the running loads. Provide clarification on the evaluation performed to analyze the worst case frequency and voltage resulting from the CSP or other pumps starting in conjunction with a large load due to permissive signals.

d. In response to RAI Question 6 regarding the EDG endurance and margin test, the licensee proposed to test the EDGs for 24 hours at ≥ 2850 kW(GO1 /G02), ≥ 2848 kW (G03/G04)." The proposed 24-hour test does not demonstrate the design margin of the EDG as recommended in RG 1.9 since the 2-hour portion of the 24-hour test is not loaded to 105–110 percent of the EDG's continuous rating. Therefore, the staff requests the licensee to provide justification why the proposed loading ranges are adequate to demonstrate the design margins of the EDGs to operate for its intended mission time.

e. The Starting of the new AFW pump was changed from a random load to a fixed load block at 32.5 seconds after EDG breaker closure. The licensee response indicates that this change was acceptable for LOOP/LOCA event. Verify that other design bases events such as main steam line break or steam generator rupture event are not adversely impacted. Provide a summary of your evaluation.

2. In response to the staff's RAI question 5 regarding the performance capabilities of the non-EQ AFW motor in potentially harsh environment during the large break LOCA or other limiting accident conditions, the licensee stated that the AFW pumps are connected to safety-related buses through safety-related breakers and it will prevent degraded MDAFW pump motors from adversely affecting the safety related bus during the accident. The staff is concerned regarding the failure modes and its effects on the equipment needed to perform safety functions including potential for presenting misleading information to the operator during and after an accident. Provide an executive summary of the failure modes and effects analysis performed to show there are no adverse effects of not qualifying the AFW pump motors.

3. Provide a summary of the loading changes to the Class 1E DC system as a result of changing/adding power supplies for motor driven auxiliary feedwater (MDAFW) pumps and turbine driven auxiliary feedwater TDAFW and other changes (AST and EPU). Confirm whether the standby steam generator pumps are powered from Class 1E DC

sources. Also, confirmwhether the battery loading profiles and the TS surveillance requirements remain the same. In addition, confirm whether MDAFW and TDAFW DC power and control circuits maintain redundancy.

Balance of Plant Branch:

BOP - AFW - RAI - 17

In order to protect the auxiliary feedwater (AFW) pumps from damage due to lack of sufficient water supply, the licensee uses a combination of a low pressure switch in conjunction with timers. One timer initiates a swap over from the condensate storage tank (CST) to service water (SW) as the supply source. Another timer runs concurrently to trip the pump if the swapover does not occur. The licensee has provided representation of the sequencing, showing the times for the swapover and the pump trip. The licensee's method differs significantly from the industry standard, which uses only the activation of a low pressure switch to trip the pump. Therefore, staff requires additional information in order to understand the logic used to protect the pump, to determine whether the pumps are adequately protected and will still perform its function when called upon. The follow questions refer to the figure in Enclosure 2, provided in letter dated January 7, 2010.

1. The figure explains the T = 0 (assumed to be the bottom line in the figure) occurs when a detected suction pressure in sensed. Explain how the low pressure setpoint was determined and how any uncertainty was captured.

2. The figure explains the "$T_{pl, Max}$ = 25.5 seconds" is the maximum allowable time delay for the pump trip.

    a. Explain the basis for pump trip prior to T = 25.5 seconds,
    b. Describe the worst case scenario, and any assumptions, that were used to establish the basis for the time allowance.
    c. Show the point in the suction piping where the water will theoretically stop once the pump stops if the swapover does not initially occur? Determine at this point if the suction piping is protected from air intrusion in the suction line if the operator later swaps over to the safety-related source of water.

3. What does "$T_{set\ switchover}$ = 14 seconds" correspond to? Timer delay or the time the service water valve operator gets a signal to open?

4. The figure states "SW full flow = 3 seconds." Does the 3 seconds represent the valve full stroke time? Does it include uncertainty? Does the system require the valve to open fully to restore significant suction pressure to stop the timer?

5. Also what stops the timer after the swapover to ensure AFW pump does not trip?

6. The figure state "$T_{Switchover\ Complete}$ = 18.4 seconds" and "$T_{Trip, min}$ = 18.9 seconds" leaving only 0.5 seconds. Is there any delay time need from 3 seconds needed to develop full flow to the time the pressure switch sense the restored pressure and send a signal to the time to stop the pump trip signal?

7. Is there any safety significance for “Tpl, min” = 12.5 seconds? If so, explain the basis used to determine the time.

BOP - AFW - RAI - 18

In a letter dated April 22, 2010, the licensee states, “The EQ evaluation provided in LR Section 2.3.1 for high energy line breaks (HELBs) outside containment is based upon the extended power uprate (EPU) operating conditions and mass and energy releases at EPU power levels, which bound the conditions at the current licensed power level.” As part of the EPU the licensee proposes to make several changes to the plant, e.g. FWIVs, methodology change in evaluating HELBs. These changes will not be part of the plant, nor approved by the U.S. Nuclear Regulatory Commission, when the AFW modifications are incorporated under the current licensing basis. Therefore, the proposed evaluation at EPU may not be appropriate to bound the current plant condition prior to the additional modifications and approval of the revised methodology.

The staff requests the licensee to evaluate secondary system line breaks for the current license conditions.

BOP - AFW - RAI - 19

The proposed modification will retain the current suction header from the CSTs to the AFW pumps for the steam-turbine driven auxiliary feedwater (TDAFW) pumps and standby steam generator (SSG) pumps, and will add a separate header from the CSTs to both new motor-driven auxiliary feedwater (MDAFW) pumps. The new suction line must be safety-related up to a specific point to support the safety-related pumps. The licensee establishes the same low pressure setpoint for both the TDAFW pumps and the new MDAFW pumps, even though the pumps are supplied by different headers and the pumps have different flow rates.

The staff requests the licensee to:

a) identify the location of the safety to nonsafety-related transition in the new suction piping,
b) evaluate any differences between the two headers,
c) determine if the new header provides the same safety assurance as the existing header,
d) provide a comparison of the pumps and the suction headers to show that calculations used to derive the low pressure setpoint are applicable for both headers and pumps.

BOP - AFW - RAI - 20

The proposed new low suction pressure trip setpoint and timing circuitry to automatically swap-over the AFW suction is based upon the AFW pumps being initially supplied by the CST and automatically swapping over to the SW supply.

The staff requests the licensee to verify that the AFW pumps will be adequately protected in the event the AFW pumps are being supplied by SW and the SW supply is interrupted.