

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-295/82-21(DETP)

Docket No. 50-295

License No. DPR-39

Licensee: Commonwealth Edison Company
Post Office Box 767
Chicago, IL 60690

Facility Name: Zion Nuclear Power Station, Unit 1

Inspection At: Zion, IL

Inspection Conducted: September 8-10, 1982

Inspector: *D. L. Robinson*
D. L. Robinson

10-1-82

Approved By: *I. N. Jackiw*
I. N. Jackiw, Chief
Test Programs Section

10-1-82

Inspection Summary

Inspection on September 8-10, 1982 (Report No. 50-295/82-21(DETP))

Areas Inspected: Routine, announced inspection of Unit 1, Cycle 7 control rod drop time tests; control rod drive and position indication checks; reactor thermocouple/RTD cross calibration; incore/excore calibration; control rod worth measurements; reactor shutdown margin determination; isothermal temperature coefficient measurement; power coefficient of reactivity measurement; target axial flux difference calculation; core thermal power evaluation; core power distribution limits; determination of reactivity anomalies. The inspection involved a total of 12 inspector-hours onsite by one NRC inspector including 0 inspector-hours onsite during off-shifts.

Results: No items of noncompliance or deviations were identified.

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DETAILS

1. Persons Contacted

- *K. Graesser, Station Superintendent
- *G. Pliml, Assistant Superintendent
- *T. Miosi, Technical Staff Supervisor
- *P. LeBlond, Assistant Technical Staff Supervisor
- *W. T'Niemi, Nuclear Group Leader
- R. Chin, Nuclear Engineer
- *P. Hull, Quality Assurance Staff
- *R. Placko, Quality Control Staff
- *J. Waters, NRC Senior Resident Inspector

*Denotes those present during the exit interview.

2. Verification of Conduct of Startup Physics Testing

The inspector reviewed the startup physics testing for Zion 1 Cycle 7 and verified that the licensee conducted the following:

- a. Rod Drive and Rod Position Indication Checks
- b. Reactor Thermocouple/RTD Cross Calibration
- c. Incore/Excore Calibration
- d. Control Rod Worth Measurement
- e. Determination of Reactor Shutdown Margin
- f. Isothermal Temperature Coefficient
- g. Power Coefficient of Reactivity Measurement
- h. Target Axial Flux Difference Calculation
- i. Core Thermal Power Evaluation
- j. Core Power Distribution Limits
- k. Determination of Reactivity Anomalies

3. Control Rod Drive and Position Indication Checks

The inspector reviewed the results of surveillance test T.S.S. 15.6.26, "Control Rod System Checkout," dated November 4, 1981 for Zion 1 Cycle 7 and concluded that all rod drop times satisfied the acceptance criteria for 1.8 seconds or less required by the Technical Specifications. The inspector also verified that rod drive and rod position indication checks were performed as part of the surveillance on June 18, 1982.

No items of noncompliance or deviations were identified.

4. Reactor Thermocouple/RTD Cross Calibration

The inspector reviewed information related to reactor thermocouple/RTD cross calibration as described in surveillance procedure T.S.S. 15.6.72, "RTD Cross Calibration," dated November 10, 1981. The inspector noted that the narrow range RTDs were within the $\pm 0.5^{\circ}\text{F}$ acceptance criteria established by the licensee and that all applicable Technical Specifications were satisfied. The inspector noted that the licensee had not established criteria to evaluate the wide range RTDs and that 15 of the

65 incore thermocouples were inoperable. The licensee committed to incorporate criteria into the procedure for the wide range RTD calibration and acknowledged the thermocouple maintenance was a problem but that steps were being taken to correct the problem.

This item will be reviewed during a subsequent inspection 50-295/82-21-01.

No items of noncompliance or deviations were identified.

5. Incore/Excore Detector Calibration

The inspector reviewed information related to incore/excore detector calibration as described in surveillance procedure T.S.S. 15.6.2, "NIS Calibration," dated January 29, 1982. The inspector reviewed the graphs of incore axial offset versus excore axial offsets for the four power range channels and noted that the calibration currents were properly obtained for the upper and the lower excore detectors. The inspector determined that the licensee had satisfied the Technical Specification requirement to calibrate the nuclear power range channels quarterly.

No items of noncompliance or deviations were identified.

