CP&L

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United States Nuclear Regulatory Commission
ATTENTION: Document Control Desk
Washington, DC 20555

SHEARON HARRIS NUCLEAR POWER PLANT
DOCKET NO. 50-400/LICENSE NO. NPF-63
RESPONSE TO ALLEGATIONS - SPENT FUEL POOL COOLING
AT THE HARRIS NUCLEAR PLANT

Dear Sir or Madam:

Carolina Power & Light Company (CP&L) is in receipt of a letter dated May 14, 1999 addressed to Mr. Richard J. Laufer of the Nuclear Regulatory Commission (NRC) from Mr. David Lochbaum of the Union of Concerned Scientists (UCS). In its letter, UCS submits formal allegations purported to be related to the current design and licensing basis of the Harris Nuclear Plant (HNP). UCS has requested that its allegations be evaluated in accordance with the NRC allegation process and that UCS receive a formal response following the NRC staff's evaluation. CP&L has investigated the allegations made in the UCS letter, and respectfully provides the following information which demonstrates that the allegations are unfounded. This information demonstrates that there is no deficiency with regard to either the current design and licensing basis of HNP, or the proposed licensing basis of HNP as defined in CP&L's license amendment request, dated December 23, 1998, to activate HNP spent fuel pools "C" and "D," which is currently under review by the NRC.

UCS alleges that CP&L Calculation SF-0040 appears to have improperly established both the "minimum flow requirement" and "maximum flow" for Component Cooling Water (CCW) flow to spent fuel pool cooling heat exchangers "A" and "B" at "5,400 gallons per minute" (gpm). UCS states that it is "highly unlikely, bordering on impossible" that HNP operators could adjust flow to provide precisely 5,400 gpm -- the flow rate that UCS mistakenly perceives to be both the minimum required flow rate and the maximum allowable flow rate to the spent fuel pool cooling heat exchangers. UCS further states that achieving this precise flow rate is "impossible" due to flow instrumentation uncertainty. UCS also asserts that there may be broader implications for other safety-related components evaluated by Calculation SF-0040. On these bases, UCS alleges that there "seems to [be] a deficiency in the current design and licensing bases of [HNP]."

Based on our internal evaluation of this matter, CP&L has determined that UCS's allegations are unfounded. The allegations appear to be rooted in an incomplete reading and misunderstanding of both the applicability and substance of CP&L Calculation SF-0040. Calculation SF-0040 does not apply to the current licensing basis for HNP and does not establish 5,400 gpm as either the required minimum flow, or the maximum allowable flow, for the spent fuel pool cooling heat exchangers "A" and "B."

First, CP&L has concluded that UCS is incorrect in its assertion that its allegation "affects the current configuration of the facility." The calculation at issue, Calculation SF-0040, is not part of the current licensing basis for HNP, but rather is part of the basis for a proposed amendment to the HNP licensing basis, an amendment to activate spent fuel pools "C" and "D." In fact, Calculation SF-0040 is entitled "Spent Fuel Pools C and D Activation Project Thermal-Hydraulic Analysis." Calculation SF-0040 will become part of the HNP licensing basis when the pending amendment is issued, modification work is completed, and spent fuel pools "C" and "D" are activated. Contrary to UCS's allegation, Calculation SF-0040 does not reflect current HNP CCW System operating conditions, and is in no way relied upon to establish the acceptability of the facility as currently licensed and operated.

Second, UCS's allegation is also unfounded in relation to the proposed amendment to activate spent fuel pools "C" and "D." Contrary to UCS's understanding, the 5,400 gpm figure that forms the basis of UCS's allegation is neither the minimum required flow rate, nor the maximum allowable flow rate for the spent fuel pool cooling heat exchangers "A" and "B," but rather the design value for CCW flow (shell side cooling) derived from the spent fuel pool cooling heat exchangers "A" and "B" data sheet. This is an established flow rate at which the heat exchangers are designed to operate. In order to ensure adequate CCW flow to the pools "C" and "D" heat exchangers, conservative assumptions (and therefore use of CCW flow) were made for pools "A" and "B" heat exchanger requirements. SF-0040 initially assumed 5,400 gpm as a CCW flow requirement for pools "A" and "B," then demonstrated that the actual minimum required CCW flow rate to spent fuel pool cooling heat exchangers "A" and "B" is somewhat less than 5400 gpm. Specifically, for both full core offload scenarios, the thermal flow requirement is 5025 gpm, which corresponds to a minimum flow requirement of 5326 gpm with 6% hydraulic uncertainty included (See Calculation SF-0040, Tables 7e and 7f, Section 4.6). Use of the bounding value of 5400 gpm for pools "A" and "B" heat exchangers assured that the analysis demonstrated adequate CCW flow to pools "C" and "D" heat exchangers even under the most challenging conditions. Calculation SF-0040 demonstrates that adequate CCW flow is available for spent fuel pool "A" and "B" heat exchangers to ensure these pools remain below 137°F, even with consideration given to instrument and analytical uncertainty.

