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SUBJECT: Application for amend to license NPF-21, modifying min
 critical power ratio safety limits by 980515 to allow
 continued power operation at WNP-2 following restart from
 R-13 refueling outage.

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WASHINGTON PUBLIC POWER SUPPLY SYSTEM

P.O. Box 968 • Richland, Washington 99352-0968

December 4, 1997
GO2-97-219

Docket No. 50-397

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

Gentlemen:

Subject: **WNP-2 OPERATING LICENSE NPF-21
REQUEST FOR AMENDMENT
MINIMUM CRITICAL POWER RATIO SAFETY LIMITS**

- References:
- 1) ANFB Critical Power Correlation Uncertainty for Limited Data Sets, ANF-1125(P), Supplement 1, Appendix D, Siemens Power Corporation - Nuclear Division, Submitted on April 18, 1997
 - 2) ANFB Critical Power Correlation, ANF-1125(P)(A) with Supplements 1 and 2, Advanced Nuclear Fuels Corporation, April 1990
 - 3) Letter KVW:97:115 dated May 20, 1997, KV Walters (Siemens) to RA Vopalensky (Supply System), Revised MCPR Safety Limits for WNP-2 Cycle 11
 - 4) Letter KVW:97:077 dated April 8, 1997, KV Walters (Siemens) to RA Vopalensky (Supply System), "ANFB Additive Constant Uncertainties for the SPC 9x9-9X Fuel Design"
 - 5) Letter HDC:97:033 dated April 18, 1997, HD Curet (Siemens) to US NRC Document Control Desk, "Interim Use of Increased ANFB Additive Constant Uncertainty"

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- 6) Letter dated July 3, 1997, TG Colburn (NRC) to JV Parrish (Supply System), "Issuance of Amendment for the Washington Public Power Supply System Nuclear Project No. 2 (TAC No. M98746) (Amendment No. 151)"
- 7) Letter dated November 5, 1997, ABBWP-97-104, Rev. 1, R Matheny (ABB) to RA Vopalensky (Supply System), "WNP-2 Cycle 14 Safety Limit Minimum Critical Power Ratio for SVEA-96 Fuel Based on Reference Core"

In accordance with the Code of Federal Regulations, Title 10, Parts 50.59, 50.90, and 2.101, the Supply System hereby submits a request for amendment of the WNP-2 Operating License. Specifically, the Supply System is requesting modification of the minimum critical power ratio safety limits by May 15, 1998. Approval of the proposed change is necessary to allow continued power operation at WNP-2 following restart from the R-13 refueling outage.

The proposed change would extend application of the current Cycle 13 Technical Specifications for Siemens Power Corporation (SPC) ATRIUM-9X fuel into Cycle 14. The current ATRIUM-9X minimum critical power ratio (MCPR) in Section 2.1.1.2 of 1.13 for two loop operation and 1.14 for single loop operation (Reference 3) would be applied in Cycle 14 as well. This fuel is co-resident with Asea Brown Boveri (ABB) fuel at WNP-2. The ABB fuel MCPR safety limit for two loop operation (1.07) is unchanged. The ABB fuel MCPR safety limit for single loop operation is increased from 1.08 to 1.09 (Reference 7) for Cycle 14.

SPC notified the Supply System (Reference 4) and other users of the ATRIUM-9 fuel design that a change was necessary in the previously approved method used by SPC to determine the additive constant uncertainty (Reference 2). This change affects the MCPR safety limits for the ATRIUM-9 fuel used at WNP-2 (Reference 3). The proposed amendment requests NRC approval for the continued use of the same interim safety limits for the ATRIUM-9 fuel in Cycle 14 that were previously established (Reference 5) and approved (Reference 6) for Cycle 13. Continued use of the interim values is being requested because the revised methodology submitted by SPC (Reference 1) has not been approved by the NRC. Following NRC approval of the SPC method, another license amendment is anticipated to revise the interim MCPR safety limits.

Additional information has been attached to this letter to complete the Supply System's amendment request. Attachment 1 provides a detailed description of the proposed changes. Attachment 2 summarizes the proposed changes and provides marked up pages of the Technical Specifications. Attachment 3 describes an evaluation of the proposed changes in accordance with 10CFR50.92(c) and concludes they do not result in a significant hazards consideration. Attachment 4 provides the Environmental Assessment Applicability Review and notes that the proposed change meets the eligibility criteria for a categorical exclusion as set forth in 10CFR51.22(c)(9). Therefore, in accordance with 10CFR51.22(b), an environmental assessment of the change is not required. Attachment 5 submits the typed Technical Specification pages as they would be revised by this amendment.

This request for an amendment has been reviewed and approved by the WNP-2 Plant Operations Committee and the Supply System Corporate Nuclear Safety Review Board. In accordance with 10CFR50.91, the state of Washington has been provided a copy of this letter.