6. Control Rod Worth Measurement

The inspector reviewed information related to the Zion 1 Cycle 7 determination of control rod worths as described in surveillance procedure, T.S.S. 15.6.55, "Rod and Boron Worth Measurements," dated November 6, 1981. The reactivity of the reference bank (Bank D) was measured using the boration/dilution technique and the reactivity worth of the remaining banks was inferred using rod swap reactivity comparisons to the reference bank. The inspector concluded that the results of the rod swap procedure satisfied all acceptance and review criteria. The difference between measured and predicted integral worth for the reference bank was approximately 3%. The maximum difference between the inferred and predicted integral worths for all other banks was less than 7%. The difference between the sum of the measured/inferred bank worths and the sum of the predicted worths was approximately 4%.

No items of noncompliance or deviations were identified.

7. Determination of Shutdown Margin

The inspector reviewed information related to an analytical determination of Cycle 7 shutdown margin at beginning of life (BOL) and end of life (EOL) conditions as given in Westinghouse Report WCAP-10047, "Core Physics Characteristics on the Zion Nuclear Plant, Unit 1, Cycle 7," dated February 1982. The inspector noted that the results of the control rod worth measurements are used in lieu of a specific physics test to verify shutdown margin. The inspector reviewed the licensee's minimum shutdown margin calculations for both BOL and EOL conditions and concluded that the applicable Technical Specifications would be met.

No items of noncompliance or deviations were identified.

8. Isothermal Temperature Coefficient

The inspector reviewed information relating to Cycle 7 determination of the isothermal temperature coefficient as described in surveillance procedure T.S.S. 15.6.54, "Isothermal Moderator Temperature Coefficient Measurements," dated May 27, 1982. The Technical Specifications require, except during low power physics testing, that the moderator temperature coefficient (MTC) be negative. In addition, the licensee's acceptance criteria requires that the isothermal temperature coefficient be within ± 3 pcm/ $^{\circ}$ F of the predicted value. The inspector determined that these requirements were satisfied for both the all rods out (ARO) condition and when the reference bank (Bank D) was inserted.

No items of noncompliance or deviations were identified.

9. Power Coefficient of Reactivity

The inspector reviewed information relating to the Cycle 7 determination of power coefficient of reactivity as described in surveillance procedures T.S.S. 15.6.61, "At Power Physics Measurements Following Refueling," dated May 27, 1982, T.S.S. 15.6.62, "Moderator Temperature Coefficient," dated July 9, 1980. The predicted design values for the power coefficient were -10.0, -9.3, and -8.8 pcm/% power at 72%, 88%, and 99% power, respectively. The corresponding measured values were -11.6, -9.0, and -9.4 pcm/% power.

No items of noncompliance or deviations were identified.

10. Target Axial Flux Difference Calculations

The inspector reviewed information related to the determination of target axial flux difference as described in surveillance procedure T.S.S. 15.5.1, "Determination of ΔI Operating Limits," dated December 22, 1981. The inspector examined surveillance test data taken on August 12, 1982 as well as data from Cycle 6 and concluded that the licensee had satisfied the Technical Specification requirements to determine the target axial flux difference at least once per equivalent full power quarter and to update target differences monthly.

No items of noncompliance or deviations were identified.

11. Core Thermal Power Evaluation

The inspector reviewed information related to the evaluation of core thermal power as determined by the onsite computer, calorimetric and by hand calculation as described in procedure PT-0, Appendix M, "Calorimetric", dated March 5, 1979. The inspector verified that the onsite computer program was working properly, and that the core thermal power calculated with the above procedure was in good agreement with that determined by the computer. The inspector noted that a manual calorimetric was performed on July 16, 1982 and compared well with the 10 minute computer calorimetric.

No items of noncompliance or deviations were identified.

12. Core Power Distribution Limits

The inspector reviewed the surveillance procedures T.S.S. 15.6.0, "Flux Map Data Acquisition, Power Distribution, and Incore/Excore Axial Imbalance Checks" dated August 3, 1981 and the results of various full core maps taken between July 3 and September 3, 1982. The inspector determined that all prerequisites were met, the onsite computer was using input values from the actual plant conditions, all thermal margins satisfied Technical Specification requirements, and the calculated values by the computer were within the acceptable criteria established by the licensee. The inspector also reviewed the adjusted Fq limit for Unit 1 and verified that surveillance procedures reflected the change.

No items of noncompliance or deviations were identified.

13. Determination of Reactivity Anomalies

The inspector reviewed information related to the determination of reactivity anomalies for Cycle 7 as described in surveillance procedure T.S.S. 15.6.29, "Reactivity Anomaly Check," dated May 18, 1982 and concluded that the applicable Technical Specification was met.

No items of noncompliance or deviations were identified.

14. Exit Interview

The inspector met with licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on September 10, 1982. The inspector summarized the purpose, the scope of the inspection, and the findings.