

June 1, 2007

NOTE TO: File

FROM: Lisa M. Regner, Project Manager
Plant Licensing Branch II-2 /RA/
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

SUBJECT: SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1 - VERIFICATION OF
INFORMATION BY EMAIL ON GENERIC LETTER (GL) 96-06 (TAC NO.
M96818)

The attached question was provided to the Carolina Power & Light Company (CP&L) via e-mail on May 15, 2007, to allow the licensee the opportunity to verify the information. After review, Mr. John Yadusky of CP&L contacted the staff by email on May 30 and indicated that the assumption had been verified to be correct. The technical staff concurred and stated that no further verifications were necessary for them to complete their review of GL 96-06.

Docket Nos. 50-400

Attachment: Draft Question and Reply by email

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OFFICIAL RECORD COPY

From: James Tatum
To: Joshua Wilson
Date: 5/30/2007 5:10:02 PM
Subject: Fwd: RE: Clarification required for the GL 96-06 response for Harris

CC: John Segala; Lisa Regner

Josh,

This looks like the clarification the we need in order to complete our action. Lisa will docket the clarification and you can refer to the e-mail message that was sent. Also, as discussed earlier this week, please review the RAI responses that are relevant to the licensee's resolution of the waterhammer and two-phase flow issues and identify any information that is material to our review and reflect it in the revised closeout letter that you prepare. Thanks. Jim

>>> "Yadusky, John" <john.yadusky@pgnmail.com> 05/30/2007 5:01:59 PM >>>
Below is the Harris Nuclear Plant (HNP) response as discussed:

Check valve back leakage will not have a significant impact on the HNP waterhammer analysis because the analysis conservatively assumes a drain down of the piping to a hydraulic equilibrium condition. Altran Report 96191-TR-02 was reviewed to verify that the analysis considered drain down and maximum void size.

The report states, "As the system pressure decreases below atmospheric and the system flow decreases, a void will form in the inlet and outlet piping above the fan cooler. Each water column will fall until it comes to a steady state hydraulic balance supported by atmospheric pressure. The water columns would come to stop at elevation 287 feet and remain there unless they were affected by air in-leakage, gases coming out of solution, or by repressurization due to steam formation in the fan cooler."

Approximate values of associated elevations and lengths used in the analysis for HNP include:

Maximum elevation of the piping: 302 feet
Hydraulic equilibrium per the above report: 287 feet
Length of vertical column: 15 feet
Length of horizontal piping: 35 feet
Total length of piping: 50 feet
Void considered in the analysis: 50 feet

It should be noted that although the piping size changes from 10-inch diameter to 6-inch diameter piping for approximately 10 feet of piping, the void volume was determined using only 10-inch diameter piping, which is conservative and will compensate for variations in the auxiliary reservoir level. Therefore, the void considered in the waterhammer analysis (Altran Report) conservatively assumed drain down of the piping to a hydraulic equilibrium condition and maximum void size, so check valve back leakage will not have a significant impact on the analysis.

-----Original Message-----

From: Lisa Regner <mailto:LMR2@nrc.gov>

Sent: Tuesday, May 15, 2007 3:37 PM

To: Yadusky, John

Cc: James Tatum; Lisa Regner

Subject: Fwd: Clarification required for the GL 96-06 response
for Harris

John,

Please see the tech staff's comments below and reply this week, if possible.

If you need further clarification, I will set up a conference call.

Thanks,
Lisa

The licensee's response to Supplemental Information Request #2, as provided in its June 3, 2004, letter to the NRC, is incomplete as it does not fully address check valve leakage considerations. The licensee's response concluded that check valve back leakage will not have a significant impact on the waterhammer analysis for the Harris plant based on the information provided in Figure 6.8-2 of the Electric Power Research Institute (EPRI) Technical Report (TR) 106238, Water Hammer Handbook for Nuclear Plant Engineers and Operators. In particular, the figure shows that for $fL/2D$ values greater than 10, the column closure impact velocities for the various void ratios are converging, and that the impact velocity is approaching the steady-state velocity of the liquid column at this point. Because the $fL/2D$ value for the Harris piping configuration is 19.2, the licensee concluded that the column closure velocity would not change significantly as a result of check valve back leakage and, thus, the resulting increase in the void size would not have a significant impact on the results of the waterhammer analysis for the Harris plant.

The NRC staff notes that Figure 6.8-2 of EPRI TR-106238 is the same as Figure 5-1 in EPRI TR-1006456, Generic Letter 96-06 Waterhammer Issues Resolution Users Manual, which has been approved by the NRC staff specifically for addressing the GL 96-06 waterhammer issue. The NRC staff's approval of this EPRI waterhammer analytical methodology was provided in a safety evaluation dated April 3, 2002. As shown on Figure 5-1 of EPRI TR-1006456, the column closure impact velocity varies as a function of the void ratio (i.e., the length of liquid remaining in the column compared to the total length of the column, or X_o/L). For void ratios that are less than or equal to 0.8, the column closure impact velocity will essentially be equivalent to the steady state velocity (depicted as V_o in Figure 5-1), and the staff agrees that check valve back leakage will not have a significant impact on the waterhammer analysis if this is the case. Therefore, the licensee is requested to confirm that the void ratio that was used in the Harris waterhammer analysis is less than or equal to 0.8.