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

Respectfully,



P.R. Bemis

Vice President, Nuclear Operations

Mail Drop PE23

Attachments:

1. Description of the Proposed Change
2. Marked up Technical Specification Pages
3. Evaluation of Significant Hazards Considerations
4. Environmental Assessment Applicability Review
5. Revised Technical Specification Pages

cc: EW Merschoff - NRC RIV
KE Perkins, Jr. - NRC RIV, Walnut Creek Field Office
TG Colburn - NRR
C Poslusny, Jr. - NRR
NRC Sr. Resident Inspector - 927N
DL Williams - BPA/399
CR Wallis - EFSEC
PD Robinson - Winston & Strawn




STATE OF WASHINGTON)
COUNTY OF BENTON)

Subject: Request for Amendment Minimum
Critical Power Ratio Safety Limits


I, G. O. SMITH, being duly sworn, subscribe to and say that I am the Acting, Vice President, Nuclear Operations for the WASHINGTON PUBLIC POWER SUPPLY SYSTEM, the applicant herein; that I have the full authority to execute this oath; that I have reviewed the foregoing; and that to the best of my knowledge, information, and belief the statements made in it are true.

DATE 12/21, 1997


G. O. Smith
Acting, Vice President, Nuclear Operations

On this date personally appeared before me G.O. Smith, to me known to be the individual who executed the foregoing instrument, and acknowledged that he signed the same as his free act and deed for the uses and purposes herein mentioned.

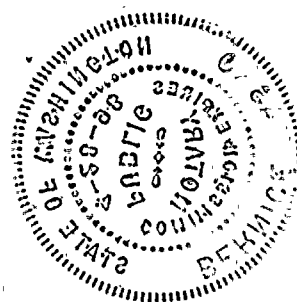
GIVEN under my hand and seal this 21st day of December 1997


Notary Public in and for the
STATE OF WASHINGTON



Residing at Benton County

My Commission Expires 4/28/98



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Attachment 1, Page 1 of 3

Description of the Proposed Changes

1. Summary of the Proposed Changes

The current licensing analysis projects Cycle 14 will be comprised of 124 fresh ABB assemblies, 112 once-burned ABB assemblies, 104 twice-burned ABB assemblies, and 424 of the at least thrice-burned SPC ATRIUM-9X assemblies. The NRC approved methodology (i.e., COLR Reference 11: CENPD-300-P-A) assumes that the safety limit MCPR (SLMCPR) for the non-ABB resident fuel is unchanged from the last cycle for which it was evaluated by its supplier. The ATRIUM-9X fuel was last evaluated by SPC in Cycle 11. Accordingly, a new ATRIUM-9X SLMCPR for Cycle 11 has been determined by SPC (Reference 3) using the changes to the additive constant uncertainty discussed below. The SPC determined SLMCPR was applied by ABB to Cycle 14 and will be applied to future cycles that use the ATRIUM-9X fuel.

A license amendment is being requested to:

- continue the use of the existing SPC MCPR safety limits (Technical Specifications Section 2.1.1.2) in Cycle 14 that were previously approved for Cycle 13; and
- to change the ABB MCPR safety limit for single loop operation from 1.08 for Cycle 13 to 1.09 for Cycle 14.

ABB has calculated single loop SLMCPR results that are about 0.006 greater for Cycle 14 than they were for Cycle 13 (Reference 7). The higher Cycle 14 results are 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. The increase in ABB single loop MCPR safety limit is attributed to a slightly more conservative assembly power distribution used in the Cycle 14 calculations following ABB standard methodology. While the Cycle 13 result is also conservative, the increase in Cycle 14 is intended to accommodate small cycle to cycle variability.

Continued use of the MCPR safety limit increase on ATRIUM-9X fuel during Cycle 14 is due to a new additive constant uncertainty calculated and conservatively applied by SPC to the ATRIUM-9X fuel. This new ATRIUM-9X additive constant uncertainty is necessary because SPC has determined that the original data base (82 points) used to determine the ATRIUM-9X additive constant uncertainty should be expanded to include a wider range of test conditions (Reference 4). In response to this need for additional data points, SPC compiled a larger set of data for the recalculation of the additive constant uncertainty. Data sets from fuel designs which, like ATRIUM-9X, have full length rods, 9x9 design, and inner water channels were included in the statistical analysis to provide a data pool of 527 points at different pressures and flows. The revised methodology for treating the uncertainties has been submitted to the NRC for approval (Reference 1).

Until the new SPC methodology is approved by the NRC (Reference 1), an interim approach will be used that provides additional conservatism in the calculation of the MCPR safety limit consistent with Reference 5. Reference 5 established a conservative additive constant uncertainty using the difference calculated between the additive constant uncertainties for the ATRIUM-9B before and after the data set was expanded from 125 to 527 points. This difference was then conservatively doubled and added



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to the original additive constant uncertainty (based on the 125 point data set) to establish a new interim value. This interim value can be applied to the ATRIUM-9X fuel because the expanded data set covers both the ATRIUM-9B and ATRIUM-9X fuel designs.

