FENOC
FirstEnergy Nuclear Operating Company

Perry Nuclear Power Plant
10 Center Road
Perry, Ohio 44081

John K. Wood
Vice President, Nuclear

440-280-5224
Fax: 440-280-8029

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Perry Nuclear Power Plant
Docket No. 50-440
Power Uprate Test Report (TAC No. MA6459)

Ladies and Gentlemen:

On June 1, 2000, the U.S. Nuclear Regulatory Commission issued Amendment 112 to Facility Operating License No. NPF-58 for the Perry Nuclear Power Plant (PNPP). This amendment revised the PNPP Technical Specifications to increase the authorized rated thermal power level by 5%. As identified within the regulatory commitments made in the initial amendment request on September 9, 1999 (PY-CEI/NRR-2420L), and as required by the PNPP Operational Requirements Manual, a summary report of the testing completed to implement Amendment 112 is enclosed as Attachment 1. This report is also required as a result of PNPP initially using fuel type GE14 supplied by General Electric, Global Nuclear Fuel.

Attachment 1 includes the purpose and a short description (if applicable) of each test along with the associated acceptance criteria, the test results and exceptions, and any actions required if an individual criterion was not satisfied.

If you have questions or require additional information, please contact Mr. Gregory A. Dunn, Manager - Regulatory Affairs, at (440) 280-5305.

Very truly yours,

John K Wood

Attachment

cc: NRC Project Manager
NRC Resident Inspector
NRC Region III
State of Ohio

A001

REPORT SUMMARY

On, June 12, 2000 the Perry Nuclear Power Plant (PNPP) Technical Specifications were changed, increasing the authorized Rated Thermal Power (RTP) from 3579 megawatts to 3758 megawatts. This change was made in accordance with License Amendment No. 112 to the PNPP Unit No. 1 Facility Operating License, No. NPF-58.

License Amendment 112 (power uprate) was partially implemented on June 20-22, 2000 following a mid-cycle outage to replace fuel assemblies. The final power uprate was achieved after Refueling Outage Eight (RFO 8). Testing was performed per Plant Temporary Instruction (TXI) 0317, "3579 MWth To 3758 MWth Power Uprate Implementation." Power increases above 3579 MWth were made in ≤ 1% RTP increments. Plant parameters were monitored, data collected, and plant areas walked down at each power plateau. Anticipated values for key parameters were projected for the subsequent power plateau to determine if the subsequent power level could be reached while maintaining the key parameters within proper plant response.

Following the June 2000 mid-cycle outage, the maximum RTP reached during TXI-0317 was 99% RTP (3720 MWth). Plant response was as anticipated, and normal for all power levels obtained. Following stabilization and data collection, control valve stability for 100% RTP plateau was anticipated to exceed the test limit of +/- 5% movement from the mean control valve position. Subsequent to the mid-cycle outage and for the remainder of operating Cycle 8, thermal power was conservatively limited to 98.5% RTP (3700 MWth). This thermal power limit was based on the control valve movement at 99% RTP and on engineering judgement.

Following modifications to the high pressure turbine during RFO 8, additional testing was performed to complete the uprate to 100% RTP (3758 MWth).

The fuel used in Cycle 8 was a combination of General Electric (GE), Global Nuclear Fuels, GE10, GE11 and GE12. At the start of Cycle 9, the fuel consists of GE12 and GE14. The following page provides the details of the fuel for Cycles 8 and 9.

This report is a final report to transmit information and data obtained during the uprate testing and up to 100% RTP. This report is also required as a result of PNPP using GE14 fuel for the first time.

FUEL DESIGN

Global Nuclear Fuels fuel designs for Cycle 8:

GE10-P8SX306-11GZ3-120M-150-T	36 bundles
GE11-P9SUB338-10GZ-120T-146-T	127 bundles
GE11-P9SUB338-12GZ-120T-146-T	56 bundles
GE12-P10SSB369-14GZ-120T-150-T	91 bundles
GE12-P10SSB369-12GZ-120T-150-T	158 bundles
GE12-P10SSB399-14GZ-120T-150-T	112 bundles
GE12-P10SSB399-16GZ-120T-150-T	168 bundles

Global Nuclear Fuels fuel designs for Cycle 9:

GE12-P10SSB369-14GZ-120T-150-T	55 bundles
GE12-P10SSB369-12GZ-120T-150-T	111 bundles
GE12-P10SSB399-14GZ-120T-150-T	110 bundles
GE12-P10SSB399-16GZ-120T-150-T	168 bundles
GE14-P10SSB415-16GZ-120T-150-T-3943	80 bundles
GE14-P10SSB416-17GZ-120T-150-T-3942	84 bundles
GE14-P10SSB416-17GZ-120T-150-T-3941	72 bundles
GE14-P10SSB415-12GZ-120T-150-T-3940	68 bundles

Complete descriptions of the design requirements for Global Nuclear Fuel designs are given in GESTAR II, General Electric Standard Application for Reload Fuel. The major difference between the GE14 and GE12 fuel is as follows: 1) length of the part-length rods, 2) design and location of the spacers, and 3) GE14 is analyzed at a higher power density.

TEST MATRIX

The following matrix outlines startup testing recommendations provided by GE Project Task Report G1-47, "Startup test Recommendations." Compared to the PNPP initial startup test program, and consistent with the NRC-approved generic power uprate guidelines in "Generic Evaluations of General Electric Boiling Water Reactor Power Uprate, Licensing Topical Report NEDC-31984P and NEDO-31984 and Supplements 1 & 2," this matrix is a limited subset of the original startup testing.

Test #	Test Title	Updated Safety Analysis Report (USAR) Section
1	Chemical and Radiochemical Monitoring	14.2.12.2.1
2	Radiation Measurements	14.2.12.2.2
4	Full Core Shutdown Margin	14.2.12.2.4
8	Rod Sequence Exchange	14.2.12.2.7
10	Intermediate Range Monitoring Performance	14.2.12.2.8
12	APRM Calibration	14.2.12.2.10
18	Core Power Distribution	14.2.12.2.15
19	Core Performance	14.2.12.2.16
21	Core Power-Void Mode Response	14.2.12.2.18
22	Pressure Regulator Testing	14.2.12.2.19
23A	Feedwater Control System	14.2.12.2.20.1
23B	Loss of Feedwater Heating	14.2.12.2.20.2
23C	Feedwater Pump Trip	14.2.12.2.20.3
23D	Maximum Feedwater Runout	14.2.12.2.20.4
24A	Main Turbine Bypass Valve Surveillance	14.2.12.2.21
24B	Main Turbine Valve Surveillance	14.2.12.2.21
25C	Main Steam Flow Element Calibration	14.2.12.2.22.3
29A	Recirculation Flow Control- Valve Position Control	14.2.12.2.26.1
29B	Recirculation Flow Loop Control	14.2.12.2.26.2
33	Drywell Piping Vibration	14.2.12.2.29
35	Recirculation Flow Calibration	14.2.12.2.31
74	Off Gas System	14.2.12.2.35

TEST SUMMARY

For each recommended test, individual test abstracts are listed defining the purpose and a short description (if applicable) of each test along with the associated acceptance criteria. Also included for each test is the test result and exceptions and any actions required if an individual criterion was not satisfied.

Note that the criteria for each test has up to two levels of importance. The criteria associated with plant safety are classified as Level 1 and the criteria associated with design expectations are classified as Level 2.

TEST NUMBER 1 - CHEMICAL AND RADIOCHEMICAL MONITORING

Purpose / Description

The purpose of this test is to secure information on the chemistry and radiochemistry of the reactor coolant at uprate conditions.

Acceptance Criteria

Level 1

Chemical factors defined in the Technical Specifications and fuel warranty are maintained within the limits specified. The activity of gaseous and liquid effluents conforms to license limitations.

Level 2

Water quality is known at all times and remains within the guidelines of the water quality specifications.

Results and Exceptions

During the initial power uprate to 99% RTP (3720MWth), none of the chemistry parameters varied significantly from those previously monitored prior to power uprate. Following RFO 8, testing to 100% RTP (3758 MWth) changes were noted in some monitored parameters. However, these changes were expected due to the application of Noble Metals to reactor internals for long-term mitigation of stress corrosion cracking. In all cases no Level 1 or 2 limits were exceeded.

