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SUBJECT: Forwards 971105 ltr from ABB to WPPSS re plant cycle 14 safety limit MCPR for SVEA-96 fuel bases on reference core.

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January 28, 1998
GO2-98-018

Docket No. 50-397

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Gentlemen:

Subject: **WNP-2, OPERATING LICENSE NPF-21, CYCLE 14 SAFETY LIMIT MINIMUM CRITICAL POWER RATIO, ADDITIONAL INFORMATION**

As requested by the WNP-2 Project Manager, please find attached a letter from ABB to the Supply System regarding "WNP-2 Cycle 14 Safety Limit Minimum Critical Power Ratio for SVEA-96 Fuel Based on Reference Core." This is listed as Reference 7 of letter GO2-97-219 dated December 4, 1997, PR Bemis (SS) to NRC, "Request for Amendment Minimum Critical Power Ratio Safety Limits"

Should you have any questions or desire additional information regarding this matter, please call me or PJ Inserra at (509) 377-4147.

Respectfully,

D. W. Coleman

DW Coleman
Acting Manager, Regulatory Affairs
Mail Drop PE20

A001 /1

Attachment

cc: EW Merschoff - NRC RIV
KE Perkins, Jr. - NRC RIV, WCFO
C Poslusny, Jr. - NRR
NRC Sr. Resident Inspector - 927N
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ABB

November 5, 1997
ABBWP-97-104, Rev. 1
R- 11/10/97

Mr. R. A. Vopalensky
Mail Drop PE10
Washington Public Power Supply System
3000 George Washington Way
P.O. Box 968
Richland, Wa 99352

Subject: WNP-2 Cycle 14 Safety Limit Minimum Critical Power Ratio for SVEA-96 Fuel Based on Reference Core

References:
1. Letter WPABB-97-047, dated October 17, 1997, transmitting Supply System Report WNP2-FTS-142, "WNP2 Cycle 14 Reference Reload Design Report."
2 CENPD-300-P-A, "Reference Safety Report for ABB BWR Fuel", July, 1996.
3. Letter ABBWP-96-100, dated October 19, 1996, "WNP2 Cycle 13 Safety Limit Minimum Critical Power Ratio for SVEA-96 Fuel."
4 CE NPSD-820-P, "WNP-2 Cycle 13 Transient Analysis Report," April, 1997.

Dear Mr. Vopalensky:

ABB has completed an evaluation of the SVEA-96 Safety Limit Minimum Critical Power Ratio (SLMCPR) for WNP-2 Cycle 14. This evaluation is based on the Reference Core loading pattern and state point depletion strategy in Reference 1. The SVEA-96 SLMCPR was determined as a function of cycle exposure based on conservative radial power distributions established at critical control rod positions as predicted with the ABB three-dimensional nodal simulator, POLCA. The approved methodology documented in Reference 2 was utilized for this evaluation.

The evaluation of the SLMCPR as a function of cycle exposure established that the value at a cycle exposure late in the cycle (5,500 MWd/MtU) provides a conservative value of the SVEA-96 SLMCPR for the entire cycle. Accordingly, the results in Table 1 can be used to establish the SVEA-96 Cycle 14 SLMCPR.

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The two-loop results in Table 1 can be used to conservatively represent the entire cycle. The radial power distribution used to establish the two-loop SLMCPR in Table 1 provides 10% margin to the Operating Limit MCPR (OLMCPR) at 100% power and 100% flow with a control rod density of about 2.6%. Sensitivity studies have demonstrated that selection of a control rod pattern which would place the lead assembly at the OLMCPR late in the cycle would lead to a substantially less uniform assembly power distribution causing a reduction in the SLMCPR. Therefore, it would be very difficult to establish a realistic control rod pattern which would place the lead assembly at the OLMCPR and lead to a radial power distribution giving the SLMCPR values quoted in Table 1.

The single-loop results in Table 1 provide a very conservative representation of the entire cycle. The radial power distribution used to establish the single-loop SLMCPR provides 9% margin to the Operating Limit MCPR (OLMCPR) at 75% power and 50% flow with a control rod density of about 1.8%. The lower control rod density reflects a higher core average void in the single-loop case than the two-loop, 100 % power, 100% flow case. As in the two-loop case, sensitivity studies indicate that selection of a control rod pattern which would place the lead assembly at the OLMCPR would cause a substantial reduction in the SLMCPR. At a control rod density of 1.8% it would be very difficult, and is probably not credible, to establish a realistic control rod pattern which would place the lead assembly at the OLMCPR and predict a radial power distribution giving the single-loop SLMCPR values quoted in Table 1.

Table 2 shows the Cycle 13 results at 5,500 MWd/MtU which were used to establish the Cycle 13 SLMCPR. These results were provided to the Supply System in Reference 3. As shown in Table 2, the two-loop results for Cycles 13 and 14 are not significantly different. Two-loop SLMCPR values of 1.09 and 1.07 continue to be supported in Cycle 14 for cases in which the mean channel bow of 0.4 mm is not included and is included in the monitored MCPR, respectively.

The single-loop SLMCPR results are about 0.006 greater for Cycle 14 than they were for Cycle 13. The higher Cycle 14 results are considered to be due to an assembly radial power distribution used for the Cycle 14 calculations which places a slightly greater number of assemblies close to the peak assembly power than for the Cycle 13 calculations. Therefore, the increase in SLMCPR for Cycle 14 is attributed to a slightly higher level of conservatism in the Cycle 14 calculations rather than a fundamental difference in the Cycle 13 and Cycle 14 Reference Cores. These results, however, no longer support a single-loop SLMCPR of 1.08 with the mean bow included in the monitored MCPR. While the results in Table 1 are considered very conservative, they do provide some margin to possible changes in Cycle

14 core design relative to the Reference Core in Reference 1 for which they were established.

It should be noted that utilization of two-loop and single-loop values of 1.07 and 1.09 requires that the SVEA-96 assembly Critical Power Ratios (CPRs) calculated in the Core Supervision System should include the effect of a mean channel bow of 0.4 mm in the monitored MCPR.

Should the Reference Core upon which the Cycle 14 licensing analysis is based or the as-loaded Cycle 14 core differ from that described in Reference 1, the continued applicability of the SLMCPRs in Table 1 will require confirmation.

A discussion of the Cycle 14 SLMCPR similar to that in Reference 4 will be included in the Cycle 14 Transient Analysis Report.

Please contact Bill Harris at (860) 687-8014 with any questions.

Best Regards,

Richard Matheny
Project Manager

Note : Revision 1 corrects typographical errors in Revision 0 issued on October 27, 1997.

cc: W. Wolkenhauer
R. Torres
J. Teachman

TABLE 1

CYCLE 14 REFERENCE CORE SLMCPR VALUES

	Bow not included in Monitored MCPR		0.4 mm Bow Included in monitored MCPR	
	Calculated Value	Nearest one-hundredth, quoted Value	Calculated Value	Nearest one-hundredth, quoted Value
Two-loop	1.087	1.09	1.065	1.07
Single-loop	1.114	1.11	1.091	1.09

TABLE 2

CYCLE 13 REFERENCE CORE SLMCPR VALUES

	Bow not included in Monitored MCPR		0.4 mm Bow Included in monitored MCPR	
	Calculated Value	Nearest one-hundredth, quoted Value	Calculated Value	Nearest one-hundredth, quoted Value
Two-loop	1.091	1.09	1.068	1.07
Single-loop	1.108	1.11	1.0845	1.08