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U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Gentlemen:

Subject: **NUCLEAR PLANT WNP-2, OPERATING LICENSE NPF-21**
REACTOR POWER UPRATE STARTUP TEST REPORT

Transmitted herewith is the reactor power uprate Startup Test Report for the WNP-2 Plant. This report is submitted in accordance with the requirements of WNP-2 Technical Specification 6.9.1.1. The report summarizes the startup testing performed on WNP-2 following implementation of reactor power uprate during the spring 1995 refueling outage (R-10).

Should you have any questions or desire additional information, please call me or D.A. Swank at (509) 377-4563.

Sincerely,

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

JVP/DLM
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WASHINGTON PUBLIC POWER SUPPLY SYSTEM

WNP-2

REACTOR POWER UPRATE

STARTUP TEST REPORT

December 1995

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EXECUTIVE SUMMARY

This report summarizes the startup testing performed on WNP-2 following implementation of reactor power uprate during the spring 1995 refueling outage (R-10). Implementation of the reactor power uprate program resulted in an approximately five percent increase in reactor power.

The WNP-2 reactor power uprate test program began on July 6, 1995, with the plant at approximately 50 percent power. All control system testing at the uprated power level was completed on July 12, 1995. The Reactor Power Uprate Test Sequence procedure was completed on September 26, 1995, after test results from the feedwater flow element calibration accuracy testing were obtained.

The test program included reactor feedwater water level system and pressure regulator control system testing to show acceptable adjustments and operational capability. Test results were compared to acceptance criteria and in all cases, the acceptance criteria were satisfied. No adjustments to control system controller settings were required.

The plant operated very well at the uprated conditions.

INTRODUCTION

WNP-2 is a GE BWR-5 which achieved commercial operation in December 1984.

On July 9, 1993 the Supply System requested a change to the Facility Operating License to increase rated thermal power from 3323 MWt to 3486 Mwt. This 4.9% increase in power is achieved by increasing steam flow and feedwater flow five percent and increasing reactor pressure by 15 psig.

This report summarizes the startup testing performed on WNP-2 following implementation of reactor power uprate during the spring 1995 refueling outage (R-10).

The initial power ascension startup tests for WNP-2 are described in Chapter 14 of the FSAR (reference 1) and are listed in Table 1. These tests were reviewed for applicability to reactor power uprate. The tests which were determined to be applicable to power uprate are also noted in Table 1. Additional surveillance tests which are normally performed during a startup following a refueling outage were also performed.

Table 1

Initial Power Ascension Startup Tests

FSAR Test No.	Initial Power Ascension Startup Test Procedures	Tests Performed Specifically for Power Uprate
1	Chemical and Radiochemical	No
2	Radiation Measurements	No
3	Fuel Loading	No
4	Full Core Shutdown Margin	No
5	Control Rod Drive System	No
6	SRM Performance and Control Rod Sequence	No
9	Water Level Reference Leg Temperature Measurement	No
10	IRM Performance	No
11	LPRM Performance	No
12	APRM Calibration	No
13	Process Computer	No
14	RCIC System	Yes (Note 1)
16A	Process Temperatures	No
17	System Expansion	No
18	Core Power Distribution	Yes (Note 1)
19	Core Performance	Yes (Note 1)
20	Steam Production	No
21	Core Power Void Mode	No
22	Pressure Regulator	Yes
23A	Water Level Setpoint and Manual Flow Changes	Yes
23B	Loss of Feedwater Heating	No
23C	Feedwater Pump Trip	No
23D	Maximum Feedwater Runout Capability	No

FSAR Test No.	Initial Power Ascension Startup Test Procedures	Tests Performed Specifically for Power Uprate
24	Turbine Valve Surveillance	No
25A	MSIV Function Tests	No
25B	Full Reactor Isolation	No
26	Relief Valves	No
27	Turbine Trip and Generator Load Rejection	No
28	Shutdown from Outside the Main Control Room	No
29A	Recirculation Flow Control Valve Position Control	No
29B	Recirculation Flow Loop Control	No
30A	Recirculation System One Pump Trip	No
30B	Recirculation System RPT Trip of Two Pumps	No
30C	Recirculation System Performance	No
30D	Recirculation Pump Runback	No
30E	Recirculation System Cavitation	No
31	Loss of Turbine Generator and Offsite Power	No
33	Piping Vibration	No
34	RPV Internals Vibration	No
35	Recirculation System Flow Calibration	Yes (Note 1)
70	Reactor Water Cleanup System	No
71	Residual Heat Removal System	No
72	Drywell Atmosphere Cooling System	No
73	Cooling Water Systems	No
74	Offgas System	No

NOTE 1: Existing plant surveillance procedure was used instead of developing a special power uprate test procedure.

POWER UPRATE TEST PROGRAM DESCRIPTION

The reactor power uprate startup testing requirements were developed from a review of Chapter 14.2 of the WNP-2 FSAR and the WNP-2 Power Uprate Project Startup Test Specification (reference 2) provided by the General Electric Company. The test program includes all testing required by the WNP-2 Licensing Submittal For Power Uprate From 3323 MWt to 3486 MWt (reference 3). Section 14.3 of the WNP-2 FSAR (Reference 4) describes the required testing for reactor power uprate.