TEST NUMBER 2 - RADIATION MEASUREMENTS

Purpose / Description

The purpose of this test is to monitor radiation at the uprate power conditions to assure that personnel exposures are maintained As Low As Reasonably Achievable (ALARA). At the uprate power level, gamma dose rate measurements and where appropriate, neutron dose rate measurements, will be made at specific limiting locations throughout the plant to assess the impact of the uprate on actual plant area dose rates. USAR radiation zones will be monitored for any required changes.

Acceptance Criteria

Level 1

The plant radiation doses and the occupancy times of personnel in radiation zones shall be controlled consistent with the guidelines of outlined in 10CFR20, "The Standards for Protection Against Radiation."

Level 2

Not Applicable.

Results and Exceptions

Plant radiation monitor readings were collected during power ascension to establish the expected trend as power was increased. The increase at each 1% power step above the original 100% RTP of 3579 MWth was evaluated to ensure the reading trended as expected. A radiation monitor near the high-pressure turbine exhibited erratic data that was unexpected. Investigation found this monitor deficient and local area radiation measurements were confirmed by manual measurement to be within expected values. All other monitor readings trended as expected. Local radiation surveys conducted at 98.5% RTP (3700 MWth) during the initial power uprate and at 100% RTP (3758 MWth) following RFO 8 confirmed that area radiation levels were unchanged from previous values.

TEST NUMBER 4 - FULL CORE SHUTDOWN MARGIN

Purpose / Description

The purpose of this test is first to demonstrate that the reactor is subcritical throughout the cycle with any single control rod fully withdrawn and second to determine quantitatively the shutdown margin of the as-loaded core.

TEST NUMBER 4 - FULL CORE SHUTDOWN MARGIN (Continued)

Acceptance Criteria

Level 1

The shutdown margin of the fully loaded, cold (68°F), Xenon-free core occurring at the most reactive time during the cycle is at least 0.38% Δ k/k with the analytically strongest rod (or its reactivity equivalent) withdrawn. If the shutdown margin is measured at some time during the cycle other than the most reactive time, compliance with the above criteria is shown by demonstrating that the shutdown margin is 0.38% Δ k/k plus an exposure dependent increment, which adjusts the shutdown margin at that time to the minimum shutdown margin.

Level 2

Criticality occurs within ±1.0 percent Δ k/k of the predicted critical.

Results and Exceptions

The full core shutdown margin and reactivity anomaly were demonstrated to be within their Technical Specification requirements during Cycle 9 startup (reactor startup number 84). Surveillance Instruction (SVI) B13-T0001, "Shutdown Margin Calculation," was performed at 0% power and 144° F moderator temperature. The minimum shutdown margin for Cycle 9 was measured to be 1.20% Δk/k. This exceeds 0.38 % Δk/k as required by the Technical Specifications. The measured reactivity anomaly calculated in accordance with SVI-B13-T0004, "Reactivity Anomaly Calculation During Mode 1," was less than the Technical Specification maximum of 1.0% Δk/k.

TEST NUMBER 8 - ROD SEQUENCE EXCHANGE

Purpose / Description

The purpose of this test is to perform a representative sequence exchange of control rod patterns at a significant power level.

Acceptance Criteria

Level 1

Complete the exchange of one rod pattern for the complimentary pattern with continual satisfaction of all licensed core limits.

TEST NUMBER 8 - ROD SEQUENCE EXCHANGE (Continued)

Level 2

Not Applicable.

Results and Exceptions

Because rod sequence exchanges are performed only approximately every 1400 MegaWatt Day/Short Ton (MWD/sT), no control rod sequence exchange was performed following startup from RFO 8. Nothing in the GE14 fuel is projected to impact the ability to perform a sequence exchange. Sequence exchanges were performed during Cycle 8 following the mid-cycle outage at 98.5% RTP, which demonstrated compliance with all licensed core limits.

TEST NUMBER 10 - IRM PERFORMANCE

Purpose / Description

The purpose of this test is to adjust the Intermediate Range Monitor (IRM) system to obtain an optimum overlap with the Source Range Monitor (SRM) and Average Power Range Monitor (APRM) systems. After the APRM calibration for power uprate, the IRM gains are adjusted as necessary to optimize the IRM overlap with the SRMs and APRMs.

Acceptance Criteria

Level 1

Each Intermediate Range Monitor (IRM) channel must be on scale before the SRMs exceed their rod block setpoint.

