U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

REGION III

Report No. 50-315/79-28

Docket No. 50-315 License No. DPR-58

Licensee: American Electric Power Service Corporation
Indiana and Michigan Power Company
2 Broadway, N.Y. 10004

Facility Name: Donald C. Cook Nuclear Plant Unit 1

Inspection At: Donald C. Cook Site, Bridgman, MI

Inspection Conducted: December 11 thru 14, 1979

Inspector: E. T. Chow E. T. Chow 1/7/80

Approved By: W. S. Little, Acting Chief 1/6/80
Nuclear Support Section 1

Inspection Summary

Inspection on December 11 thru 14, 1979 (Report No. 50-315/79-28)
Areas Inspected: Routine, announced inspection of shutdown margin determination; isothermal temperature coefficient; power coefficient of reactivity measurement; target axial flux difference; reactivitiy anomalies. The inspection involved 22 inspector hours onsite by one NRC inspector.
Results: Of the five areas inspected, no Items of Noncompliance or Deviations were identified in four areas. One Item of Noncompliance was identified in one area. (Deficiency - failure to update the plant technical data book - Paragraph 7).

DETAILS

1. Persons Contacted

*J. Ho, Performance Engineer
*V. Vanderburg, Nuclear Engineer
*E. Smarrella, Technical Superintendent
*J. Stietzel, QA Supervisor
*T. Beilman, Senior QA Auditor
*E. Townley, Assistant Plant Manager
*D. Shaller, Plant Manager
*R. Masse, Resident Inspector, NRC, RIII

*Denotes those present during the exit interview.

2. Verification of Conduct of Startup Physics Testing

The inspector reviewed the startup physics testing and verified that the licensee conducted the following:

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

3. Shutdown Margin Determination

The inspector reviewed information relating to Cycle 4 shutdown margin determination as described in Appendix B, "Shutdown Margin Verification," of Procedure 12 THP 6040 PER .059, Revision 2, "Zero Power and Power Ascension Tests," dated May 8, 1979.

The inspector noted that the calculated shutdown margin with the most reactive rod F 14 stuck out of the core was 4689 pcm which met the Technical Specification requirement of 1750 pcm.

The inspector noted that only the worths of control banks were measured and the worths of shutdown banks were not measured but calculated by assuming that the ratio of the measured control bank worth

to the predicted control bank worth was the same as the ratio of the measured shutdown bank worth to the predicted shutdown bank worth. The licensee agreed that the assumption of using the same ratio to calculate shutdown bank worth might not be conservative and would review the procedure. This Unresolved Item (315/79-28-01) will be reviewed in a subsequent inspection.

No items of noncompliance or deviations were identified.

4. Isothermal Temperature Coefficient

The inspector reviewed information relating to Cycle 4 determination of isothermal temperature coefficient as described in Procedure 12 THP 6040 PER. 050, Revision 2, "Isothermal Temperature Coefficient Measurement," dated July 9, 1979.

The licensee's acceptance criterion requires that the measured isothermal temperature coefficient be within ±3 pcm/°F of the predicted value. The inspector determined that this requirement was satisfied. The isothermal temperature coefficient measured during heatup was .2048 pcm/°F and the coefficients measured during two cooldowns were .2621 pcm/°F and .2125 pcm/°F.

No items of noncompliance or deviations were identified.

5. Power Coefficient of Reactivity Measurement

The inspector reviewed information relating to the Cycle 4 determination of power coefficient of reactivity as described in Procedure THP 6040 PER.054, Revision 2, "Determination of the Doppler Power and Total Power Coefficients," and Procedure 12 THP 4030 STP.307, "Moderator Temperature Coefficient Determination."

The inspector noted that the power coefficient was calculated from the measurements of Doppler and moderator temperature coefficients.

The inspector reviewed the results of power coefficient tests at 50% of rated power on July 22, 1979 and at 90% of rated power on July 25, 1979. The review criterion was that the power coefficient obtained from the measurements be within ± 30% of the design value. The inspector noted that the predicted power coefficient was -12.22 pcm/% power and the power coefficient obtained from measurements was -9.177 pcm/% power. The inspector concluded that the review criterion was met.

No items of noncompliance or deviations were identified.

6. Target Axial Flux Difference

The inspector reviewed information relating to the Cycle 4 determination of target axial flux difference as described in Procedure 12 THP 4030 STP.372, Revision 3, "Target Flux Difference Update." The inspector noted that the Technical Specification requires that the indicated axial flux difference be maintained within a ±5% target band about the target flux difference, and a new target band will be issued if the measured or updated target value is more than 1% different from the present target value. The inspector reviewed the flux map taken on November 16, 1979 and noted that a new target value was calculated and the related target band was issued. The inspector further noted that the target flux difference was measured at least once per 92 effective full power days (EFPD) and was updated at least once per 31 EFPD.

No items of noncompliance or deviations were identified.

7. Reactivity Anomaly Determination

The inspector reviewed information relating to the Cycle 4 determination of reactivity anomaly as described in Procedure 1-THP 4030 STP.308, Revision 2, "Boron Curve Update," dated January 4, 1979. The inspector noted that, based on the boron endpoint and rod worth measurements, the measured differential boron worth was about 20% higher than the Exxon design value. The inspector noted that the determination of reactivity anomaly using either the measured differential boron worth or the predicted value satisfied Technical Specification requirement.

Plant Manager Instruction PMI 4060 requires the licensee to forward only properly prepared, reviewed and approved technical data for entry in technical data books.

The inspector noted that Unit 1 Cycle 4 Physics Test Data Summary stated that the values for the differential boron worth used in the plant technical data book have been scaled up to reflect the true boron worth in the core.

Contrary to the above, the differential boron worth curves in the technical data books have not been scaled up to reflect the discrepancy between the predicted and the measured differential boron worths. This is considered to be an item of noncompliance of the Deficiency level.

The licensee stated that Exxon had acknowledged the discrepancy in boron worth and also discovered the similar problem at another nuclear power plant. This Unresolved Item (315/79-28-02) will be reviewed in a subsequent inspection.

8. Unresolved Items

Unresolved Items are matters about which more information is required in order to ascertain whether they are acceptable items, Items of Noncompliance, or Deviations. Two Unresolved Items disclosed during the inspection were discussed in Paragraph 3 and 7.

9. Exit Interview

The inspector met with licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on December 14, 1979. The inspector summarized the purpose and the scope of the inspection and the findings.