This conservative interim additive constant uncertainty was then used by SPC in conjunction with their original NRC approved methodology (Reference 2) to determine the appropriate MCPR safety limit for the ATRIUM-9X fuel in WNP-2 Cycle 11 (the ATRIUM-9X design was the lead fuel in that cycle). Accordingly, the interim MCPR safety limits for the ATRIUM-9X fuel have been determined by SPC to be 1.13 for two loop operation and 1.14 for single loop operation.(Reference 3).

The Supply System believes that this conservative approach for calculating the interim MCPR safety limit will continue to ensure design basis fuel protection while Reference 1 is under NRC staff review. Using NRC approved methodology, ABB applied these interim values as the basis for the Cycle 14 safety limit for the co-resident ATRIUM-9X.

After NRC approval of Reference 1, another license amendment is anticipated to change (lower) the ATRIUM-9X MCPR safety limit to a value supported by the new NRC approved methodology (based on the revised data base).

2. Detailed Description of the Proposed Safety Limit Changes

A) Siemens Power Corporation (SPC)

Just as in Cycle 13, WNP-2 will use Siemens Power Corporation (SPC) ATRIUM-9X fuel assemblies in Cycle 14 operation. SPC has determined that the need existed to increase the size of the data base for determining the additive constant uncertainty for SPC's ATRIUM-9X fuel designs with an internal water channel (Reference 4). SPC calculated a new additive constant uncertainty (ACU) for the ATRIUM-9X fuel by including additional experimental data from critical power tests for other fuel designs which share many of the same design features as the ATRIUM-9X design. The information was selected to address the full operating range of the fuel. Reference 1 details the statistical analysis performed on the data.

SPC increased its ATRIUM-9X and ATRIUM-9B critical power test data base from 82 and 125 data points, respectively, to 527 data points that cover a much wider range of pressures, mass fluxes and axial power shapes. The Experimental Critical Power Ratio (ECPR) and the standard deviation of the ECPR for each of the 527 data points were statistically examined by an Analysis of Variance. The results of the Analysis of Variance for each of the pressures are a mean ECPR, a standard deviation of ECPR, degrees of freedom, and equivalent sample size (Reference 1).

The overall uncertainty for CPR is statistically calculated using the standard deviation of the pooled data and the variance between the means associated with the axial power shapes. An upper 95% confidence limit standard deviation is calculated based on Chi-Square for the calculated degrees of freedom. The overall standard deviation in ECPR is converted to an ACU. The conversion is derived from the ratios of the ANFB correlation standard deviation to the additive constant standard deviation for the ATRIUM-9X data. This calculation is explained in detail in Reference 1 and summarized below:

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Overall Standard Deviation = 0.0388 (Reference 1)

ECPR to ACU Ratio = 1.99 (Reference 1)

ACU for ATRIUM-9X (data set of 527 points) = $0.0388 \div 1.99 = 0.0195$

For additional conservatism, this calculated additive constant uncertainty is not directly applied to the MCPR safety limit calculation. Rather, a conservative additive constant uncertainty is used to calculate a new ATRIUM-9X MCPR safety limit for WNP-2 Cycle 11.

Utilizing the ATRIUM-9B design as the basis, the difference is calculated between the additive constant uncertainties after and prior to the data set being expanded to include 527 points. This difference is then conservatively doubled. The doubled difference in the additive constant uncertainties is then added to the additive constant uncertainty prior to the expansion of the data set (based on 125 data points). This calculation is summarized below:

Additive Constant Uncertainty for ATRIUM-9B (data set of 125 points) = 0.010

Additive Constant Uncertainty for ATRIUM-9B (data set of 527 points) = 0.0195

Calculation of the interim Additive Constant Uncertainty for the ATRIUM-9B =

$$(0.010 + 2(0.0195 - 0.010)) = 0.029$$

The resulting conservative additive constant uncertainty of 0.029 for ATRIUM-9B was then applied to the ATRIUM-9X fuel and was used to calculate the interim MCPR safety limits of 1.13 (two loop operation) and 1.14 (single loop operation) for ATRIUM-9X fuel for WNP-2 Cycle 11 (Reference 3). Using NRC approved ABB methodology, these MCPR safety limit values apply for future cycles for the ATRIUM-9X fuel.

After NRC approval of Reference 1, an additional license amendment is anticipated to change (lower) the MCPR safety limit for the ATRIUM-9X fuel based on the application of the newly approved methodology.

B) Asea Brown Boveri (ABB)

ABB has completed an evaluation of the cycle dependent SVEA-96 Safety Limit Minimum Critical Power Ratio (SLMCPR) for WNP-2 Cycle 14 (Reference 7). The Cycle 14 SLMCPR of 1.07 for two loop operation remains unchanged from Cycle 13. The SLMCPR for single loop operation has been determined to be 1.09 for Cycle 14. The calculated single loop SLMCPR results are about 0.006 greater for Cycle 14 than they were for Cycle 13. The higher Cycle 14 results are 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. The increase in single loop MCPR safety limit is attributed to a slightly more conservative assembly power distribution used in the Cycle 14 calculations following ABB standard methodology. While the Cycle 13 result is also conservative, the increase in Cycle 14 is intended to accommodate small cycle to cycle variability.

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