Each APRM must be on scale before the IRMs exceed their rod block setpoint.

Level 2

Each IRM channel must be adjusted so that a half decade overlap with the SRMs and one-decade overlap with the APRMs are assured.

Results and Exceptions

APRM channels were calibrated for power uprate during the power ascension following the Cycle 8 mid-cycle outage. SVI-C51-T0024, “APRM Gain Channel Calibration,” was also performed during power ascension following RFO 8.

TEST NUMBER 12 - APRM CALIBRATION

Purpose / Description

The purpose of this test is to calibrate the APRMs re-referenced to the 100% power uprate level. Each APRM channel reading will be adjusted to be consistent with the core thermal power re-referenced to the 100% power uprate level as determined from the heat balance.

Acceptance Criteria

Level 1

Each APRM shall be calibrated relative to core thermal power per the Technical Specifications.

Level 2

Not applicable.

Results and Exceptions

APRM channels were calibrated relative to 100% RTP (3758 MWth) per plant Surveillance Instruction SVI-C51-T0024 during the power ascension following the Cycle 8 mid-cycle outage and following RFO 8.

TEST NUMBER 18 - CORE POWER DISTRIBUTION

Purpose / Description

The purpose of this test is to determine the reproducibility of the Traversing Incore Probe (TIP) system readings.

Acceptance Criteria

Level 1

Not Applicable.

Level 2

The total TIP uncertainty (including random noise and geometrical uncertainties) obtained by averaging the uncertainties for all data sets is less than 6.0%.

TEST NUMBER 18 - CORE POWER DISTRIBUTION (Continued)

Results and Exceptions

The licensing basis TIP uncertainty for the Minimum Critical Power Ratio (MCPR) Safety Limit is 8.7% (standard deviation). This value is based on a model uncertainty of 4.6%, a Local Power Range Monitor (LPRM) uncertainty of 3.4%, and a TIP measurement uncertainty of 6.6%. The TIP measurement uncertainty is based on 6.4% geometry uncertainty and 1.2% random noise uncertainty [reference NEDE-31152P, "General Electric Fuel Bundle Designs," and letter PY-GEN/CEI-2961 dated 9/6/89 from N. R. Barker (GE) to K. R. Pech (CEI)]. Fuel Technical Instruction, FTI-A16, "Total TIP Uncertainty," was performed in an octant symmetric control rod pattern at approximately 100% of rated thermal power to determine the TIP measurement uncertainty. The TIP measurement uncertainty was determined to be 1.73%. A comparison to the 6.6% value for TIP measurement uncertainty assumed in the licensing basis showed the TIP reading reproducibility to be acceptable. This test was considered a physics test in the USAR, Section 14.2.12.2.15.

TEST NUMBER 19 - CORE PERFORMANCE

Purpose / Description

The purposes of this test are to evaluate the core thermal power and core flow, and to evaluate the following core performance parameters:

1. Maximum Linear Heat Generation Rate (MLHGR),
2. Minimum Critical Power Ratio (MCPR), and
3. Maximum Average Planar Linear Heat Generation Rate (MAPLHGR).

Acceptance Criteria

Level 1

1. The MLHGR of any rod during steady-state conditions does not exceed the limit specified by the plant Technical Specifications.
2. The steady-state MCPR exceeds the limits specified by the plant Technical Specifications.
3. The MAPLHGR does not exceed the limits specified by the plant Technical Specifications. Steady-state reactor power is limited to 3758 MWth with values on or below the more limiting of either rated thermal power or the bounding licensed load line.

TEST NUMBER 19 - CORE PERFORMANCE (Continued)

Level 2

Not Applicable.

Results and Exceptions

The fuel thermal limits were monitored on a once per shift basis under the Technical Specification rounds instruction. The core thermal power was continuously monitored and controlled under Integrated Operating Instruction (IOI) 3, "Power Changes." During post refueling testing, there were no fuel thermal limit violations and no steady-state operation above the more limiting of rated thermal power or the bounding licensed load line.

The following table lists the average Core Thermal Power (CTP) and the most limiting values for each of the thermal limits for 15 days following reactor startup that reactor power was above 23.8% of rated thermal power during the day. A thermal limit value less than or equal to 1.00 indicates compliance with the limit.

