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

LaSalle County Station, Unit 1
Facility Operating License No. NPF-11
NRC Docket No. 50-373

Subject: LaSalle 1 Cycle 13 Startup Test Report Summary

Enclosed for your information is the LaSalle County Station (LSCS) Unit 1 Cycle 13 Startup Test Report. This report is submitted in accordance with Technical Requirements Manual Section 5.0.b.

LSCS Unit 1 Cycle 13 began commercial operation on February 28, 2008, following a refueling and maintenance outage. The Unit 1 Cycle 13 core loading consisted of 324 fresh Framatome-ANP (FANP) Atrium-10 fuel bundles, 279 once-burned FANP Atrium-10 fuel bundles and 161 twice-burned Global Nuclear Fuel (GNF) fuel bundles. Also installed in the Unit 1 Cycle 13 reactor were eight new GE/Reuter-Stokes NA-300 Local Power Range Monitors (LPRMs), four new General Electric Marathon Control Rod blades and 26 new Westinghouse CR82M-1 Control Rod blades.

Attached are the evaluation results from the following tests:

- Reactor 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
- Reactor Recirculation System Performance

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. Terrence W. Simpkin, Regulatory Assurance Manager, at (815) 415-2800.

Respectfully,

Daniel J. Enright
Site Vice President
LaSalle County Station

Attachment

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

Reactor Core Verification

Purpose

The purpose of this test is to visually verify that the core is loaded as intended for Unit 1 Cycle 13 operation.

Criteria

The as-loaded core must conform to the cycle core design used by the Core Management Organization (FANP & 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.

Conformance to the cycle core design will be documented by a permanent core serial number map signed by the audit participants.

Results and Discussion

Core verification was performed concurrently with core load and shuffle per core verification guideline NF-AA-330-1001. The Unit 1 Cycle 13 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 20, 2008, the core was verified as being properly loaded and consistent with the LaSalle 1 Cycle 13 Core Loading Plan per Transmittal of Design Information (TODI) # NF0800064, Revision 0. This was documented in WO# 00901560.

Single Rod Subcritical Check

Purpose

The purpose of this test is to demonstrate that the Unit 1 Cycle 13 core will remain subcritical upon the withdrawal of the analytically determined strongest Control Rod.

Criteria

In accordance with LTP-1600-30, the core must remain subcritical, with no significant increase in SRM readings, with the analytically determined strongest rod fully withdrawn.

Results and Discussion

The analytically determined strongest rod for the Beginning of Cycle 13 for Unit 1 was determined by Nuclear Fuels to be Control Rod 42-11 per TODI# NF0800060, Revision 4. On February 22, 2008, with a Unit 1 moderator temperature of 141 ºF, Control Rod 42-11 was withdrawn to the full out position (48) and the core remained subcritical with no significant increase in SRM readings. This information is documented on LTP-1600-30, Attachment A.

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

Appropriate acceptance criteria are provided in LOS-RD-SR7 and include limits on rod settle time (less than 10 seconds); and if necessary, scram times from position 45 to position 05 and full stroke insertion time criteria (dependent on seal leakage and normal insertion time).

Friction testing shall be performed on the respective Control Rod drives(s) when any condition listed below is applicable:

- After relocation or replacement of the 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.
- The Unit Nuclear Engineer or CRD System Engineer determines that friction testing is appropriate.

Results and Discussion

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 identified by the above criteria as the rod met the appropriate acceptance criteria. The testing was completed on February 27, 2008 and is documented in LOS-RD-SR7.

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, acceptance criteria for the withdraw times (full-in to full-out) is between 45 and 60 seconds and insert times (full-out to full-in) is between 40 and 55 seconds.

Results and Discussion

LOS-RD-SR5 was performed satisfactorily for all CRDMs requiring post maintenance testing. As left Control Rod speeds are satisfactory per the LOS-RD-SR5 criteria. Timing was completed on February 27, 2008, and is documented in WO# 01009072-04.

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 and all other rods fully inserted.

Criteria

In accordance with LTS-1100-1 and Technical Specifications, if a shutdown margin (SDM) of 0.38% Δk/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 13 is 0.31% Δk/k per ANP-2708(P), "Startup and Operations Report LaSalle Unit 1 Cycle 13," transmitted by NF TODI# NF0800069, Revision 0, so a SDM of 0.69% Δk/k must be demonstrated.