PPM 8.8.1, Reactor Power Uprate Test Sequence, documented the required power uprate testing which was performed in addition to the normal surveillance and routine testing required after a refueling outage. The procedure documented implementation and subsequent surveillance testing of required instrument setpoint changes for power uprate, RCIC system testing, steady-state core thermal limits data collection, and control system checks at the previous rated power level (95%), 97% and near 100 percent rated power.

SUMMARY OF TEST RESULTS

All reactor power uprate tests were performed satisfactorily during the startup following refueling outage R-10.

The tests are summarized below.

RCIC SYSTEM

A quick start of RCIC was performed at the new rated reactor pressure to verify the RCIC turbine did not trip on overspeed. This test was performed using PPM 7.4.7.3.3B, RCIC Quarterly Operability Test. The acceptance criteria were met demonstrating adequate overspeed trip avoidance margin exists at uprated pressure. Since there were no changes made to the RCIC system controller settings as a result of reactor power uprate, control system testing was not required to be performed.

CORE POWER DISTRIBUTION AND CORE PERFORMANCE (THERMAL LIMITS)

Core thermal limits were evaluated for reactor power uprate at approximately 88 percent, 95 percent, 98 percent and 100 percent uprated power. PPM 7.4.2.1, Power Distribution Limits, was used to evaluate the operating performance parameters before exceeding the previous power rating. The acceptance criteria were met.
PPM 7.4.3.1.1.49, APRM and Core Thermal Power Channel Calibration Check, was performed to ensure each APRM channel was maintained within ±2% of calculated thermal power (calculated by heat balance).

PRESSURE REGULATOR

Pressure regulator transient response was demonstrated at approximately 95 percent, 98 percent and 100 percent rated power using PPM 8.8.3, Pressure Regulator Step Changes. Pressure control setpoint changes of ±4 psi, ±8 psi and ±10 psi were induced to evaluate pressure regulator transient performance. The system response to these step changes was excellent and no system adjustments were required. There were no signs of oscillations. The measured decay ratios were zero and no limit cycles were observed.

Acceptance Criteria

1. The transient response of any pressure control system-related variable to any test input must not diverge.

2. Pressure control system-related variables may contain oscillatory modes of response. In these cases, the decay ratio for each controlled mode of response must be less than or equal to 0.25.

3. The pressure response time from initiation of pressure setpoint change to the turbine inlet pressure peak shall be $\leq$ 10 seconds.

4. Pressure control system deadband, delay, etc., shall be small enough that steady state limit cycles (if any) shall produce steam flow variations no larger than ± 0.5 percent of rated steam flow.

5. The peak neutron flux and/or peak vessel pressure shall remain below the scram settings by 7.5 percent and 10 psi, respectively, for all pressure regulator transients.

The acceptance criteria were met.

PPM 8.8.2, Pressure Regulator Linearity Demonstration, was performed during power ascension from 55 percent power to rated power. Steam flow, pressure regulator output and governor valve position data was collected at approximately two percent increments in power to verify the pressure control system linearity. The data was used to calculate incremental regulation.

Acceptance Criteria

The variation in incremental regulation (ratio of the maximum to the minimum value of the quantity, "incremental change in pressure control signal/incremental change in steam flow" for each flow range) shall meet the following:

% of Steam Flow Obtained With Valves Wide Open	Maximum Variation
0 to 90%	$\leq$ 4:1
90 to 97%	$\leq$ 2:1
90 to 99%	$\leq$ 5:1

The acceptance criteria were met.

REACTOR WATER LEVEL SETPOINT CHANGES

Reactor water level control system response was demonstrated at approximately 95 percent, 98 percent and 100 percent rated power using PPM 8.8.4, Reactor Water Level Setpoint Changes. Manual feedwater flow changes were made to induce ±3 inch and ±6 inch

reactor water level changes. The transient response of the control system was evaluated. The system response was very good and no system adjustments were required.

Acceptance Criteria

1. The transient response of any Feedwater Level Control System related variable to any test input shall not diverge.

2. Level control system related variables may contain oscillatory modes of response. In these cases, the decay ratio for each controlled mode of response shall be less than or equal to 0.25.

The acceptance criteria were met.

RECIRCULATION SYSTEM FLOW CALIBRATION

Calibration of the installed recirculation system flow instrumentation was performed at near 100 percent power using PPM 9.3.11, Core Flow Determination and Instrument Calibration. The acceptance criteria were met.

FEEDWATER FLOW ELEMENT CALIBRATION ACCURACY

Feedwater flow element calibration accuracy was evaluated using PPM 8.3.338, Rubidium Nitrate Tracer Test, following power uprate testing at the uprated power level. The results of this testing indicated feedwater flow, and hence reactor power, was approximately 2.4 percent higher than indicated by plant instrumentation. Feedwater flow instrumentation and the APRM's were adjusted to indicate 100 percent rated conditions after reactor power was reduced by 2.5 percent. Problem Evaluation Request (PER) 295-1039 was written to document and resolve this issue. Subsequent sodium tracer and rubidium testing determined rated conditions may be 1.2 percent higher than determined by the first rubidium test.

REFERENCES

1. FSAR Chapter 14, Section 14.2.12.3, Startup Test Procedures

2. WNP-2 Power Uprate Project Startup Test Specification GE-NE-208-19-0993, Rev. 1, July 1994.

3. WNP-2 Licensing Submittal For Power Uprate From 3323 MWt to 3486 MWt With Extended Load Line Limit

4. FSAR SCN 94-069, Section 14.3, Initial Testing For Power Uprate