DATE	CTP (MWth)	MFLCPR* (MCPR)	MFLPD** (LHGR)	MAPRAT*** (MAPLHGR)
03/25/01	2337.9	0.825	0.449	0.700
03/26/01	1099.8	0.790	0.418	0.670
03/27/01	1631.7	0.881	0.664	0.838
03/28/01	2697.4	0.898	0.743	0.784
03/29/01	3033.0	0.889	0.739	0.813
03/30/01	3064.1	0.950	0.823	0.892
03/31/01	3406.4	0.937	0.937	0.926
04/1/01	3748.3	0.903	0.937	0.930
04/2/01	3596.6	0.878	0.941	0.932
04/3/01	3751.5	0.874	0.940	0.931
04/4/01	3752.8	0.874	0.941	0.933
04/5/01	3753.9	0.873	0.912	0.891
04/6/01	2926.7	0.897	0.913	0.892
04/7/01	1223.6	0.899	0.591	0.750
04/8/01	3193.2	0.935	0.905	0.882

* Maximum Fraction Limiting Critical Power Ration (MFLCPR)
** Maximum Fraction Limiting Power Density (MFLPD)
*** Maximum Average Planer Linear Heat Generation Rate (MAPRAT)

TEST NUMBER 21 - CORE POWER-VOID MODE RESPONSE

Purpose / Description

The purpose of this test is to measure the stability of the core power-void dynamic response and to demonstrate that its behavior is within specified limits.

Acceptance Criteria

Level 1

The transient response of any system-related variable to any test input does not diverge.

Level 2

The decay ratio for any oscillatory modes of response is less than or equal to 0.25.

Results and Exceptions

This test was not required to be performed during the return to power since the decay ratio of the GE14 fuel is less than previous fuel designs.

TEST NUMBER 22 - PRESSURE REGULATOR

Purpose / Description

The purpose of this test is to:

1. Confirm the adequacy of the settings for the pressure control loop used in the analysis of the transients induced in the reactor pressure control system using the pressure regulators.
2. Demonstrate smooth pressure control transition between the turbine control valves and bypass valves when the reactor steam generation exceeds the steam flow used by the turbine, and demonstrate that other affected parameters are within acceptable limits during pressure regulator induced transient maneuvers in preparation for operation at uprated conditions.

When testing is completed for one pressure regulator, the other pressure regulator is selected and the tests are repeated. Turbine control valve testing at approximately 20% and 80% Nuclear Boiler Rated (NBR) demonstrates that there is adequate margin to a flux scram, and that the control valve position response is not velocity limited for any turbine pressure control valve.

TEST NUMBER 22 - PRESSURE REGULATOR (Continued)

Acceptance Criteria

Level 1

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

Level 2

1. Pressure control system related variables may contain oscillatory modes of response. In these cases, the decay ratio for the controlled parameter, the turbine inlet pressure, must be less than or equal to 0.25. This criterion is not applicable to pressure regulator failure tests.
2. The pressure response time from initiation of pressure setpoint change (± 10 psi) to the turbine inlet pressure peak shall be ≤10 seconds.
3. 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.
4. 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. This criterion is also applicable to pressure regulator failure tests.
5. The variation in incremental regulation (ratio of the maximum to minimum value of the quantity, "incremental change in pressure control signal/incremental change in steam flow," for each flow range) should meet the following criteria:

% of Steam Flow Obtained with VWO (Valve Wide Open)	Variation
0 to 85%	≤ 4:1
85% to 97%	≤ 2:1
85% to 99%	≤ 5:1

Results and Exceptions

Pressure regulator testing as described was conducted following the power uprate modifications in RFO 8. The testing included pressure steps at 23% uprated RTP in all pressure control modes, i.e., with control valves, bypass valves, and a combination of both. Testing also included pressure steps at 92% uprated RTP, which included pressure control modes with control valves and a combination of bypass valves and control valves. All Level 1 and Level 2 acceptance criteria for both regulator channels were met. The plant response was similar to response demonstrated during previous testing.

No tuning adjustments were necessary and all dynamic parameters are set "as left" during the initial startup. Incremental regulation data was recorded during power ascension for Cycle 8 in May 1999 and during power ascension following the Cycle 8 mid-cycle outage in June 2000.