Results and Discussion

The beginning-of-cycle SDM was successfully determined from the initial critical data. The initial Cycle 13 critical occurred on February 27, 2008, on Control Rod 38-35 at position 04, using an A-2 sequence. The moderator temperature was 188 ºF and the reactor period was 220 seconds. Using rod worth information, moderator temperature reactivity corrections, and period reactivity corrections supplied by Nuclear Fuels in TODI# NF 0800069, the SDM was determined to be 1.4875% Δk/k. The SDM exceeded the 0.69% Δk/k that was required to satisfy the Technical Specifications.

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 NF-AB-715, NF-AB-760, and Technical Specifications, 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 at full power steady state conditions. If the difference does exceed 1% Δk/k, 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 1 Cycle 13 Startup Test Program. One reactivity anomaly calculation is from the in-sequence critical and the other is from steady state, equilibrium conditions at approximately 100 percent of full power.

The initial critical occurred on February 27, 2008, on Control Rod 38-35 at position 04, using an A-2 sequence. The moderator temperature was 188 ºF and the reactor period was 220 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 0.0175% Δk/k of the predicted critical. The anomaly determined is within the 1% Δk/k required for BOC conditions as stated in NF-AB-715. This was documented in NF-AB-715, Attachment 3.

The reactivity anomaly calculation for full power steady state operation was performed on March 06, 2008. The data used was from 99.9% power at a cycle exposure of 113.0 MWD/MT at equilibrium conditions. The expected k_{eff} supplied by Nuclear Fuels was 0.9995. The actual k_{eff} was 1.0008. The resulting anomaly was 0.13% Δk/k. This value is within the 1% Δk/k criteria of Technical Specifications.

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 the Technical Specifications.

Criteria

In accordance with LTS-1100-4 and Technical Specifications, 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.

No more than 12 OPERABLE Control Rods shall be "slow" in accordance with the below table. In addition, no more than 2 Operable Control Rods that are "slow" shall occupy adjacent locations.

When the scram insertion time of an operable Control Rod from the fully withdrawn position (48), based on de-energization of the scram pilot valve solenoids as time zero, exceeds any of the following, that Control Rod is considered "slow":

Notch Position	Scram Time to Notch Indicated (seconds)
45	0.52
39	0.80
25	1.77
05	3.20

Results and Discussion

Scram testing was successfully completed on March 1, 2008 per WO 00906054. All 185 rods were scram timed during the reactor pressure vessel leakage testing (Hydro) prior to startup or at power prior to exceeding 40% rated thermal power. One Control Rod (46-39) was determined to be "slow." The results of the testing are given below.

Notch Position	Core Average Scram Times of all CRDs (sec)
45	0.360
39	0.660
25	1.367
05	2.455

These results also meet the "Nominal" Scram Speeds referenced in the Unit 1 Cycle 13 Core Operating Limits Report (TRM Appendix I).

TIP Measurement Uncertainty

Purpose

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

Criteria

In accordance with NF-AB-716, the χ^2 value of the total measured 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 (OD-1) performed on March 6, 2008, at approximately 100% power. The TIP set was performed with all 5 TIP machines operable. All traces were obtained. The χ^2 value was 8.86, which satisfies the test criteria of 36.19 for 19 pairs. The maximum deviation between symmetrical TIP pairs was 4.77%, which is within the 25% acceptance criteria.

Recirculation System Performance

Purpose

The purpose of this procedure is to collect sufficient baseline data at the beginning of cycle to establish the following relationships:

- core thermal power vs. total core flow
- recirculation total drive flow vs. total core flow
- core plate flow vs. total core flow
- recirculation flow control valve position vs. loop drive flow
- jet pump readings vs. loop drive flow

Criteria

In accordance with LTP-1600-13 and Technical Specifications, the performance curves used in conjunction with reactor recirculation system flow and differential pressure data will establish baseline data to determine if possible jet pump or recirculation pump degradation exists.

The established baseline performance curves will also be used to verify jet pump operability to determine if jet pump anomalies exist.

Results and Discussion

Reactor Recirculation data was collected during the L1C13 startup. Data was obtained from computer points for all the points of interest to evaluate the RR System performance. No significant changes from L1C12 were noted in the L1C13 RR performance curves. This was completed on May 12, 2008 and is documented in WO# 00968868.