Commonwealth Edison Company
Dresden Generating Station
6500 North Dresden Road
Morris, IL 60450
Tel 815-942-2920

ComEd

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U.S. Nuclear Regulatory Commission
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Subject: Dresden Nuclear Power Station Unit 2
Cycle 15 Supplemental Test Report (Startup Test Report 3)
NRC Docket No. 50-237

Reference: J. S. Perry letter (96-109) to U.S. NRC, dated July 16, 1996
(Dresden Nuclear Power Station Unit 2 Cycle 15 Test Report
NRC Docket No. 50-237)

Enclosed please find a supplement to the above referenced Dresden Unit 2 Cycle 15 Startup Test Report. This transmittal provides the Commission with results of Unit 2 Cycle 15 startup test number 3 which were not available on July 16, 1996. Technical Specifications 6.6.A.1 requires a submittal of the Startup Test Report to the NRC within 90 days following resumption of commercial power operation. The initial 90 day period expired on July 23, 1996 and the above referenced letter provided the available startup tests results. Due to various problems during unit 2 startup, full power TIP set was not completed until September 19, 1996. The TIP System Symmetry and Total Uncertainty tests were completed on October 4, 1996, and are provided with this transmittal. This transmittal completes the Dresden Unit 2 Cycle 15 Startup Test Report required by Technical Specifications.

Please direct any questions or comments regarding this change to C. de la Hoz, Dresden Reactor Engineer, (815) 942-2920, extension 2997.

Very truly yours,

J. Stephen Perry
Vice President
Dresden Station

Enclosure

cc: A. Bill Beach, Regional Administrator, Region III
NRC Resident Inspector's Office
NRR, Project Manager
Illinois Department of Nuclear Safety

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DRESDEN UNIT 2 CYCLE 15
STARTUP TEST REPORT

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Startup Testing Summary

Dresden Unit 2 resumed commercial operation for Cycle 15 on April 25, 1996, following an extended refueling and maintenance outage. The reload fuel for Cycle 15 is comprised of 224 Siemens Power Corporation (SPC) manufactured 9x9-2 liner fuel bundles and 8 SPC ATRIUM-9B liner Lead Assemblies. The D2C15 reload is the fifth reload of 9x9-2 fuel for Dresden Unit 2 and the tenth such reload at Dresden Station. Cycle 15 marks the second reload of liner fuel and the first introduction for the ATRIUM-9B fuel design as Lead Assemblies at Dresden.

The startup test program was similar to those performed for previous Unit 2 and Unit 3 beginning-of-cycle startups at Dresden. Various physics tests were performed (shutdown margin, critical eigenvalue comparison, etc.) as well as instrument calibrations (LPRM, TIP, flow instrumentation) as addressed by the Technical Specifications, the Rebaselined Updated Final Safety Analysis Report, and previous commitments to the Nuclear Regulatory Commission. The TIP System Symmetry and Total Uncertainty checks were completed on October 4, 1996, and is included in this supplemental transmital. To date, no unusual conditions were noted during the performance of these tests and results were as expected.

Summaries of the startup tests identified in the Draft Regulatory Guide SC 521-4 on refueling and startup tests for LWR reloads are included per DPR-19 Technical Specification 6.6.A.1. Additional test results are available at the site.

Startup Test No. 3 - TIP System Symmetry and Total Uncertainty

Purpose

This test performs a gross symmetry check and a detailed statistical uncertainty analysis on the Traversing Incore Probe (TIP) System.

Acceptance Criteria

For the gross check, the maximum deviation between symmetrically located TIP pairs of LPRM strings should be less than 25%. For the statistical check, the calculated X^2 of the integrated TIP responses should be less than 34.81.

NOTE: One data set may be used to meet the above criteria. If either criteria is not met, the instrumentation and data processing system should be checked for any problems that could lead to asymmetries. If the problem persists, the core management organization should be consulted to provide assurance that the larger than expected TIP asymmetries do not significantly affect core monitoring calculations.

Results and Discussion

One complete set of TIP data required for evaluating TIP uncertainty was obtained during the startup test program on September 19, 1996. The data was obtained at near full power steady state operating conditions. The results for each method of analysis are summarized below.

1. TIP Symmetry - Gross Check

In order to determine the overall symmetry of the TIP system, the machine-normalized, power adjusted 6-inch TIP readings were obtained and averaged over nodes 1 through 24 for each symmetric TIP pair (the symmetric locations are given in Table 3-1). The absolute percent deviation for each symmetric TIP pair was calculated and the results are summarized in Table 3-2. The maximum absolute deviation was 8.63%, which is within the acceptance criteria of 25%.

2. TIP Symmetry - Statistical Check

The TIP symmetry statistical analysis was performed using the standard X^2 test. The machine-normalized, power adjusted 6-inch TIP readings were obtained and used for the analysis. These TIP readings were summed over nodes 3 through 22 for each TIP tube location. The percent relative difference (Dm) for each symmetric TIP pair was then calculated using Equation 3-1 with the results summarized in Table 3-3. The TIP data variance (S^2TIP_{ij}) was calculated to be 10.272 using equation 3-2 and X^2 was calculated to be 5.136 using Equation 3-3. This value is within the acceptance criteria of 34.81.

Table 3-1 Symmetric TIP Locations

TIP Pair	LPRMs	TIP Pair	LPRMs
1	08-17 16-09	10	24-33 32-25
2	08-25 24-09	11	24-41 40-25
3	08-33 32-09	12	24-49 48-25
4	08-41 40-09	13	24-57 56-25
5	08-49 48-09	14	32-41 40-33
6	16-25 24-17	15	32-49 48-33
7	16-33 32-17	16	32-57 56-33
8	16-41 40-17	17	40-49 48-41
9	16-49 48-17	18	40-57 56-41

Table 3-2 TIP Symmetry - Gross Check

Symmetric TIP Pair	Absolute Percent Deviation
1	2.39
2	6.87
3	7.33
4	1.19
5	0.28
6	3.79
7	8.63
8	6.71
9	0.96
10	0.24
11	4.70
12	4.33
13	8.21
14	0.70
15	1.84
16	0.21
17	3.88
18	0.30

Maximum Absolute Percent Deviation: 8.63%

Table 3-3 TIP Symmetry - Statistical Check

Symmetric TIP Pair	Relative Difference, Dm
1	2.298
2	7.405
3	7.499
4	1.688
5	0.054
6	2.414
7	9.117
8	6.285
9	0.240
10	0.070
11	4.376
12	4.035
13	8.221
14	0.977
15	2.374
16	0.318
17	3.519
18	0.078

Equation 3-1

$$Dm = \frac{100\left(Tm_1 - Tm_2\right)}{\frac{\left(Tm_1 + Tm_2\right)}{2}}$$

Note: $Tm_1 = \sum_{k=3}^{22} T_1(k) for TIP_1 and Tm_2 = \sum_{k=3}^{22} T_2(k) for TIP_2$

where TIP_1 and TIP_2 are symmetric TIP pairs, and $T_1(k)$ and $T_2(k)$ are the machine normalized, power adjusted, 6-inch TIP readings for the respective TIP pair locations.

Equation 3-2

$$S^2 TIP_{ij} = \frac{\sum_{m=1}^{18} Dm^2}{36} = 10.272$$

Equation 3-3

$$X^2 = \frac{18\left(S^2 TIP_{ij}\right)}{36} = 5.136$$