TEST NUMBER 22 - PRESSURE REGULATOR (Continued)

Variations in incremental regulation following RFO 8 were in the acceptable regions. Extensive work was completed to the turbine control/pressure regulation system during RFO 8 including conversion to partial arc admission. Attention to tuning in the Steam Bypass and Pressure Regulation system (C85) is a contributing factor to the improved incremental regulation variation data. In addition to the Incremental Regulation testing, Periodic Test Instruction (PTI) C85-P0001, "Pressure Control System Tune-up Instruction," was completed at 23% and 92% power successfully without any adjustments necessary. Pressure control following RFO 8 was acceptable.

TEST NUMBER 23A - FEEDWATER CONTROL SYSTEM

Purpose / Description

The purpose of this test is to confirm the adequacy of the Feedwater Control System to provide acceptable reactor water level control at power uprate conditions during steady state operation and transients. Individual feedwater pump flow step changes and reactor water level setpoint changes are used to evaluate the Feedwater Control system response rate and stability.

Acceptance Criteria

Level 1

The transient response of any Feedwater Level Control system related variable to any test input must not diverge.

Level 2

1. 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.
2. The open dynamic flow response of each feedwater actuator to small (<10% rated pump flow) step disturbances shall be:
   a) Maximum time to 10% of a step disturbance ≤ 1.1 sec,
   b) Maximum time from 10% to 90% of a step disturbance ≤ 1.9sec,
   c) Peak overshoot (% of step disturbance) ≤ 15%, and
   d) Settling time, 100% ± 5% of step disturbance ≤ 14 sec.
3. The average rate of response of the feedwater actuator (> 20% of pump flow) to large step disturbances shall be between 10 percent and 25 percent rated feedwater flow/second. (For this criterion, rated flow is based on 3579 MWth, original 100% rated power). Determining the time required to pass linearly through the 10 percent and 90 percent response points assesses this average response rate.

TEST NUMBER 23A - FEEDWATER CONTROL SYSTEM (Continued)

4. At steady-state conditions for 3/1 element control, the input scaling to the mismatch gain shall be adjusted such that level error due to biased mismatch gain output are within ± 1 inch.
5. The variation in incremental regulation (ratio of the maximum to the minimum value of the quantity, "incremental change in feedwater flow demand signal / incremental change in feedwater flow" for each flow range) should not exceed 2:1.
6. The turbine speed regulation between the three feedwater pumps should match within ± 5% of rated speed over the controllable speed range.
7. Feedwater control system deadband, delay, etc., shall be small enough that steady state limit cycles (if any) shall not produce narrow range water level variations that exceed ± 1.5 inch.

Results and Exceptions

Certain Feedwater Control system testing described in this section was not performed based on the previous evaluation that established control system parameters were sufficient. Specifically, the system was not subjected to large or small step disturbances. Since the uprated Feedwater flow rate was well within the range of the Feedwater Control system and the Feedwater system (pumps, valves, etc.) no specific testing was needed. The system performed as expected during plant startup from cold shutdown to rated conditions including planned events that did cause level transients like shifting Reactor Recirculation pumps to fast speed. Other factors such as turbine speed regulation, control system deadband, incremental regulation and mismatch gain was verified to be within range at rated conditions.

The span for the main steam flow transmitters was increased to accommodate the increase flow rate as a result of power uprate. However, this did not adversely affect control system performance. The output of the steam flow loop was conditioned such that the change was invisible to the remainder of the control system resulting in no change to system response.

TEST NUMBER 23B – LOSS OF FEEDWATER HEATING

This test is not required for the power uprate program. The results from the loss of feedwater heating test done during the initial startup test program were extrapolated to an uprated 100% RTP. The resulting feedwater temperature decrease of 26.7 degrees was well within the 100° F limit and adequately close to the predicted value. These results remain valid until affected by plant modifications.

TEST NUMBER 23C – FEEDWATER PUMP TRIP

This test is not required for the power uprate program. Reviews of the feedwater trip test done during the initial startup program and a subsequent unplanned trip in 1996 concluded that repeating the test at the uprated 100% RTP will not be needed because an ample margin for scram avoidance was maintained in both events.

TEST NUMBER 23D - MAXIMUM FEEDWATER RUNOUT

This test is not required for the power uprate program. There were no changes to the Feedwater system that affected maximum feedwater runout capability for Reactor Feed Pump A and B since the last performance of this test indicated conformance with the runout criteria under uprated conditions.

