U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-244/85-09

Docket No. 50-244

License No. DPR-18 Priority - Category C

Licensee: Rochester Gas and Electric Company
49 East Avenue
Rochester, New York

Facility Name: R. E. Ginna

Inspection At: Ontario, New York

Inspection Conducted: May 7 - 10, 1985

Inspectors: C Petrone 7/25/85
C. Petrone, Lead Reactor Engineer date

C Petrone for 7/25/85
A. Alba, Reactor Engineer date

Approved by: L H Bettenhausen 7/28/85
L. H. Bettenhausen, Chief date
Operations Branch, DRS

Inspection Summary: Inspection on May 7-10, 1985 (Report No. 50-244/85-09)

Areas Inspected: Routine, unannounced inspection of the cycle 15 startup physics tests including: Pre-critical tests; critical boron measurements, moderator temperature coefficient measurements; control rod worth measurement; excore/incore calibration; core thermal power calculations; core power distribution limits; and QA/QC role in startup physics testing. The inspection involved 56 hours onsite by two region based inspectors.

Results: No violations were identified.

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DETAILS

1.0 Persons Contacted

*C. Edgar, I&C Supervisor
*T. Meier, Technical Engineer
K. Nassauer, QC Inspection Supervisor
*C. Peck, Nuclear Assurance Manager
*B. Snow, Plant Superintendent
*S. Spector, Assistant Plant Superintendent
*J. Widay, Reactor Engineer

USNRC

*W. A. Cook, Resident Inspector

*denotes those present at the exit interview on May 10, 1985. The inspector also contacted other licensee employees in the course of the inspection.

2.0 Licensee Action on Previous Inspection Findings

(Closed) Unresolved Item (50-244/84-15-02) Inadequate Test Procedure.

During a previous inspection, a review of test procedure PT-6.4, Excore/Incore Recalibration, identified that the linearity check between excore and incore detectors was not detailed, the method to determine calibration currents was not specified, and the comparison of measured values to predicted values was not documented in the test procedures.

Subsequently the licensee revised PT-6.4, (Rev. 11) to require that a least squares fit correlation be used to establish the relationship between the excore and incore detectors. The inspector reviewed the computer printouts for the excore/incore calibration performed on April 16, 1985, and noted the data was taken over an appropriate tilt range and the correlation coefficients verified the relationship was essentially linear. The calibration currents were calculated by the program and included on the printout. A comparison of the measured values to the predicted values and acceptance criteria was performed by the reactor engineer, and a QC inspector, and documented on a separate Physics Testing Summary Sheet. The reactor engineer stated that this summary sheet would be added as an appendix to one of the approved test procedures to make it a permanent part of the startup physics test program.

The inspector identified no further discrepancies; the concerns identified in this unresolved item had been adequately addressed.

3.0 Cycle 15 Startup Physics Test Program

The startup physics test program was conducted in accordance with PT-34.0, Startup Physics Test Program, Rev. 12. This procedure outlined the steps in the testing sequence, set the initial conditions and prerequisites, specified calibration or surveillance procedures at appropriate points, and referenced detailed test procedures and data collection sheets in various attachments. Initial criticality for Cycle 15 was achieved on April 6, 1985; 100% power was reached on April 17, 1985. The startup physics test program was completed on April 19, 1985.

The inspector independently verified that the predicted values and acceptance criteria had been obtained from The Nuclear Design and Core Management of the R.E. Ginna Nuclear Reactor Cycle 15, WCAP-10794, March, 1985. The inspector reviewed test results and documents described in this report to ascertain that the startup testing was conducted in accordance with technically adequate procedures and as required by Technical Specifications (TS). The details and findings of this review are described below.

4.0 Cycle 15 Startup Testing - Precritical Tests

The inspector reviewed calibration and functional test results to verify the following:

- Procedures were provided with detailed instructions;
- Technical content of procedure was sufficient to result in satisfactory component calibration and test;
- Instruments and calibration equipment used were traceable to the National Bureau of Standards;
- Acceptance and operability criteria were observed in compliance with TS.

The following tests were reviewed:

4.1 Control Rod Checks and Tests

The rod drop measurement was performed in accordance with procedure RSSP-7.0, Rev. 7. The inspector verified by review of the test results performed on April 4, 1985, that Rod Cluster Control Assemblies (RCCA) were tested for drop times and the individual RCCA drop times were all less than 1.8 seconds as required by the TS. The inspector also reviewed several visicorder traces and verified that the drop times had been interpreted correctly.

