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SUBJECT: Provides supplemental info re water level calculation in RETRAN model.

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U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Gentlemen:

Subject: **WNP-2, OPERATING LICENSE NPF-21**
WATER LEVEL CALCULATION IN WNP-2 RETRAN MODEL
(TAC NO. M81723) -SUPPLEMENTAL INFORMATION

References:

1) Letter GO2-92-274, dated March 5, 1992, GC Sorenson (SS) to NRC, "Response to Second Request for Information Regarding Topical Report WPPSS-FTS-129, 'BWR Transient Analysis Model' (TAC No. 77048)"

2) Letter GO2-94-192, dated August 12, 1994, JV Parrish (SS) to NRC, "Revised Response to Request for Additional Information Regarding Topical Report WPPSS-FTS-131, 'Applications Topical Report for BWR Design and Analysis' (TAC Nos. 77048 and M81723)"

3) Siemens Power Corporation, "WNP-2 Cycle 7 Plant Transient Analysis", ANF-91-01, Figure 3.9, dated February 1991

4) Letter dated May 23, 1990, AC Thadani (NRC) to RA Copeland (SPC), "Acceptance for Referencing Licensing Topical Report ANF-913 'COTRANSAZ: A Computer Program for Boiling Water Reactor Transient Analysis' (TAC No. 68356)"

5) Letter dated August 28, 1995, JV Parrish (SS) to NRC, "Clarification Regarding Safety Evaluation for Topical Report WPPSS-FTS-131 (TAC No. M81723)"

6) Letter dated October 12, 1994, JW Clifford (NRC) to JV Parrish (SS), "Approval of Topical Report FTS-131, 'Applications Topical Report for BWR Design and Analysis,' for the Washington Public Power Supply System Nuclear Project No. 2 (TAC No. M81723)"

A001

WATER LEVEL CALCULATION IN WNP-2 RETRAN MODEL (TAC NO. M81723) - SUPPLEMENTAL INFORMATION

This responds to the staff's September 15, 1995, questions regarding the use of a different feedwater flow rate from the vendor in comparing the water level predictions for the feedwater controller failure (FWCF) transient. The Supply System methodology assumes a faster rate of feedwater flow than Siemens Power Corporation (SPC) since a step change in feedwater flow is used by the Supply System as opposed to the ramp increase in flow used by SPC. Therefore, when comparing water level predictions, under these assumptions, it was not possible to separate the effect of different water level models from the effect of different feedwater flow rates. In order to allow meaningful comparisons of the water level models, it is necessary to compare the predictions assuming identical feedwater flow rates. The staff requested that such a comparison be provided.

Reference 1, Question 6, response provides, in Figure 23, a water level comparison between WNP-2 RETRAN and SPC models for the FWCF transient. Identical feedwater flow rates were used by both models. The flow rate input to the RETRAN code is shown in the attached Figure 1.

The RETRAN model predicted a water level lower than that predicted by SPC and provided in the Reference 1, Question 6 response. The response also stated that this lower water level is conservative because a lower water level would delay the main turbine trip on high reactor water level (Level 8). The turbine trip delay results in vessel pressurization at a higher power level and delays the time to scram, resulting in further conservatism. This was confirmed by a sensitivity study also presented in the response.

Subsequent to the September 15, 1995 discussion, the staff asked the Supply System to extend the water level comparisons to the point of Level 8 trip. In the process of doing so, we realized that the SPC analysis initiated the FWCF transient at a water level of 31.5" above instrument zero, not the nominal value of 36" used in the Supply System analysis provided by Reference 1 (Figure 23). In addition, the feedwater increase in the WNP-2 model starts after one second, whereas the SPC model starts at time zero. The one second simulation in the Supply System results is a null transient and is included in the RETRAN model to calculate steady-state conditions prior to initiation of a transient. However, it should not have been included in the Figure 23 comparison. As discussed below, these shifts do not change the conclusions provided by Reference 1 which described the difference in water level responses between the SPC and Supply System models.

We have rerun the FWCF case with the water level set to 31.5" at transient initiation to provide an equivalent basis for water level comparison between the WNP-2 and SPC runs. The net effect is a shift of 4.5" throughout the transient. The resulting transient duration was extended and is presented in the attached Figure 2. Figure 2 provides the point of turbine trip at Level 8 for both WNP-2 and SPC simulations, assuming identical initial water level and transient initiation time. The WNP-2 water level prediction results in a later trip than SPC (24.5 seconds versus 20 seconds). The divergence in water levels after the main turbine trip is due to the fact

that SPC model does not credit a feedwater trip whereas the WNP-2 model does. The automatic feedwater flow trip at Level 8 has no effect on the ΔCPR value as described in the Reference 2, Question 18 response. The SPC water level shown in the attached Figure 2 was obtained from Reference 3. SPC calculated the water level using the NRC approved code COTRANSA2 (Reference 4).