TEST NUMBER 24A - MAIN TURBINE BYPASS VALVE SURVEILLANCE

Purpose / Description

The purpose of this test is to evaluate the impact of power uprate on the maximum power levels for recommended periodic surveillance testing of the main turbine bypass valves without producing a reactor scram.

The response of the reactor to bypass valve surveillance tests will be measured at several test points along the maximum uprated load line to evaluate the impact on the maximum test power level as a consequence of the implementation of power uprate. A maximum power test condition will be predicted from the data. For all tests, the proximity to pressure scram, APRM Flux and Simulated Thermal Power (STP) flow bias scram, and main steam line high flow isolation will be closely monitored. Each test will be manually initiated and reset. Rate of valve stroking and timing of the close-open sequence will be such that the minimum practical disturbance is introduced.

Acceptance Criteria

Level 1

Not applicable.

Level 2

1. Peak neutron flux must be at least 7.5% below the scram trip setting. Peak vessel pressure must remain at least 10 psi below the high-pressure scram setting. Peak STP must remain at least 5.0% below its scram trip point.
2. Peak steam flow in each line must remain 10% below the high flow isolation trip setting.

TEST NUMBER 24A - MAIN TURBINE BYPASS VALVE SURVEILLANCE (Continued)

Results and Exceptions

A test program was performed to ensure Level 2 acceptance criteria were met. Bypass valve testing was performed at a thermal power range of 94% through 99%. All Level 2 acceptance criteria were met at 99% RTP. Bypass valve surveillances will be performed in the future at 99% RTP.

TEST NUMBER 24B - MAIN TURBINE VALVE SURVEILLANCE

Purpose / Description

The purpose of this test is to evaluate the impact of power uprate on the maximum power levels for recommended periodic surveillance testing of the main turbine stop and control valves without producing a reactor scram.

This test applies to the mid-Cycle 8 on-line and RFO 8 power uprate implementation phases. At several test points along the maximum uprated rod line the response of the reactor to stop and control valve surveillance tests will be measured to evaluate the impact on the maximum test power level as a consequence of the implementation of power uprate. The test will be performed using the approach employed for initial startup. A maximum power test condition will be predicted from the data. For all tests the proximity to pressure scram, APRM Flux and STP flow bias scram, and main steam line high flow isolation will be closely monitored. Each test will be manually initiated and reset. Rate of valve stroking and timing of the close-open sequence will be such that the minimum practical disturbance is introduced.

Acceptance Criteria

Level 1

Not applicable.

Level 2

1. Peak neutron flux must be at least 7.5% below the scram trip setting. Peak vessel pressure must remain at least 10 psi below the high-pressure scram setting. Peak STP must remain at least 5.0% below its scram trip point.
2. Peak steam flow in each line must remain 10% below the high flow isolation trip setting.
3. Bypass valves should not open for this test.

TEST NUMBER 24B - MAIN TURBINE VALVE SURVEILLANCE (Continued)

Results and Exceptions

Control valve testing is currently being performed at a thermal power (85%) consistent with the thermal power at which testing was performed prior to the power uprate. Before surveillance testing is performed at a higher power level, a test program will be performed to ensure the Level 2 acceptance criterion above is met.

Stop valve and intermediate valve testing is currently being performed at a thermal power (94%) consistent with the thermal power at which testing was performed prior to the power uprate. Before surveillance testing is performed at a higher power level, a test program will be performed to ensure the Level 2 acceptance criterion above is met.

TEST NUMBER 25C - MAIN STEAM FLOW ELEMENT CALIBRATION

Purpose / Description

The purpose of this test is to confirm acceptable calibration of the main steam flow elements at uprated power conditions.

In order to verify accurate steam flow input to the Feedwater Control system, steam flow data from the flow elements will be compared against a known flow source to verify that acceptable steam flow measurement. It is not necessary to re-perform the repeatability evaluation since this is not affected by power uprate.

Acceptance Criteria

Level 1

Not applicable.

Level 2

The accuracy of the main steamline flow venturi relative to the calibrated feedwater flow shall be at least $\pm$ 5 percent of rated steam flow at flow rates between 20 and 120 percent rated. The process signal noise shall be within $\pm$ 5 percent of rated steam flow.

