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

REGION III

Report No. 50-155/79-08

Docket No. 50-155 License No. DPR-6

Licensee: Consumers Power Company
212 West Michigan Avenue
Jackson, MI 49201

Facility Name: Big Rock Point Nuclear Plant

Inspection At: Big Rock Point Site, Charlevoix, MI

Inspection Conducted: April 17-20, 1979

Inspectors: E. T. Chow for — 5/7/79
B. M. K. Wong for — 5/7/79

Approved By: J. F. Streeter, Chief for — 5/7/79
Nuclear Support Section 1

Inspection Summary

Inspection on April 17-20, 1979 (Report No. 50-155/79-08)
Areas Inspected: Routine, unannounced inspection of moderator temperature coefficient; control rod sequence and reactivity checks; control rod scram time tests; shutdown margin determination; core thermal power determination; review of plant operation. The inspection involved 49 inspector-hours onsite by two NRC inspectors.
Results: No items of noncompliance or deviations were identified.

DETAILS

1. Persons Contacted

C. J. Hartman, Plant Superintendent
D. E. DeMoor, Technical Engineer
*D. Blanchard, Reactor Engineer
*L. Monshor, Reactor Engineer
C. F. Sonnenberg, Shift Supervisor
M. Malec, Document Control Clerk
A. Sevener, Operations Supervisor
J. R. Johnson, Control Operator
*T. Fisher, QA Engineer
*K. Brun, Senior Secretary
*J. Rang, Operations - Maintenance Superintendent

*Denotes those attending the exit interview.

2. Moderator Temperature Coefficient

The inspector reviewed information relating to Cycle 15 moderator temperature coefficient test as described in Procedure No. RE-9.

Big Rock Point Technical Specifications require that the maximum amount of reactivity added when heating from ambient be less than one dollar.

The inspector reviewed Cycle 15 measurements taken on October 18, 1977. The inspector noted that the heating started from an ambient temperature of approximately 80°F by running both recirculating pumps. The reactor was brought supercritical by withdrawing control rods until a rising period of approximately 110 seconds was attained. The period and the primary system temperature were recorded, and the period was converted to reactivity so that moderator temperature coefficient could be obtained. This process was repeated using increasing temperatures until the moderator temperature coefficient became negative. The amount of reactivity added from ambient temperature to the turnover temperature was 9.3 cents which was less than the acceptance criterion of 0.5 dollar.

The inspector reviewed analytical information relating to Cycle 16 determination of moderator temperature coefficient using GROK, a three-dimensional BWR simulator computer program. The computer

results indicated that the maximum reactivity addition due to heatup at beginning of cycle and end of cycle were 12 cents and 35 cents respectively.

The inspector concluded that the Technical Specifications requirement on moderator temperature coefficient was satisfied for Cycle 15 and 16.

No items of noncompliance or deviations were identified.

3. Control Rod Sequence and Reactivity Checks

The inspector reviewed information relating to Cycle 15 control rod sequence and reactivity check as described in Procedure No. 16.3.2, "Critical Configuration Prediction."

The acceptance criterion stated that the difference between the predicted and the actual critical configuration be less than 1% of reactivity.

The inspector examined the results on Attachment I, "Reactivity Analysis," of Procedure No. 16.3.2. The inspector compared the actual control rod sequence with that estimated by GROK. The comparison indicated that there was no difference between the predicted and the actual control rod pattern, and the difference between the predicted and the actual k_{eff} was none.

The inspector reviewed information relating to Cycle 16 Procedure No. 16.3.2. The reactivity analysis was performed on April 17, 1979. The result indicated that actual criticality was achieved using the predicted control rod withdrawal sequence and the reactor was critical when Rod D6 was withdrawn to Notch 8. The difference between the predicted and the actual k_{eff} due to the difference between the predicted and the actual temperature was .25% of reactivity.

The inspector concluded that Cycle 15 and Cycle 16 control rod sequence and reactivity checks were adequate.

No items of noncompliance or deviations were identified.

4. Control Rod Scram Time Tests

Big Rock Point Technical Specifications require that the control rod scram time be less than 2.5 seconds for 90% insertion of all control rods.

The inspector reviewed information relative to Cycle 15 control rod scram time tests as described in Procedure No. TR-01, "Control Rod Drive Performance Test Procedure." The inspector examined the results of the test performed on August 28, 1977. The results indicated that the scram time of every rod was less than 1.5 seconds for full insertion.