Third, the actual maximum allowable flow rate for the spent fuel pool cooling heat exchangers "A" and "B" is much greater than 5,400 gpm. Note 3 to Table 5 in Calculation SF-0040 stated that "SFP Hx A/B Max Flow is 5,400 gpm per design data sheet which should not be exceeded to ensure flow induced vibration problems do not occur." As stated earlier, 5,400 gpm is not a limit, but is, instead, an allowable design operating flow rate for the pools "A" and "B" heat exchangers. For the purposes of demonstrating the capability of spent fuel pools "C" and "D" in Calculation SF-0040, this conservative number was assumed as a maximum flow rate for pools "A" and "B" heat exchangers. UCS mistakenly interprets Note 3 to identify 5,400 gpm as being a definitive limit on the heat exchangers as provided by the manufacturer. To the contrary, the

manufacturer's data sheet and A/E procurement specification for the spent fuel pool "A" and "B" heat exchangers confirm that 5,400 gpm is an allowable design operating point on which no operational constraints are stipulated. In fact, the manufacturer of the HNP spent fuel pool cooling heat exchangers (Yuba) states that these units have a design margin of at least 50% between the specified operating point and calculated flow induced vibration limits. It is clear that operation of the spent fuel pool cooling heat exchangers "A" and "B" at 5,400 gpm, plus any reasonable margin for uncertainties, does not approach any limit regarding the potential for causing flow induced vibration.

With regard to Note 3 to Table 5 of Calculation SF-0040, CP&L conservatively assumed 5,400 gpm as an upper bound value because this design point met or exceeded all operational requirements. To the extent that Note 3 can be misinterpreted as presenting 5,400 gpm as an absolute limit, where one is not intended, CP&L plans to revise the wording as follows to avoid further misunderstanding: "Note 3: 5,400 gpm is the design operating point on the manufacturer's data sheet. Establishing this value (plus uncertainties) as an upper flow limit for the purposes of this calculation will ensure that applicable system requirements are satisfied while providing ample margin to the potential onset of flow induced vibration. The actual minimum required CCW flow for these scenarios is somewhat less than 5,400 gpm (calculated as 5,326 gpm with 6% uncertainty included). See Tables 7e and 7f, Section 4.6."

The preceding discussion provides an understanding of the purpose and context of Calculation SF-0040 and shows why the UCS allegations do not present a concern with respect to either the current licensing basis of HNP, or that defined in the spent fuel pools "C" and "D" license amendment request. CP&L now provides the following responses to each of the three specific allegations raised by UCS

Allegation 1 - "CP&L has improperly established the minimum and maximum flow rate through spent fuel pool cooling heat exchangers A and B for the full core offload configuration at the same value, which cannot be physically achieved at the plant."

Response to Allegation 1 - 5,400 gpm is not a manufacturer's limit prescribed to preclude flow induced vibration, but an acceptable operating point for the system at which it is known there are no flow induced vibration concerns. In fact, the heat exchangers have at least 50% design margin (at least 8,100 gpm flow) before even the potential for the onset of flow induced vibration. Moreover, as discussed above, Calculation SF-0040 demonstrates that the actual minimum required CCW flow to these heat exchangers is somewhat less than 5,400 gpm. Note 3 to Table 5 in Calculation SF-0040 is intended to conservatively establish a value which ensures that flow induced vibration will not occur. Note 3 as written is apparently subject to misinterpretation and therefore CP&L plans to revise it to eliminate ambiguity, as stated above.

Allegation 2 – "CP&L has improperly established the minimum and maximum flow rates for spent fuel pool cooling heat exchangers A and B without accounting for flow instrumentation accuracy and uncertainty limitations."

Response to Allegation 2 - UCS's allegation appears to be based solely on its interpretation of Note 3 to Table 5 in Calculation SF-0040 as establishing 5,400 gpm as a design limit on the physical capability of the heat exchangers. As discussed above, the 5,400 gpm value that UCS addresses is a not a flow induced vibration limit, but rather an allowable design operating point with at least 50% margin prior to any such flow induced vibration limit. Calculation SF-0040 specifically considers both instrument inaccuracies and analytical uncertainty in developing the prescribed flow balance for the CCW system and its heat exchangers. Section 4.6 of Calculation SF-0040 clearly identifies that hydraulic margins for the CCW system were evaluated by degrading the CCW pump curves by 10%, then reducing resulting flows by an additional 6% to account for modeling and instrument uncertainty (See Calculation SF-0040 at pages 13-15).

Allegation 3 – "CP&L may have also improperly established minimum and maximum flow rates for safety-related components without accounting for flow instrumentation accuracy and uncertainty limitations. The 31 calculations rumored to be attached to calculation SF-0040 were, in fact, not attached to the calculation supplied in response to the Orange County Board of Commissioner's contentions. Thus, I am unable to determine whether CP&L's apparent oversight was limited to just spent fuel pool heat exchangers A and B."

Response to Allegation 3 - The "31 calculations" referred to by UCS are in fact the backup attachments for Calculation SF-0040. These attachments include backup data for the results summarized in Tables 7a through 7j on CCW system flow margins for the different HNP operating scenarios. These supporting calculations also incorporate margins to account for pump degradation and modeling and instrument uncertainty, as applicable (See, e.g., SF-0040, Tables 7a-7j, explicitly showing 6% uncertainty). Moreover, UCS's allegations are based on a misinterpretation of 5,400 gpm as a physical design constraint to preclude flow induced vibration. As discussed above, this is not the case. Therefore, there is no conflict between the minimum heat exchanger flow requirements stated in Table 5 of Calculation SF-0040 and the actual design limitations on spent fuel pool cooling heat exchangers "A" and "B." As stated above, CP&L plans to revise Note 3 to Table 5 to remove the potential for misunderstanding. Aside from spent fuel pool cooling heat exchangers, the only safety related heat loads on the CCW system are the RHR heat exchangers and the RHR pump coolers. A review of Calculation SF-0040 shows no other similar opportunity for misunderstanding with regard to specifying flow limitations for these CCW heat loads, nor were there any such instances found with regard to the nonsafety-related components served by CCW.

Please refer any questions regarding the enclosed information to Mr. Steven Edwards at (919) 362-2498.

Sincerely,

Donna B. Alexander

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KWS/kws

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Nuclear Records
Harris Licensing File
Files: H-X-0511
H-X-0642