TEST NUMBER 25C - MAIN STEAM FLOW ELEMENT CALIBRATION (Continued)

Results and Exceptions

During initial power ascension following RFO 8, steam flow was found to be indicating lower than expected and differed as much as 5% of rated steam flow at times. This condition was due to the initial calibration of the steam flow transmitters during RFO 8. After resolving the deficiency, steam flow indication met this requirement. To support uprated conditions, steam flow transmitter span was increased. However, the initial transmitter span resulted in lower than expected indication. The flow transmitters were subsequently "re-spanned" using theoretical data to be more consistent with feedwater flow and the expected performance of the flow elements. Calibration of these transmitters resulted in a difference between feedwater flow and steam flow of approximately 2.5%, meeting the Level 2 acceptance criteria.

TEST NUMBER 29A - RECIRCULATION FLOW CONTROL - VALVE POSITION CONTROL

This test is not required for the power uprate program. Testing the Recirculation Flow Control system's capability while in the valve position mode is not required for the power uprate program. Manual valve performance is not significantly affected by uprated power and the standard controller tuning procedure, PTI-B33-P0001, "Reactor Recirculation Flow Control System Tune-Up," is in place if required.

TEST NUMBER 29B - RECIRCULATION FLOW CONTROL - RECIRCULATION FLOW LOOP CONTROL

This test is not required for the power uprate program. The testing of the flow, neutron flux, and load following flow control modes are not required for the power uprate program because System Operating Instruction (SOI) B33, "Reactor Recirculation Flow Control," and established commitments restrict the recirculation system mode of operation to the Loop Manual Control Mode.

TEST NUMBER 33 - DRYWELL PIPING VIBRATION

This test is not required for the power uprate program. It is not necessary to collect additional data at the up-rated 100% RTP, since 1) the initial startup test program found this piping to be well within the test acceptance criteria; 2) the flow rate, the pressure and the temperature changes involved in raising power to the uprated 100% RTP are not significant; and 3) the years of plant operation have provided a significant experience base. Any questions regarding vibration at 100% power can be resolved through the extrapolation of initial startup data and analytical methods.

TEST NUMBER 35 - RECIRCULATION FLOW CALIBRATION

Purpose / Description

The purpose of this test is to perform a complete calibration of the jet pump instrumentation with respect to the four calibrated jet pumps at power uprate conditions including specific signals to the plant process computer.

At the operating conditions, which allow the recirculation system to be operated at the speeds required for rated flow at 100% uprated power, the jet pump flow instrumentation is adjusted to provide correct flow indication based on the calibrated jet pump flow. After the relationship between drive flow and core flow is established, the drive flow signals to the APRM system are adjusted to match this relationship. In addition, the accuracy of the total core flow and recirculation drive flow signals to the process computer is confirmed.

Acceptance Criteria

Level 1

Not applicable.

Level 2

1. Jet pump flow instrumentation shall be adjusted such that the jet pump total flow recorder provides a correct core flow indication at rated conditions.
2. The APRM flow-bias instrumentation shall be adjusted to function properly at rated conditions.
3. The nozzle and riser plugging criteria shall not be exceeded.

Results and Exceptions

This test is not required for the power uprate program. Jet pump flow instrumentation is calibrated every refueling outage. Core flow is not increased for power uprate. Jet pump flow is trended for degradation and cleaning performed as required.

APRM flow-biased scram and rod block settings were calibrated to uprated conditions.

TEST NUMBER 74 - OFF GAS SYSTEM

Purpose / Description

The purpose of this test is to evaluate the performance of the Off Gas system at uprated power conditions. The pressure, temperature, relative humidity, system flow and percentage of radiolytic hydrogen in the off gas will be monitored at steady state uprated power conditions.

Acceptance Criteria

Level 1

The release of radioactive gaseous and particulate effluents shall not exceed Technical Specification limits.

Level 2

The system flow, pressure, temperature and dewpoint shall comply with the expected performance at power uprate conditions.

Results and Exceptions

The Off Gas post treatment radioactive particulate and gaseous effluent levels remained well below Technical Specification limits at all times following power uprate.

Off Gas system operating parameters are within expected values and within limits at the highest power levels obtained.