The inspector reviewed information relating to Cycle 16 control rod scram time tests as shown in Procedure No. TR-01. The test was performed on April 7, 1979. The longest scram time was 1.5 seconds for Rod E-3.

The inspector concluded that Cycle 15 and 16 control rod scram tests satisfied Technical Specification requirements.

No items of noncompliance or deviations were identified.

5. Shutdown Margin Determination

Big Rock Point Technical Specifications require that the shutdown margin with the most reactive control rod stuck out of the core be greater than 0.3% of reactivity.

The inspector examined information relating to Cycle 15 shutdown margin determination as described in Test Procedure BRP-RE-8, "Shutdown Margin Check Procedure," dated August 2, 1977.

The inspector noted that the initial condition was that all control rods were fully inserted and two channels of fission chambers were placed in the core in addition to the two fixed excore channels. The measurements of the steady state neutron count rates were recorded for all four channels. Then a control rod was completely withdrawn, and another control rod in the vicinity was withdrawn a few notches which were equivalent to an insertion of reactivity greater than 0.6%, as determined by GROK. The count rates of the four channels would increase and level off to new steady state values to verify that subcriticality was still maintained. The new steady state count rates of the four channels were recorded. Measurements continued until subcriticality of at least 0.6% reactivity was verified for every configuration with one rod full out and an adjacent rod partially out.

The inspector noted that the count rate of the incore Channel 9 was 350 cps (counts per second) prior to withdrawing any control rod, and when Rod A-3 was partially withdrawn and Rod A-2 was

fully withdrawn, the count rate of Channel 9 dropped down to 55 cps. All the other three channels showed increases of count rates. The licensee stated that the initial count rate of Channel 9 was probably 35 cps and was recorded incorrectly.

The inspector examined information relating to Cycle 16 shutdown margin determination dated April 10, 1979. The test procedure used in Cycle 16 was identical to that described previously. Shutdown margin of at least 0.6% was verified by measurements. The inspector concluded that the shutdown margin determination was adequate.

No items of noncompliance or deviations were identified.

6. Core Thermal Power Determination

Big Rock Point administrative requirements state that the heat balance calculation shall be performed at least once per week by each shift. The inspector noted that the licensee was following their administrative requirements.

The inspectors examined information relating to the January 28, 1979, calculation of the core thermal power. The Big Rock Point Facility does not have an online computer system to perform its thermal power determination. The licensee utilizes Procedure T7-06, "Heat Balance Calculation," to ensure that the steady state reactor power shall not exceed the Technical Specifications limits of thermal power and the high neutron flux scram setting.

The inspectors verified all the input parameters for the calculations and performed an independent determination of the core thermal power. The results were within 1% of the value determined by the licensee. It was noted that the calculated value when compared with the instrumentation value indicated that the calculated power exceeded the low calibration acceptance criteria. The inspector followed up on the recalibration of the three picoammeters and determined that the indicated readings were more conservative than the calculated power.

No items of noncompliance or deviations were identified.

7. Review of Plant Operations

The inspectors examined General Operating Procedure GOP1, "Plant Startup from Cold Shutdown," which included Master Checkoff Sheet (O-TGS-1) and the system checkoff lists for the systems disturbed

or tested during the refueling outage. It was verified that these systems were returned to an operating status prior to plant startup. Some difficulty was encountered in the area of document control in the retrieval of the Master Checkoff Sheet. The licensee explained that the difficulty was due to a revision of the master list and due to an unanticipated reactor scram.

A review of the licensee's Technical Data Book, Volume 15 verified the control rod withdrawal sequence and rod withdrawal authorization were in effect prior to startup. The withdrawal sequence was developed by the computer program GROK. The inspectors also reviewed the operator's log book and verified the use of the proper rod withdrawal sequence on April 17, 1979.

The plant startup, heatup and approach to criticality were conducted in accordance with the approved GOP1. The inspectors' review of plant records and the discussion with the operations supervisor verified that the technical specification requirements were met during the entire approach to criticality.

No items of noncompliance or deviations were identified.

8. Exit Interview

The inspectors met with licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on April 20 1979. The inspectors summarized the purpose and the scope of the inspection and the findings.