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United States Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

LaSalle County Station, Unit 2
Facility Operating License No. NPF-18
NRC Docket No. 50-374

Subject: Startup Test Report Summary

Enclosed for your information is the LaSalle County Station (LCS) Unit 2 Cycle 10 Startup Test Report. This report is submitted in accordance with Technical Requirements Manual Section 5.0.b.

LaSalle County Station Unit 2 Cycle 10 began commercial operation on February 21, 2003 following a refueling and maintenance outage. The Unit 2 Cycle 10 core loading consisted of 382 fresh Framatome-ANP Power Corporation ATRIUM-10 fuel bundles and 382 reload bundles manufactured by Framatome-ANP Power Corporation. Also installed in the Unit 2 Cycle 10 reactor were 16 new Reuter-Stokes NA-300 Local Power Range Monitors (LPRMs), and 22 new General Electric Marathon control rod blades.

Attached are the evaluation results from the following tests:

- Core Verification
- Single Rod Subcritical Check
- Control Rod Friction and Settle Testing
- Control Rod Drive Timing
- Shutdown Margin Test (In-sequence critical)
- Reactivity Anomaly Calculation (Critical and Full Power)
- Scram Insertion Times
- Core Power Distribution Symmetry Analysis

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All test data was reviewed in accordance with the applicable test procedures, and exceptions to any results were evaluated to verify compliance with Technical Specification limits and to ensure the acceptability of subsequent test results.

Should you have any questions concerning this letter, please contact Mr. Glen Kaegi, Regulatory Assurance Manager, at (815) 415-2800.

Respectfully,

George P. Barnes

George P. Barnes
Site Vice President
LaSalle County Station

Attachment

cc: Regional Administrator - NRC Region III
NRC Senior Resident Inspector - LaSalle County Station

NF-AA-330, Core Verification

Purpose

The purpose of this test is to visually verify that the core is loaded as intended for Unit 2 Cycle 10 operation.

Criteria

The as-loaded core must conform to the cycle core design used by the Core Management Organization (Nuclear Fuels) in the reload licensing analysis. Any discrepancies discovered in the loading will be promptly corrected and the affected areas re-verified to ensure proper core loading prior to unit startup.

A permanent core serial number map signed by the audit participants will document conformance to the cycle core design.

Results and Discussion

Core verification was performed concurrently with core load per core verification guideline NF-AA-330-1001, "Core Verification Guideline." The Unit 2 Cycle 10 core verification consisted of a core height, assembly orientation, assembly location, and assembly seating check performed by reactor services and reactor engineering. Bundle serial numbers and orientations were recorded during the videotaped scans for comparison to the appropriate core loading map and Cycle Management documentation. On February 6, 2003, the core was verified as being properly loaded and consistent with the Nuclear Fuels LaSalle 2 Cycle 10 Design Basis Loading Plan.

LTP-1600-30, Single Rod Subcritical Check

Purpose

The purpose of this test is to demonstrate that the Unit 2 Cycle 10 core will remain subcritical upon the withdrawal of the analytically determined strongest control rod.

Criteria

The core must remain subcritical, with no significant increase in Source Range Monitor (SRM) readings, with the analytically determined strongest rod fully withdrawn.

Results and Discussion

The analytically determined strongest rod for the Beginning of Cycle 10 for Unit 2 was determined by Nuclear Fuels to be rod 46-47. On February 10, 2003, with a Unit 2 moderator temperature of 88 degrees Fahrenheit, rod 46-47 was withdrawn to the full out position and the core remained subcritical with no significant increase in SRM readings. The satisfactory completion of LTP-1600-30, "Single Rod Subcritical Check," allows single control rod withdrawals for control rod testing.

LTP-700-2, Control Rod Friction and Settle Testing

Purpose

The purpose of this test is to demonstrate that excessive friction does not exist between the control rod blade and the fuel assemblies during operation of the control rod drive (CRD) following core alterations.

Criteria

With the final cell loading complete for the fuel assemblies in a control cell, the drift alarm shall not be received when moving the control rod from position 00 to 02, and then to 04.

Friction testing shall be performed on the respective control rod drive(s) when any condition listed below is applicable:

- After relocation or replacement of the Control Rod Drive Mechanism (CRDM).
- After relocation or replacement of Control Rod Blades.
- After maintenance or modification of an installed CRDM that could affect the performance of the drive.
- Prior to initial criticality of a new operating cycle, for any cell when any condition listed below is met:
  - A channel in the cell is beginning its third cycle in a peripheral location.
  - The combined peripheral residence time for any two channels in a control cell exceeds 4 cycles.
  - Bundle-average exposure for any fuel in the control cell exceeds 30 GWD/ST (~27.24 GWD/MT).
- The Unit Nuclear Engineer or CRD System Engineer determines that friction testing is appropriate.

Results and Discussion

Control rod drive (CRD) friction testing commenced after the completion of the core load verification and single rod subcritical check. There was no indication of excessive friction on the control rods tested as described above since none of the rods tested produced a drift alarm. The testing was completed on February 10, 2003.

LOS-RD-SR5, Control Rod Drive Timing

Purpose

The purpose of this test is to check and set the insert and withdrawal speeds of the Control Rod Drives (CRDs).

Criteria

LOS-RD-SR5, "Control Rod Drive Timing," states the withdraw times from the full in (notch 00) to the full out (notch 48) position to be between 45 and 60 seconds and insert times from the full out to the full in position to be between 40 and 55 seconds.