The WNP-2 step-change model is consistent with General Electric's original core licensing approach, which is presented in WNP-2 FSAR Chapter 15 safety analyses. The Supply System has retained the step-change modeling because it provides an overall conservative result in thermal limits. The conservative results in ΔCPR calculations for FWCF transients presented in Reference 5 are based on this modeling which was submitted to and originally reviewed by the staff (Reference 6).

The comparison shown in the attached Figure 2 demonstrates that the WNP-2 water level model provides a conservative response to significant level transients (> 30") when compared to SPC's methods.

Should you have any questions or desire additional information regarding this matter, please call me or contact Dave Swank at (509) 377-4563.

Sincerely,

G. V. Parrish (Mail Drop 1023)
Vice President, Nuclear Operations

SHB:slc

Attachments

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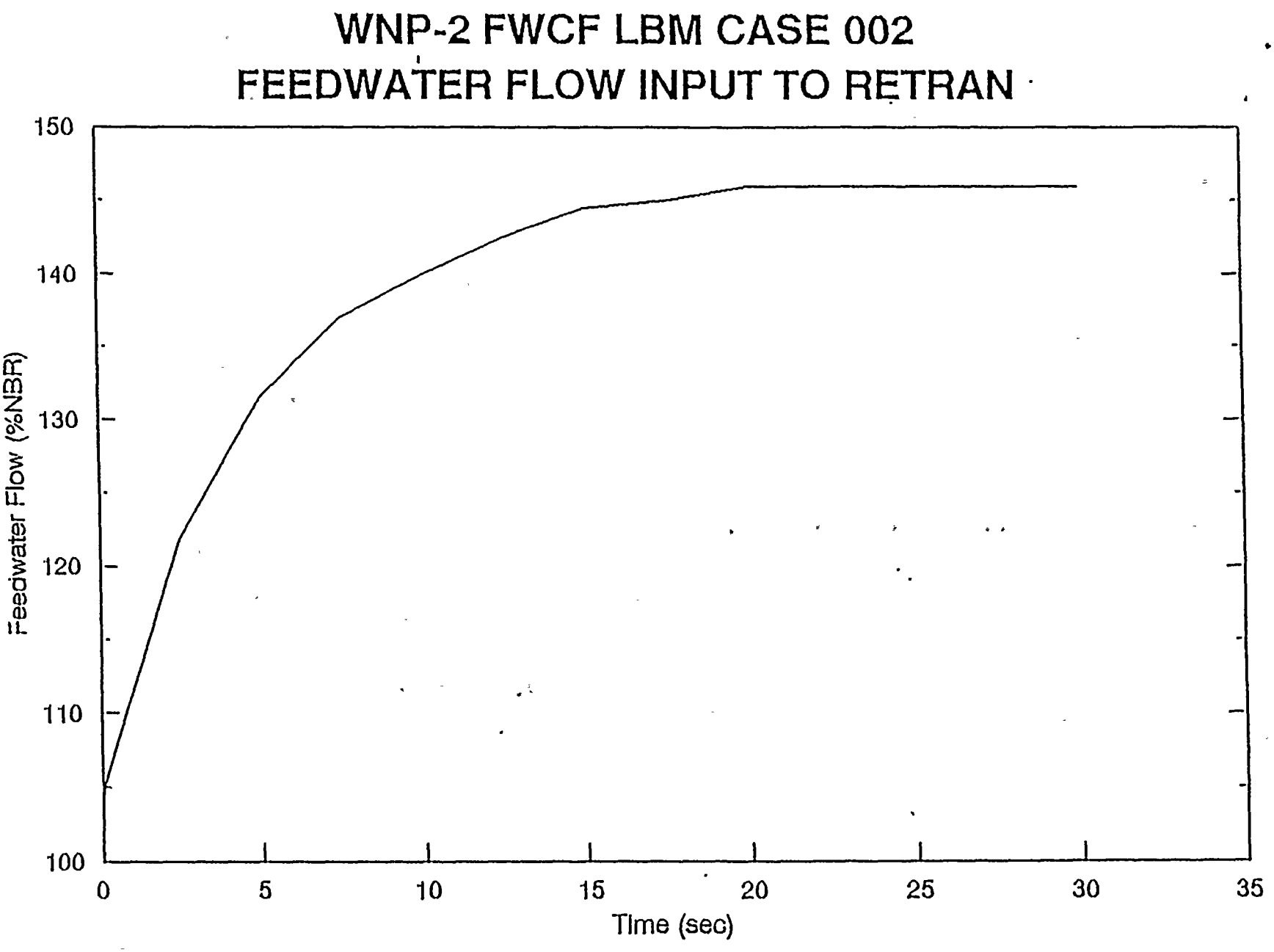
WNP-2 FWCF LBM CASE 002
FEEDWATER FLOW INPUT TO RETRAN
Feedwater Flow (%NBR)
150
140
130
120
110
100
0
5
10
15
20
25
30
35
Time (sec)

