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SUBJECT: Responds to NRC 930830 ltr re violations noted in insp rept 50-397/93-24.C/As:personnel will review & incorporate technical changes to Vol 9 procedures & shift engineers will perform an independent technical review of procedures.

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WASHINGTON PUBLIC POWER SUPPLY SYSTEM

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September 30, 1993
G02-93-240

Docket No. 50-397

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

Gentlemen:

Subject: **WNP-2, OPERATING LICENSE NO. NPF-21**
NRC INSPECTION REPORT 93-24
RESPONSE TO NOTICE OF VIOLATION

The Washington Public Power Supply System hereby replies to the Notice of Violation contained in your letter dated August 30, 1993. Our reply, pursuant to the provisions of Section 2.201, Title 10, Code of Federal Regulations, consists of this letter and Appendix A (attached).

In Appendix A, the violation is addressed with an explanation of our position regarding validity, corrective action and date of full compliance.

Sincerely,

J. V. Parrish (Mail Drop 1023)
Assistant Managing Director, Operations

CDM/bk

Attachments

cc: BH Faulkenberry - NRC RV
NS Reynolds - Winston & Strawn
JW Clifford - NRR
DL Williams - BPA/399
NRC Site Inspector - 901A

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Appendix A

During an NRC inspection conducted on June 22 through August 2, 1993, a violation of NRC requirements was identified. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," 10 CFR Part 2, Appendix C, the violation is listed below:

10 CFR 50, Appendix B, Criterion V, requires, in part, that activities affecting quality be prescribed by procedures of a type appropriate to the circumstances.

Contrary to the above, the following two WNP-2 procedures were found to be inappropriate to the circumstances:

1. As of July 16, 1993, WNP-2 Plant Procedures Manual (PPM) 9.3.1, "Manual Core Heat Balance," Revision 6, was inadequate in that it directed data to be taken for total reactor water cleanup (RWCU) flow by using computer data points which did not reflect the actual flow through the bypassed RWCU demineralizers. This error allowed a non-conservative value for the calculation of core thermal power.

2. As of June 22, 1993, PPM 7.4.1.1, "Reactor Shutdown Margin and/or Demonstration," was inadequate in that it did not provide direction to the user regarding which value of K_{eff} to use to calculate the effective neutron multiplication factor (K_{eff}) with all rods in. PPM 7.4.1.1 referenced two different values in the "Startup Operations Letter Report." PPM 7.4.1.1 also did not provide direction to the user regarding which of the two referenced values for moderatior temperature coefficient (MTC) should be used. As a result, the wrong values for K_{eff} and the MTC were used during the performance of PPM 7.4.1.1 on June 21, 1993.

This is a Severity Level IV violation (Supplement I).

Validity of Violation

The Supply System acknowledges the validity of this violation. The two examples cited in this violation are representative of a lack of a questioning attitude on the part of Supply System Engineering personnel. Management continues to focus on developing a "questioning" culture throughout the Supply System. This effort is being pursued on two fronts: (1) rewarding those individuals who demonstrate the desired questioning attitude, and (2) counseling those organizations and individuals who fail to demonstrate this behavior. The recent discovery of a containment bypass pathway through the Containment Atmosphere Control (CAC) system (LER 93-016) and the identification of a main steam line leak (LER 93-027) indicate that some individuals do possess the desired questioning attitude. Supply System management believe that the desired cultural change can be achieved by their ongoing effort to resolve this concern.

1. Core Thermal Power (CTP)

On July 16, 1993, a NRC Resident Inspector reviewed PPM 9.3.1, "Manual Core Heat Balance," for technical adequacy. The NRC inspector was initially concerned when he calculated a reactor power significantly greater than the license limit. This was resolved with the assistance of a Reactor Engineer. However, in the subsequent discussion, another concern was identified with regard to Reactor Water Cleanup (RWCU) system flow. PPM 9.3.1 allows the user the option of obtaining RWCU demineralizer flow from Plant Process Computer Replacement System (PPCRS) computer points B021 and B024, or flow indicator RWCU-FI-609 at Control Room Panel E-CP-H13/P602. The NRC inspector questioned the fact that the RWCU demineralizer flow obtained from the computer points was a "factor of three" less than the flow indicated at the Control Room Panel. The RWCU demineralizer flow from the computer points is used in the automatic PPCRS calculation of CTP, and this calculated CTP value is monitored for compliance with the Operating License CTP limit of 3323 MW_{th}. The NRC inspector calculated CTP using the different values for RWCU demineralizer flow and found the difference to be 4 MW_{th}. Further investigation by the NRC inspector revealed that one of the RWCU demineralizers was bypassed, and the bypass flow power contribution of approximately 2.5 MW_{th} was not accounted for in the CTP calculation when the computer point flow values were used. In addition, a Supply System Reactor Engineer discovered a nonconservative error in the temperature compensation density assumption for the computer points. This error results in a power contribution of approximately 1.14 MW_{th} not being included in the CTP calculation. The sum of the RWCU demineralizer bypass flow and computer point temperature compensation errors equate to approximately 3.64 MW_{th}. Within expected inaccuracies, this accounts for the 4 MW_{th} difference in total CTP values calculated by the NRC inspector.

