From: Joseph B. Brady
To: Brian Bonser, Bruce Mallett, Carolyn Evans, Cha...
Date: Mon, May 17, 1999 1:52 PM
Subject: Re: Fwd: [NRC_CONCERNS] UCS Allegations re: Spent Fuel Storage at Harris Nuclear Pla

CP&L came to me this morning with a copy of the allegation. They were sent a copy via E-mail by Mr. Lochbaum on May 14. The numbers that he is concerned about (5400 gpm) for the existing A&B pools were used as worst case assumptions for the C&D pool calcs. The calc assumed that A&B would get max flow. The FSAR (section 9.1.3.3) states that the required flow for A&B pool SFP heat exchangers is 1789 gpm. I have faxed a copy of the appropriate pages of the calc to George MacDonald and Brian Bonser. [redacted] E45

[redacted] E45

Joe

>>> Kenneth Clark 05/14 1:01 PM >>>
Here's a letter from UCS containing what it says are Harris spent fuel pool allegations. It's signed by D. L'baum of UOCS. it was apparently sent out by UCS as an email today. Diane Scrtenci, our RI senior PAO, is on the subscription list and forwarded it to me.

*When I try to right-click to open it, I get gobbledygook. When I left click, it opens.

CC: Anne Boland

H/1

Title/Approval Sheet

SYSTEM# 4065

CALC. TYPE Mechanical

CAROLINA POWER & LIGHT COMPANY

SF-0040
(CALCULATION #)

FOR

Spent Fuel Pools C and D Activation Project Thermal-Hydraulic Analysis
(TITLE INCLUDING STRUCTURE/SYSTEM/COMPONENT)

FOR

SHEARON HARRIS NUCLEAR POWER PLANT X

NUCLEAR ENGINEERING DEPARTMENT

QUALITY CLASS X A ☐ B ☐ C ☐ D ☐ E

REV. NO.	RESPONSIBLE ENGINEER / DATE	☒ DESIGN VERIFIED BY ☐ ENGINEERING REVIEW BY / DATE	APPROVED BY RESPONSIBLE SUPERVISOR / DATE
0	[signature] 10/27/98	[signature] 10/27/98	R. Steve Edwards 11-10-98
REASON FOR CHANGE			
REASON FOR CHANGE			

Computed by: Jeff Lundy Date:	CAROLINA POWER & LIGHT COMPANY	Calculation ID: SF-0040	
Checked by: Date:		Pg 11 of 32	Rev 0
Project No.:	CALCULATION SHEET	File:	
Project Title: Spent Fuel Pools C and D Activation Project			
Calculation Title: Spent Fuel Pools C and D Activation Project Thermal-Hydraulic Analysis			

Reference (1), is 5166 gpm or approximately 5200 gpm. As the containment sump temperature decreases, the minimum required CCWS flow also decreases, as shown in Figure 1 of Attachment (C), based on maintaining a maximum RHR heat exchanger tube side outlet temperature of 180°F, Reference (21). The CCWS was initially rebalanced using the CCWS PROTO-FLO™ model in the LOCA:Recirc (RHR Only) alignment, Attachment (F), with a 10 percent degraded CCW pump curve, by adjusting 1CC-146 to 47.9 percent open. When the nominal CCW pump curve is applied to the previously balanced CCWS, CCWS flow to the RHR heat exchanger increases to approximately 5440 gpm resulting in an increased RHR heat exchanger heat duty of 118 MBTU/hr. The increased RHR heat exchanger heat duty results in an excessive CCWS supply temperature which cannot be maintained below 120°F, given 8250 gpm ESWS flow to the CCW heat exchanger. Holding the position of 1CC-146 (or 1CC-166) constant, the specified ESWS flow to the CCW heat exchanger was increased to 8500 gpm which results in a CCW heat exchanger outlet temperature of 120°F, Attachment (G), consistent with the original assumption used in setting the minimum CCWS flow to the RHR heat exchanger, documented in Attachment (D).

Therefore, a reduction in the minimum specified RHR heat exchanger CCWS flow to 5200 gpm from the original 5600 gpm specification and an increase in the minimum specified CCW heat exchanger ESWS flow to 8500 gpm from the original 8250 gpm are necessary to meet all the thermal-hydraulic assumptions which are used in the HNP Containment Analysis, Reference (21). A minimum specified ESWS flow of 8500 gpm to the CCW heat exchangers was verified to be within the capacity of the current ESWS system, Reference (20), even considering the most limiting ESWS single failure of a MCC 1B35-SB feeder breaker failure, Reference (29).