Figure 1

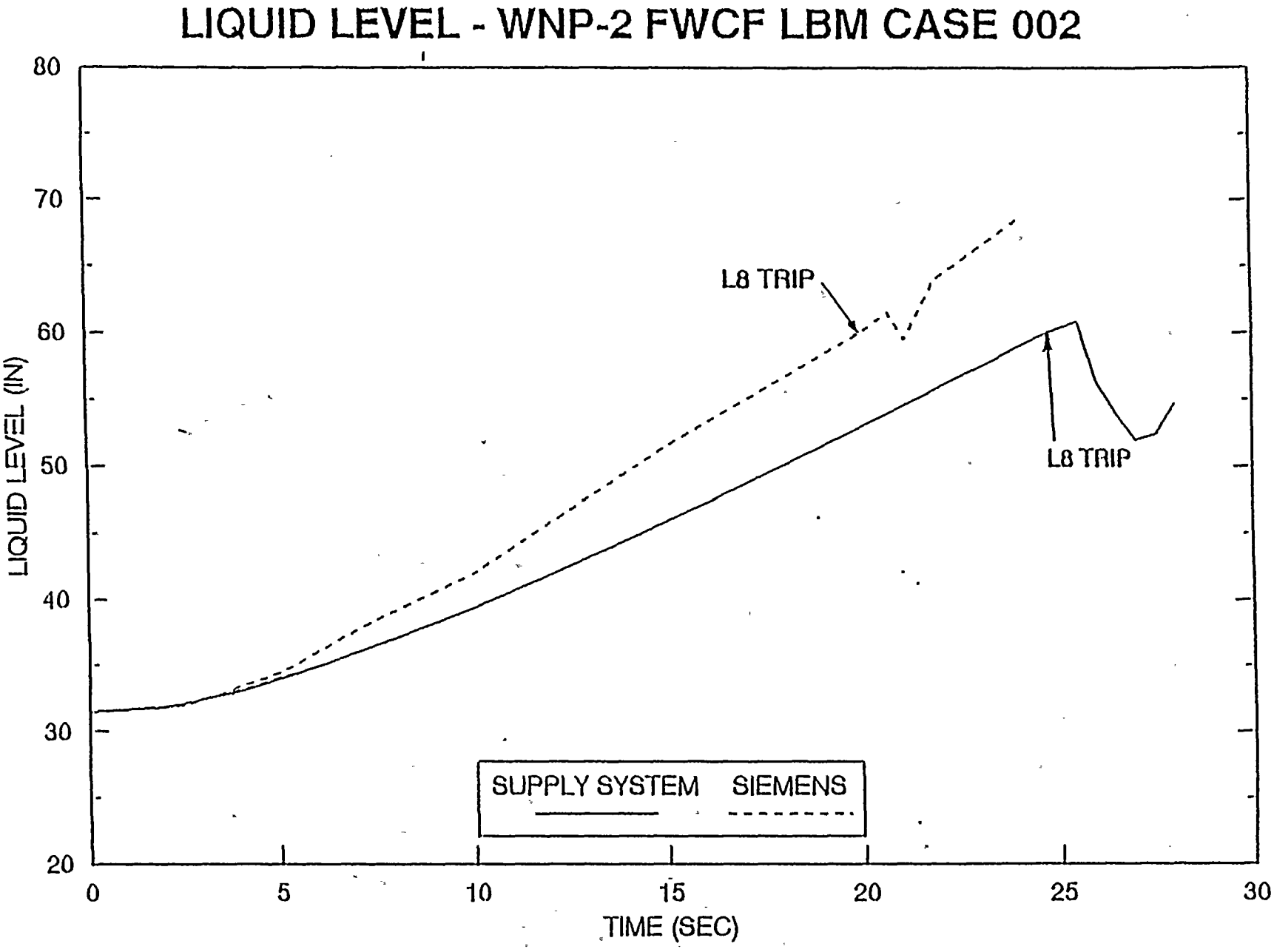
LIQUID LEVEL - WNP-2 FWCF LBM CASE 002
LIQUID LEVEL (IN)
80
70
60
50
40
30
20
0
5
10
15
20
25
30
TIME (SEC)
L8 TRIP
L8 TRIP
SUPPLY SYSTEM
SIEMENS

Figure 2