RWCU demineralizer flow computer points B021 and B024 have been used by the PPCRS for total RWCU system flow in the automatic CTP calculation since initial plant startup. General Electric (GE) computer programming information (NEDE-24810) listed these computer points for use in this application. However, the computer points are configured to monitor flow only through their associated RWCU demineralizers. When a RWCU demineralizer is removed from service (isolated), the flow through that demineralizer goes to zero. Accordingly, the computer point monitoring flow through the isolated demineralizer provides a zero flow input to the PPCRS for the CTP calculation. Computer points B021 and B024 were added to Revision 5 of PPM 9.3.1 to facilitate data collection for a new Personal Computer (PC) based CTP calculation program that could be used if the PPCRS automatic calculation was unavailable. These computer points were selected to make the PC and PPCRS data inputs consistent, and because they were the only computer points available that indicated RWCU flow.

When one or both demineralizers are isolated, flow is actually bypassed around the demineralizers through Demineralizer Bypass Valve RWCU-V-44 and adjusted to maintain total RWCU system flow constant. Because of their configuration, the PPCRS computer points do not monitor the bypass flow. Consequently, the use of the computer points to calculate CTP with one or both RWCU demineralizers isolated results in a CTP value that is less than actual..

The root cause for this portion of the violation was that the original computer points established for the total RWCU system flow input to the PPCRS were selected incorrectly prior to initial plant startup. Subsequent procedure reviews and useage did not identify the deficiency.

2. Reactor Shutdown Margin

Surveillance Procedure PPM 7.4.1.1, "Reactor Shutdown Margin Determination and/or Demonstration," was performed on June 19, 1993. The adequacy of the calculations performed in the procedure was subsequently questioned by an NRC Resident Inspector on June 22, 1993. This initiated a review of the completed procedure by a Supply System Reactor Engineer. The reviewer found that the Shutdown Margin for Fuel Cycle 9 had been incorrectly calculated. Problem Evaluation Request (PER) 293-992 was initiated on July 16, 1993, to document the problem. Two issues were determined to be contributors to the problem.

The first issue concerns the PPM 7.4.1.1 calculation for the worth of the strongest control rod. In previous years, the worth of the strongest rod was directly stated in the vendor supplied Startup and Operations [Letter] Report (SOLR). An equation was given in PPM 7.4.1.1 for calculating the worth of the strongest rod if the value was not provided. The equation is as follows:

$$\text{Worth of Strongest Rod} = K_{\text{eff sro}} - K_{\text{eff ari}}$$

The Supply System Station Nuclear Engineer (SNE) correctly calculated the value of $K_{\text{eff sro}}$ (K_{eff} strong rod out) using information provided in the SOLR, but while attempting to determine the value for $K_{\text{eff ari}}$ (K_{eff} all rods in), he encountered two values listed in the SOLR. The two values were given for different temperatures: 68°F and 180°F. Since the average reactor coolant temperature at the time of the calculation was approximately 175°F, the SNE determined the correct value for $K_{\text{eff ari}}$ to be the one given at 180°F. However, based on discussions with the vendor, this value was found to be technically incorrect. Independent of the actual reactor coolant temperature, a reference temperature of 68°F had been established by the vendor. Consequently, the value for $K_{\text{eff ari}}$ at 68°F must be used in the worth of the strongest rod calculation. The value for $K_{\text{eff ari}}$ at 180°F chosen by the SNE was the smaller of the two choices (0.9398 vs. 0.9438), and by the above equation, resulted in a larger than actual value for the worth of the strongest rod. Using the larger rod worth resulted in a 2.324% value for the PPM 7.4.1.1 Reactor Shutdown Margin calculation, which was smaller than the actual corrected value of 2.46%, and therefore, conservative.

