

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-333/85-14 and 50-333/85-17

Docket No. 50-333

License No. DPR-59 Priority -- Category C

Licensee: Power Authority of the State of New York

P.O. Box 41

Lycoming, New York 13093

Facility Name: Fitzpatrick Nuclear Power Plant

Inspection At: Scriba, New York

Inspection Conducted: May 13-17, and May 24-25, 1985

Inspectors: Peter C. Wen
P. C. Wen, Reactor Engineer

7/11/85
date

A. Alba
A. Alba, Reactor Engineer

7/11/85
date

C. Petrone
C. Petrone, Lead Reactor Engineer

7/11/85
date

Approved by: L. H. Bettenhausen
for L. H. Bettenhausen, Chief
Operations Branch, DRS

7/15/85
date

Inspection Summary: Inspection on May 13-17 and May 24-25, 1985 (Inspection Report No. 50-333/85-14; 50-333/85-17)

Areas Inspected: Routine, unannounced inspection of startup testing following refueling of Cycle 6/7. The inspection included the testing program, pre-critical tests, test procedures review and witnessing of a Shutdown Margin Test. The inspection involved 65 hours onsite by three region-based inspectors.

Results: No items of noncompliance were identified.

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DETAILS

1. Persons Contacted

- †*D. Burch, Reactor Analyst Supervisor
- *R. Converse, Superintendent of Power
- *W. Fernandez, Operations Superintendent
- *H. Glovier, Resident Manager
- L. Johnston, QA Supervisor

NRC

- *L. Doerflein, Senior Resident Inspector

The inspector also interviewed other licensee personnel during the inspection.

*Denotes those present at the exit meeting on May 17, 1985.

†Denotes those present at exit meeting on May 25, 1985.

2. Cycle 7 Reload Safety Evaluation and Core Verification

The Cycle 7 reload contains 196 new fuel bundles (GE Barrier-Type BP8X8R). The barrier-type fuel provides a liner on the inner surface of the Zircaloy-2 cladding and was designed to reduce cladding failures due to pellet-cladding interaction. The reload safety evaluation (RSE) of the Cycle 7 along with the required Technical Specification (TS) changes were submitted to the NRC for review. This reload submittal was found acceptable (Letter from H. I. Abelson (NRC) to J. B. Bayne (PASNY), dated May 2, 1985). The basic assumption used in the RSE was Cycle 6 burnup of 8884.6 MWD/ST. The actual Cycle 6 burnup (8976.6 MWD/ST) is within the licensing window 8684-9282 MWD/ST.

The licensee performed the core verification in accordance with procedure RAP 7.2.4, "Reactor Core Fuel Verification" on May 2 and 3, 1985. After the unsuccessful SDM demonstration (test date 5/6/85), QC performed another core verification on May 8 and 9, 1985. No discrepancies were identified during these verifications.

The inspector, with the assistance from the resident inspectors, reviewed the whole core verification videotapes and verified that the fuel bundle position and orientation were in agreement with the intended core map.

No unacceptable conditions were identified.

3. Cycle 7 Startup Testing

Plant startup is planned for last week of May, 1985 after regular Cycle 6/7 refueling outage. During the inspection period, May 13-17, 1985, the unit was still in preparation for startup.

The refuel startup program will be conducted according to test procedure RAP-7.1.17, "Refuel Startup Program". This procedure outlined the steps in the test program. The detailed tests and data collections are referenced in separate test procedures.

The inspector reviewed selected test programs and available results to verify the following, where applicable:

- Procedures were provided with the detailed stepwise instructions, including Precautions, Limitations, and Acceptance Criteria;
- Technical content of the procedures was sufficient to result in satisfactory calibration and test;
- Provisions for recovering from anomalous conditions were provided;
- Methods and calculations were clearly specified and tests were conducted accordingly;
- Review, approval, and documentation of the results were in accordance with the requirements of the TS and the licensee's administrative controls.