4.4 Evaluation of Maximum RHR Heat Exchanger CCWS Flow

An evaluation was performed, using the RHR heat exchanger PROTO-HX™ model developed in Reference (1), to estimate the maximum CCWS flow rate which could be accommodated during the initial phase of containment sump recirculation. This analysis shows that a maximum CCWS flow of 5220 gpm is attainable for a CCW heat exchanger ESWS flow of 8250 gpm and a maximum CCWS flow of 5440 gpm is attainable for an ESWS flow of 8500 gpm in order to maintain a CCWS supply temperature of 120°F. Given that the RHR heat exchanger throttle valves (1CC-146 and 1CC-166) are set on the basis of maintaining a minimum CCWS flow rate under all hydraulic conditions, including modeling uncertainty and CCW pump degradation limits, when the CCWS is in the LOCA recirculation alignment, there will be excess flow to the RHR heat exchanger, approximately 5440 gpm total, Attachment (D). The thermal effect of the excess RHR heat exchanger flow can be mitigated with an increase in the minimum ESWS flow to the CCW heat exchanger of 250 gpm.

4.5 Evaluation of Minimum Spent Fuel Pool Heat Exchanger CCWS Flow

An evaluation of the minimum thermally required CCWS flow to the Spent Fuel Pool heat exchangers was performed by generating heat duty versus CCWS flow for all combinations of design CCWS supply temperatures and SFP temperature limits. This analysis is performed using the PROTO-HX™ model developed in Reference (1) and assumes 5 percent tube plugging and design fouling factors. CCWS design supply temperatures of 105°F for normal and refueling system alignments and 120°F for cooldown and LOCA:Recirculation alignments are used in the analysis. A maximum SFP temperature limit of 137°F for all fuel pool operations is also assumed. Figure 1 and Table 5 summarize and Attachment (E) documents the results of this analysis.

Computed by: Jeff Lundy	Date:	CAROLINA POWER & LIGHT COMPANY	Calculation ID: SF-0040	
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Figure 1

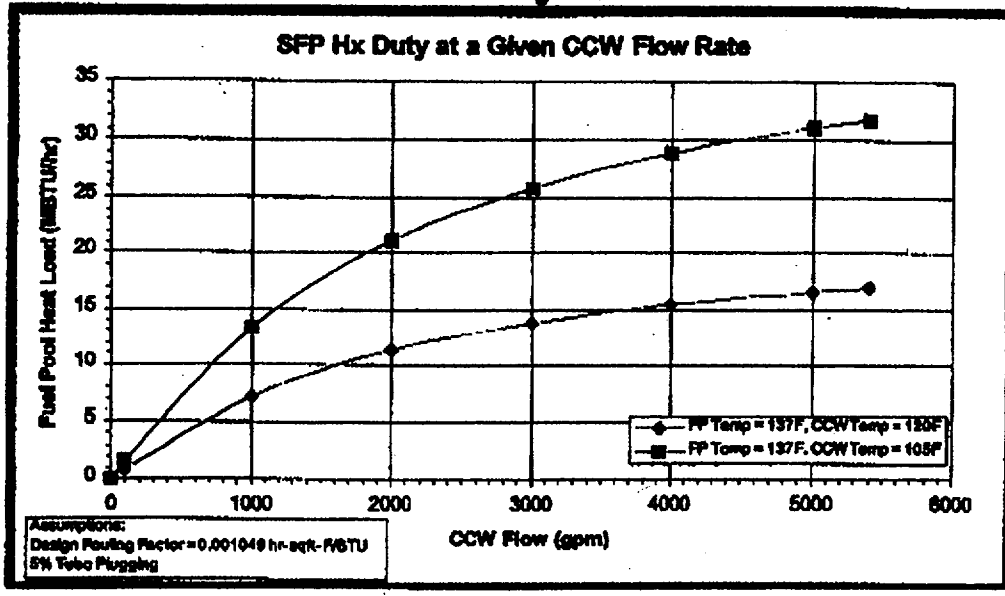

Table 5
Minimum SFP Heat Exchanger CCW Flow Requirements

Alignment	As of Date	SFP Hx A/B Thermal Flow Requirement (gpm)	SFP Hx A/B Minimum Flow (1) (gpm)	SFP Hx C/D Thermal Flow Requirement (gpm)	SFP Hx C/D Minimum Flow (1) (gpm)
Normal	10/22/2001	1200	1272	60	63.6
Hot S/D (350F)	9/15/2001	2800	2968	125	132.5
Safe S/D(350F)	9/15/2001	2800	2968	125	132.5
Refuel-Core Shuffle	9/22/2001	2800	2968	60	63.6
Refuel-Normal Full Core Offload (2)	9/22/2001	5400	5400 (3)	60	63.6
Refuel-Abnormal Full Core Offload (2)	9/22/2001	5400	5400 (3)	60	63.6
LOCA-Safety Injection	10/22/2001	1200	1272	60	63.6
LOCA-Recirc (RHR Only)	10/22/2001	0	0	0	0
LOCA-Recirc (RHR/SFP)	10/22/2001	3830	4059.8	125	132.5

Note 1: Minimum Heat Exchanger Flow Includes 6% Hydraulic Uncertainty Per CP&L HNP Calculation CC-0039 Revision 0
Note 2: Assumes Sufficient Decay Time to Reach 31.78 MBTU/hr (265.36 hours after S/D)
Note 3: SFP Hx A/B Max Flow is 5400 gpm per design data sheet which should not be exceeded to ensure flow induced tube vibration problems do not occur.