

Attachment A

Startup Physics Testing Report, Cycle 17

Shutdown Margin Demonstration (Test 0073)

Withdrawal of the highest worth control rod as calculated by the NSP Nuclear Analysis and Design group (NSP-NAD), plus additional reactivity to account for the 0.25% delta-k Technical Specification margin requirement, the 0.05% allowance for inverted absorber tubes, a 0.21% allowance for temperature defect (140 degrees F), a 0.08% allowance for calculational uncertainty, and a 0.26% allowance for the Technical Specification "R" value, still showed the reactor to be subcritical, thereby demonstrating shutdown margin compliance. Demonstration of subcriticality after sufficient notch withdrawals to account for the above numerical values is the acceptable and required result.

Benchmark Critical (Test 8079)

One benchmark critical was performed. In recent past cycles, rod worth calculations had been performed by NSP-NAD, who had performed the licensing analyses and by GE, who had performed confirmatory calculations. For Cycle 17, confirmatory calculations were performed in-house at NSP-NAD, using the CASMO3/SIMULATE computer code package which is expected to be licensed for use with Cycle 18 licensing analyses. The licensing calculations for Cycle 17 were performed using the CASMO-IIe/NDH code package. These two code packages predicted the same top two high worth control rods, but reversed in order. (I.e. CASMO-IIe/NDH predicted Rod A as the high worth rod, and Rod B as the second highest worth rod, while CASMO3/SIMULATE predicted Rod B as the high worth rod and Rod A as the second highest worth rod.) Rod A and B were diagonally adjacent to each other. As a result, if criticality were to occur beyond the withdrawal of the second control rod in the benchmark critical, then the two benchmark criticals for the two code packages would reduce to the same benchmark critical rod configuration (since the benchmark criticals utilize withdrawal of diagonally adjacent control rods). This was indeed found to be true.

The benchmark critical occurred within 0.30% (early) delta-k of the predicted critical position for CASMO-IIe/NDH and within 0.03% delta-k of the predicted critical position of CASMO3/SIMULATE. These results are acceptable because they fall within the +/- 1% delta-k acceptance band for reactor criticals, and are within the 0.70% reliability factor (approximately 2 sigma) calculated by NSP-NAD. Note that the minimum shutdown margin during the cycle calculated using CASMO-IIe/NDH methods is 1.308% delta-k, so a 0.30% (early) adjustment still leaves abundant shutdown margin

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remaining. Similarly, the minimum shutdown margin during the cycle calculated using the CASMO3/SIMULATE confirmatory calculations was 1.44%.

In-Sequence Critical

The reactor was started up in the A2R3 sequence for BOC17. Criticality occurred 0.29% delta-k early, according to CASMO-Ile/NDH, and occurred within 0.01% delta-k of the predicted critical position of CASMO3/SIMULATE. These in-sequence critical results are acceptable, since they fall within the +/- 1% delta-k acceptance band for reactor criticals.

Temperature Coefficient Data

The data taken during the Cycle 17 startup was compared to the prediction based on NSP-NAD methods. The maximum difference in the temperature defect between the reactor and the NSP-NAD predictions is approximately 0.06% delta-k. This value is similar to past cycles and is reasonable. There is no quantitative acceptance band for this data.

Summary

All data collected satisfied acceptance criteria. There was no anomalous data. Physics testing for the new core loading, including the 8 Siemens 9x9-IX (ATRIUM 9B) fuel bundles, was satisfactory.

TRANSMITTAL MANIFEST

NORTHERN STATES POWER COMPANY

NUCLEAR LICENSING DEPARTMENT

MONTICELLO NUCLEAR GENERATING PLANT

Startup Physics Testing Report, Cycle 17

Correspondence Date:

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