Rod Position Indication System Calibration was performed under Procedure CP-2, Rev. 1. The calibration was performed on April 4 and 5, 1985. The inspector reviewed calibration data, and noted that calibration checks were satisfactory.

4.2 Reactor Coolant System RTD Calibration

Reactor Coolant RTD's were cross calibrated in accordance with Procedure RSSP-8.0, on April 4, 1985. The inspector reviewed the calibration data and noted that all calibration checks were satisfactory.

4.3 Reactivity Computer Setup/Verification

The reactivity computer was setup and calibrated according to procedure STS-126, Rev. 3. The reactivity computer was adjusted with the correct inputs of delayed neutron fractions (betas) and decay constants (lambdas). An exponential test signal was fed into the reactivity computer. The dynamic response was then compared with predicted values which were derived from point reactor kinetics. The results of this calibration check were satisfactory.

5.0 Cycle 15 Startup Testing - Postcritical Tests

The inspector reviewed selected tests to verify the following:

-- The test were implemented in accordance with Cycle 15 Startup Physics Test Program;

-- Stepwise instructions of test procedures were adequately provided including Precautions, Limitations and Acceptance Criteria in Conformance with the requirements of the Technical Specifications;

-- Appropriate measures were taken if a test condition and/or test result, acceptance criteria was not met;

-- Methods and calculations were clearly specified and the tests were performed accordingly;

-- Review, approval, and documentation of the results were in accordance with the requirement of the TS and the licensee's administrative controls; and,

-- Quality control was active during test and review.

5.1 Critical Boron Measurements (Boron End Points)

The licensee measured the critical boron concentrations in accordance with test procedures PT 34.1 and PT 34.4. The inspector reviewed the data and noted the following results:

Configuration	Predicted Value (ppm)	Measured Value (ppm)
All Rods Out (ARO)	1350 ± 75	1352
D IN	1241 ± 75	1256
D + C IN	1118 ± 75	1135
B + C + D IN	1032 ± 75	1060

The average critical boron concentration for a given configuration was compared to the predicted concentration for that configuration. The acceptance criterion of ± 75 ppm was met in all cases.

5.2 Moderator Temperature Coefficient

The Moderator Temperature Coefficient (MTC) was measured in accordance with the procedure specified in PT 34.2, Rev. 5. The test was performed to measure the Isothermal Temperature Coefficient (ITC). The measured ITC was -2.3 pcm/°F at 547°F which was in reasonable agreement with the predicted value of -4.46 pcm/°F. The ITC is defined as the change in reactivity for a unit change in the moderator, clad and fuel pellet temperatures. Thus, the ITC can be interpreted as the sum of the moderator and doppler coefficient. The design report gave the doppler coefficient (FTC) equal to approximately -2.0 pcm/°F, Thereby giving the Moderator Temperature Coefficient (MTC) a value of -0.3 pcm/°F which meets the TS requirement that the MTC be less than zero.

No discrepancies were identified.

5.3 Control Rod Worth Measurement

The control rod reactivity worth measurements were performed in accordance with test procedure PT -34.3, Rev. 5. The following results were noted.

Rod Bank	Predicted Worth (pcm)	Measured Worth (pcm)
Control Bank D	1058 ± 159 (±15%)	935.9
Control Bank C	1202 ± 180 (±15%)	1113.5
Control Bank B	857 ± 128 (±15%)	695
Subtotal (D+C+B)	3117 ± 312 (±10%)	2744
Control Bank A	1641 ± 246.15 (±15)	1560
Total	4758 ± 475.8 (10%)	4304.4

The acceptance criteria states the measured individual bank integral worth be within ± 15% of the predicted values and that the total of the banks being measured be within ± 10% of the predicted values. If the criteria for total bank worth is not met, additional banks will be measured until the measured worth is within ± 10% of the predicted value. Boron end points shall also be compared with the integral rod worth for the particular configuration in question.