The following test and procedures were reviewed:

3.1 Shutdown Margin Demonstration (SDM)

The licensee conducted SDM demonstration in accordance with the test procedure RAP-7.3.9, "Shutdown Margin Demonstration". The licensee is required to demonstrate SDM by at least $R+0.38\% \Delta K$. The value of R is the maximum decrease in SDM from Beginning of Cycle (BOC). An R value of 0.06% was derived from the GE Nuclear Fuel Management Report, Doc. No. 23A1807, Rev. 0. The Diagonally-Adjacent-Rod method was used during the demonstration performed on May 3 and 6, 1985. The Diagonally-Adjacent-Rod method was originally intended to withdraw the strongest rod (SR) (26-31) to its fully withdrawn position and the diagonally adjacent rod (ADJR) (22-27) to notch position 12. If the core reached this configuration without being critical, the calculated rod worth would be greater than the TS required SDM. However, both tests were prematurely aborted due to high readings in all four source range monitors. The Fuel Vendor (GE) was consulted on the problem, a recommendation using In-Sequence critical method is subsequently planned in the startup test sequence. The inspector verified the following to ensure the problems encountered during the SDM demonstration were not caused by:

- New Fuel Receipt: All 196 new unirradiated fuel bundles and 196 new fuel channels were inspected by QC inspectors. No abnormal conditions were identified in the QC fuel inspection report (#F85-0067).

- Control Blade Exposure: The inspector verified the process computer output - TCRES array. All control blades' TCRES values were within the projected end of life time.
- Core Loading Verification: As described in Section 2, NRC inspectors independently verified the whole core loading map. No unacceptable conditions were identified.

The inspector noted that the SR is surrounded by 2 new unirradiated and 2 once burnt fuel bundles. The ADJR at octant symmetric location is also surrounded by 2 new unirradiated and 2 once burnt fuel bundles. All 4 once burnt fuel bundles have about the same bundle exposure.

Based on the test data review, the inspector informed the licensee that the SDM test performed on May 6, 1985 did not successfully demonstrate the TS required values. The licensee agreed to reperform the shutdown margin test using the in-sequence method.

3.2 In-sequence Shutdown Margin Demonstration

On May 25, 1985, the licensee performed a shutdown margin test using the in-sequence method. The inspectors reviewed the pretest checklist and verified that all required prerequisites and precautions had been signed off by appropriate licensee personnel. The inspectors witnessed the test and noted that the reactor went critical with the group 2, rod 14-11 at position 20; moderator temperature was 130.5°F and the reactor period was 89 seconds. The licensee calculated the shutdown margin to be .79% ΔK which met the TS minimum required shutdown margin of .44% ΔK . The inspectors independently calculated the shutdown margin and verified the licensee's result.

On May 28, 1985, the licensee reperfomed the in-sequence shutdown margin test (during the planned restart) and obtained a shutdown margin of .81% ΔK , which was in good agreement with the previous in-sequence test, and met Technical Specification Requirements.

The inspectors were satisfied that adequate shutdown margin existed but questioned the accuracy of the two rod method in view of the discrepancy between the results obtained using it, the in-sequence method, and the predicted (calculated) shutdown margin. The licensee subsequently provided additional information to NRC Region I and NRR who evaluated the data and concluded that the difference between the calculations and measurements are within the uncertainties of the calculational methods. The inspectors had no further questions.

3.3 Reactor Heat Balance (Procedure RAP-7.1.17 Item 6.4.9)

The acceptance criteria of the weekly check of process computer's core thermal power calculation was discussed. To prevent inadvertently exceeding the licensed core thermal power, the licensee agreed that at near rated condition a 2% acceptance criterion in lieu of 5% will be incorporated in the future procedure.

4. Thermal-Hydraulic (T-H) Stability

The possibility of BWR T-H instability in certain operating regions, especially high power/low flow corner of the power/flow map has been previously identified through testing and operating experience in the industry. To prevent and mitigate the consequence of operating the unit near these regions, the licensee has committed to incorporate the recommendations as specified in GE SIL-380, Rev. 1 into plant operating procedures prior to startup of Cycle 7 (TS Amendment No., 88). This subject was discussed with a cognizant licensee representative. Through discussion and document review, the inspector noted that the related operation procedures revision is nearly complete. The inspector also noted that a special test is planned to obtain baseline data for normal neutron instrumentation noise monitoring.

The inspector had no further questions.

5. Quality Assurance/Quality Control Involvement

The inspector reviewed two QC surveillance reports (Nos. 1018 and 1019) and noted that QC verified the core loading map. Through discussion with QA supervisor the inspector learned that QA has planned to cover portions of startup testing.

No unacceptable conditions were identified.

6. Exit Interview

Licensee management was informed of the purpose and scope of the inspection at the entrance interview. The findings of the inspection were periodically discussed and were summarized May 17, and May 25, 1985. Attendees at the exit interview are denoted in paragraph 1.

No written material was provided to the licensee by the inspector at any time during this inspection.