The second issue concerns the determination of a Moderator Temperature Coefficient (MTC) to be used in the PPM 7.4.1.1 Shutdown Margin temperature correction calculation. For Fuel Cycles 2 through 5, the SOLR listed only one value for the MTC and did not give an associated rod density. For Fuel Cycles 6 through 9, two values for the MTC were given, one at "predicted critical" and one at "all rods full in." During the June 19, 1993 performance of PPM 7.4.1.1, the SNE chose the value at "predicted critical" for use in the temperature correction calculation. However, again based on discussions with the vendor, this value was found to be the wrong choice. The correct MTC value for the PPM 7.4.1.1 temperature correction calculation was the one at "all rods full in." During past performances of PPM 7.4.1.1 for Fuel Cycles 6 through 8, the MTC value at "predicted critical" had always been used in the temperature correction calculation. To the SNE, the MTC value at "predicted critical" appeared to be the logical choice since the calculation was performed during fuel cycle initial criticality. This logic was confirmed when three other SNEs were independently surveyed to determine which MTC value they would choose for the PPM 7.4.1.1 temperature correction calculation. All three selected the incorrect "predicted critical" value.

The root causes for this portion of the violation were the SNE's misinterpretation of information in the vendor supplied SOLR and the failure to verify that the extracted information was correct for performing the PPM 7.4.1.1 calculations. A contributing cause was that when the vendor changed the format for the SOLR, they omitted some information that had been typically provided and included conditions on parameters that were misleading.

Corrective Steps Taken/Results Achieved

1. A review of over 80 RWCU filter demineralizer backwash cycles was conducted for the period of December 1992 through July 1993, with a spot check of demineralizer outages from October 1992. This review used Control Room Operator Logs and RWCU Filter/Demineralizer Logs to determine if CTP exceeded the WNP-2 Operating License limit of 3323 MW_{th} with RWCU demineralizer(s) bypassed. The review concluded that CTP was maintained at or below the licensed limit.

2. Computer Change Request TE-93-012 was completed to correct the temperature compensation for PPCRS computer points B021 and B024.

3. Technical Evaluation Request (TER) 93-0207 was initiated to evaluate a design change that provides total inlet and outlet RWCU system flow data for the automatic and manual heat balance calculations.

4. PPM 9.3.1 was revised to correct the manual heat balance calculation for conditions when the RWCU demineralizers are bypassed.

5. PPM 2.2.3, "Reactor Water Cleanup System Operations," was revised to administratively limit CTP when removing a RWCU demineralizer from service.

6. A Problem Evaluation Request (PER) history search was performed to establish if the discrepancies associated with PPCRS computer points B021 and B024 were the result of programmatic deficiencies. Based on the results of the history search, the Supply System believes that this computer point problem was not the result of a broader issue or indicative of a trend. No further corrective action is planned.

7. The Reactor Shutdown Margin for Fuel Cycle 9 was recalculated using the correct $K_{eff\ ari}$ value (at 68°F) in the worth of the strongest rod calculation. The new calculation resulted in an increase in Shutdown Margin. Therefore, the Supply System was never in violation of Technical Specification 3/4.1.1, "Shutdown Margin."

8. The Reactor Shutdown Margins for Fuel Cycles 6 through 9 were recalculated using the correct MTC values (at "all rods full in") in the temperature correction calculations. The new calculations show that the Supply System was never in violation of Technical Specification 3/4.1.1.

9. A meeting was held with the WNP-2 nuclear fuel supplier, Siemens Power Corporation, and members of Supply System Fuels Engineering and Reactor Engineering. The meeting determined the correct methodology and conditions for the Shutdown Margin calculation. The SNEs were present at the meeting and are now aware of the correct conditions and assumptions required to perform the Reactor Shutdown Margin calculation.

10. To prevent any future confusion, Siemens Power Corporation will provide future SOLRs with a clearly defined section containing the parameters to be used in the Reactor Shutdown Margin calculation.

11. PPM 7.4.1.1 was revised to clarify the Reactor Shutdown Margin calculation methodology and specify the appropriate information contained in the Shutdown Margin calculation section of the SOLR (from Corrective Action No. 10).

12. In addition to the specific root causes identified above, there is an underlying concern that these issues were not self identified and had gone unnoticed. This is indicative of a lack of a questioning attitude and the willingness to accept past practices without challenging them. The specifics of this violation have previously been a topic at department discussions and have been discussed with personnel in the groups involved with these errors.

Corrective Action to be Taken

WNP-2 personnel will review and incorporate technical changes to Volume 9 procedures, "Nuclear Performance Evaluation Procedures," by January 15, 1994. Technical reviews will be conducted as follows:

1. The Nuclear Engineering staff will perform a technical review of selected Volume 9 procedures by December 15, 1993.

2. The Operations Shift Engineers will perform an independent technical review of those Volume 9 procedures not reviewed by Nuclear Engineering by October 18, 1993.

Date of Full Compliance

Full compliance was achieved on August 26, 1993, when PPMs 9.3.1 and 7.4.1.1 were revised to correct the identified deficiencies.