Results

The inspector noted that the individual bank worth measurements were on the low end of the acceptance criteria. Control bank B was out of the acceptance criteria of ± 15% by having a deviation from the predicted value of 18.97%. The total deviation for the three banks measured was 11.95% which was out of the acceptance criteria of ± 10% of the total predicted worth. Since the criterion was not met, the licensee measured the worth of Bank A as required by the procedure. The additional bank worth brought the total bank worth deviation within the acceptance criteria of ± 10%. The total deviation of all banks was 9.54%. Bank A had an individual bank worth deviation from the predicted worth of 4.97%. The inspector questioned the licensee about the adequacy of the shut down margin in view of the less than predicted rod bank worths. These low rod bank worths also were noted during the Cycle 14 startup test program. The licensee stated that if the final acceptance criteria were met, the shutdown margin would be adequate. The licensee also stated that the Boron end point measurements, which were very close to the predicted values, provide a more accurate measure of rod bank worth. However, to investigate the accuracy of the computer model used to calculate the predicted rod bank worth, the licensee had already arranged for representatives of the fuel vendor (Westinghouse) to meet with the licensee's engineering staff to discuss and resolve any remaining questions. The inspector had no further questions regarding the adequacy of the shutdown margin for Cycle 15, but informed the licensee that the accuracy of the rod bank worth predictions was considered an unresolved item (50-244/85-09-01) and would be reviewed during a future inspection.

5.4 Excore/Incore Recalibration

The inspector reviewed procedure PT -6.4, Rev. 11 and verified it contained adequate stepwise instruction and established proper plant conditions to determine the relationship between the incore and excore axial offsets and detector currents. The inspector noted that a linearity check between the incore and excore detectors had been satisfactorily performed.

The inspector identified no discrepancies.

5.5 Core Thermal Power Calculation

The inspector reviewed the licensee's method for performing core thermal power calculations and noted that it is performed on each eight hour shift in accordance with procedure 0-6.3, Maximum Unit Power. The purpose of the procedure is to ensure that the licensed reactor power of 1520 MWth, averaged over any eight hour shift, was not exceeded. The method of calculation used is based on a heat balance across the secondary side of the steam generators, with corrections for non-nuclear heat input and steam generator blowdown flow. The inspector selected a sample of four calorimetric calculations, listed below, and independently verified that the calculations were correct.

Date	Normal Power	Calculated Core Thermal Power (MWth)
04-07-85	23%	347.5
04-10-85	51%	783.5
04-17-85	98%	1487.5
05-05-85	100%	1516.8

No discrepancies were identified.

5.6 Core Power Distribution Limits and Control Room Observations

The procedure and methods used to verify plant operation within the power distribution limits, defined in Technical Specifications, were reviewed and discussed with cognizant licensee personnel. The flux data was obtained using the Movable Incore Detector System, then analyzed using the Westinghouse "Incore" computer code. Flux maps were performed during the startup test program at 23%, 50%, 70%, 87% and 100% core thermal power. During operation, they are performed monthly.

The inspector reviewed the results of the most recent flux maps taken at 100% power and noted that the control rod insertion, core power level, and burnup at the time of the flux map were part of the input to the code calculations. All incore detectors independently traversed a reference calibration tube. The power distribution limits, which are expressed as peaking factor, FQ and hot channel factor FΔH, were within the limits specified in the Technical Specifications and included an uncertainty correction.

The inspector also reviewed a sample of the Reactor Engineers' Incore Reduction Maps completed since Cycle 15 startup. These maps summarized the results of each flux map and verified their conformance to Technical Specifications. These results included the peak rod FΔH, peak assembly FΔH, peak core FQ; quadrant power tilt; axial offset;

and the most limiting FQ. The inspector noted that the data reduction had been performed by the Reactor Engineer, reviewed by the Technical Engineer and approved by a corporate nuclear engineer.

On May 9, 1985 the inspector observed portions of the core flux mapping activities in the control room. Core Map 15 - 8 was performed at 100% power by the reactor engineer who completed the required prerequisite and procedure steps. The reactor engineer took appropriate precautions to minimize reactor power changes during the test and performed an intercomparison of the detectors by running each detector through a common instrument tube and normalizing the output from each detector. The reactor engineer was very familiar with the equipment and knowledgeable of the interpretation of the resultant data.

No discrepancies were identified.

6.0 QA/QC Role in Cycle 15 Startup Physics Testing

During a previous inspection, the inspector noted that the licensee did not provide QA or QC witnessing of the startup physics testing activities. To strengthen QA/QC coverage of these activities the licensee agreed to provide additional training for QC inspectors and to provide on-shift witnessing of future startup physics test activities.

During this inspection the inspector reviewed the scope of the QA/QC coverage of the Cycle 15 startup testing. Based on a review of startup test result verification signoffs, and discussions with QA personnel, the inspector determined that QC inspectors had witnessed most of the startup tests and verified that the test results met acceptance criteria. This inspection coverage represented a significant increase over the previous cycle.

The inspector had no further concerns regarding QA/QC coverage of startup physics testing.

7.0 Exit Meeting

The inspector discussed the inspection findings at an exit meeting on May 10, 1985.

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