Results and Discussion

LOS-RD-SR5 was performed satisfactorily for all replaced CRDMs requiring post maintenance testing. As found control rod speeds are satisfactory per the UFSAR requirements. Timing was completed on February 14, 2003.

LTS-1100-1, Shutdown Margin Test

Purpose

The purpose of this test is to demonstrate, from a normal in-sequence critical, that the core loading has been limited such that the reactor will remain subcritical throughout the operating cycle with the strongest worth control rod in the full-out position (position 48) and all other rods fully inserted.

Criteria

If a shutdown margin (SDM) of 0.38% delta K/K + R cannot be demonstrated with the strongest worth control rod fully withdrawn, the core loading must be altered to meet this margin. R is the reactivity difference between the core's beginning-of-cycle SDM and the minimum SDM for the cycle. The R value for Cycle 10 is 0.0% delta K/K, so a SDM of 0.38% delta K/K must be demonstrated.

Results and Discussion

The beginning-of-cycle SDM was successfully determined from the initial critical data. The initial Cycle 10 critical occurred on February 20, 2003, on control rod 18-31 at position 24, using an A-2 sequence. The moderator temperature was 161 degrees Fahrenheit and the reactor period was 398 seconds. Using rod worth information, moderator temperature reactivity corrections, and period reactivity corrections supplied by Nuclear Fuels, the beginning-of-cycle SDM was determined to be 0.752% delta K/K. The SDM exceeded the 0.38% delta K/K that was required to satisfy Technical Specification 3.1.1.

NF-AB-451, Reactivity Anomaly Determination

Purpose

The purpose of this test is to compare the actual and predicted critical rod configurations to detect any unexpected reactivity trends.

Criteria

In accordance with Technical Specification 3.1.2, the reactivity equivalence of the difference between the actual critical control rod configuration and the predicted critical control rod configuration shall not exceed 1% delta K/K. If the difference does exceed 1% delta K/K, the Core Management Engineers (Nuclear Fuels) will be promptly notified to investigate the anomaly. The cause of the anomaly must be determined, explained, and corrected for continued operation of the unit.

Results and Discussion

Two reactivity anomaly calculations were successfully performed during the Unit 2 Cycle 10 Startup Test Program, one from the in-sequence critical and one from steady state, equilibrium conditions at approximately 99.7 percent of full power.

The initial critical occurred on February 20, 2003, on control rod 18-31 at position 24, using an A-2 sequence. The moderator temperature was 161 degrees Fahrenheit and the reactor period was 398 seconds. Using rod worth information, moderator temperature, reactivity corrections, and period reactivity corrections supplied by Nuclear Fuels, the actual critical was determined to be within 0.294% delta K/K of the predicted critical. The anomaly determined is within the 1% delta K/K required for BOC conditions as stated in NF-AB-233.

The reactivity anomaly calculation for power operation was performed on February 26, 2003. The data used was from 99.7% power at a cycle exposure of 88.1 MWD/MT at equilibrium conditions. The expected Keff supplied by Nuclear Fuels was 0.9970. The actual Keff was 0.9963. The resulting anomaly was 0.07% delta K/K. This value is within the 1% delta K/K criteria of Technical Specification 3.1.2.

LTS-1100-4, Scram Insertion Times

Purpose

The purpose of this test is to demonstrate that the control rod scram insertion times are within the operating limits set forth by Technical Specification 3.1.4.

Criteria

The maximum scram insertion time of each control rod from the fully withdrawn position (48) to notch position 05, based on de-energization of the scram pilot valve solenoids as time zero, shall not exceed 7.0 seconds.

The average scram insertion time of all operable control rods from the fully withdrawn position (48), based on de-energization of the scram pilot valve solenoids as time zero, shall not exceed any of the following:

Position Inserted From Fully Withdrawn	Average Scram Insertion Time (Seconds)
45	0.52
39	0.80
25	1.77
05	3.20

Results and Discussion

Scram testing was successfully completed on February 19, 2003. All 185 rods were scram timed during the reactor pressure vessel leakage test (Hydro) prior to startup. All control rods were scram timed from full out. All control rod scram timing acceptance criteria were met during this test. The results of the testing are given below.

Position	Core Average Scram Times of all CRDs (sec)
45	0.373
39	0.675
25	1.401
05	2.492

These results also meet the Nominal Scram Speeds referenced in the Unit 2 Cycle 10 Core Operating Limits Report (TRM Appendix J).

Position	Core Average Scram Times of all CRDs (sec)
45	0.38
39	0.68
25	1.68
05	2.68

NF-LB-435, TIP Measurement Uncertainty

Purpose

The purpose of this test is to verify the core power symmetry.

Criteria

The χ^2 value of the total measured Traversing Incore Probe (TIP) uncertainty must be less than the critical value at the 1% confidence level (i.e., 36.19 for 19 TIP pairs).

The gross check of the TIP signal symmetry should yield a maximum deviation between symmetrically located pairs of less than 25%.

Results and Discussion

Core power symmetry calculations were performed based upon data obtained from a full core TIP set performed on February 27, 2003 at approximately 99.9% power. The TIP set was performed with all 5 TIP machines operable. All traces were obtained. The calculated χ^2 value was 1.06, which satisfies the test criteria of 36.19 for 19 pairs. The maximum deviation between symmetrical TIP pairs was 4.65%, which is within the 25% acceptance criteria.