U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-244/84-15

Docket No. 50-244

License No. DPR-18 Priority -- Category C

Licensee: Rochester Gas & Electric Company

49 East Avenue

Rochester, New York 14649

Facility Name: Ginna

Inspection At: Ontario, N.Y.

Inspection Conducted: May 14-18, 1984

Inspector: Peter C. Wen 7/2/84
P. C. Wen, Reactor Engineer date

Approved by: L. H. Bettenhausen 7/3/84
L. H. Bettenhausen, Chief, TPS date

Inspection Summary:

Areas Inspected: Routine, unannounced inspection of startup testing following refueling of Cycle 14. The inspection included the testing program, precritical tests and power ascension tests. The inspection involved 38 hours onsite by one region-based inspector.

Results: In the areas inspected, no items of noncompliance were identified.

DETAILS

1. Persons Contacted

* C. Edgar, I&C Supervisor
  J. Germain, QC Inspector
* T. Meyer, Technical Manager
  K. Nassauer, QC Inspection Supervisor
* C. Peck, Nuclear Assurance Manager
  T. Rakiewicz, I&C Foreman
  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 18, 1984. The inspector also contacted other licensee employees in the course of the inspection.

2. Cycle 14 Startup Physics Test Program

The startup physics test program was conducted according to test procedure PT-34.0, Startup Physics Test Program, Rev. 10. The test program outlined the steps in the testing sequence, set initial conditions and prerequisites, specified calibration or surveillance procedures at appropriate points, and referenced detailed test procedures and data collections in attachments. Initial criticality of Cycle 14 was achieved on May 12, 1984. After completing the Low Power Physics Testing (LPPT), the power was increased to 25% power level to start the Power Ascension Test. On May 14, 1984, while at 25% power, the plant experienced steam generator secondary side water chemistry problems and was shutdown. The outage is expected to last for about two weeks. The Power Ascension Test will be conducted when the unit returns to an appropriate power level.

The inspector independently verified that the predicted values and acceptance criteria were obtained from "The Nuclear Design and Core Management of the R.E. Ginna Nuclear Reactor Cycle 14", WCAP-10505, March, 1984. 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 the review are described in Sections 3 and 4.

3. Cycle 14 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:

3.1 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 May 10, 1984 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 veritied 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 May 11 and 12, 1984. The inspector reviewed calibration data, and noted that calibration checks were satisfactory.

3.2 Incore Thermocouple/RTD Cross Calibration

Reactor Coolant RTD's were cross calibrated in accordance with Procedure RSSP-3.0, Rev. 6, on May 7 and 10, 1984. The inspector reviewed the calibration data and noted that all calibration checks were satisfactory.

Reactor incore thermocouples were trended and compared with RTD readings. However, these comparisons were not formally documented in the test procedure, but rather, were only kept as a personal file. The licensee representative agreed that this information will be properly evaluated and documented in future startup testing.

3.3 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.

The reactivity computer was further checked when reactor reached criticality. Comparisons of predicted and measured reactivities based on reactor period measurement were acceptable.

No unacceptable conditions were identified.

4. Cycle 14 Startup Testing - Post-critical Tests

The inspector reviewed selected test programs to verify the following:

-- The test programs were implemented in accordance with Cycle 14 Startup Physics Test Program;

-- Step-wise instructions of test procedures were adequately provided including Precautions, Limitations and Acceptance Criteria in conformance with the requirements of the TS;

-- Provisions for recovering from anomalous conditions were provided;

-- Methods and calculations were clearly specified and the tests were performed 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 tests were reviewed:

4.1 Low Power Physics Tests

4.1.1 Critical Boron Measurements

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)	1329±75	1329
D IN	1227±75	1206
D+C IN	1113±75	1103

Test results were within acceptance criteria.

4.1.2 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 -3.875 pcm/°F which was in reasonable agreement with the predicted value of -4.85 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 integrated as the sum of the MTC and Doppler coefficient. The Doppler coefficient is difficult to measure in normal operations. A value of -1.66 pcm/°F supplied by the fuel vendor was used in the MTC determination. The MTC was determined as follows:

Configuration	Measured Value (pcm/°F)	TS Limits (pcm/°F)
ARO	-2.215	<0

4,1,3 Control Rod Worth Measurement

The control rod reactivity worth measurements were performed in accordance with test procedure PT-34.3, Rev. 4. The following results were noted:

Rod Bank	Predicted Worth (pcm)	Measured Worth (pcm)
Control Bank D	946 ± 142	914.5
Control Bank C (D IN)	1042 ± 156	995.5
Control Bank B (D&C IN)	1002 ± 150	827.5
Total	2990 ± 299	2737.5

The total rod worth for the measured three banks satisfied the acceptance criteria of ±10%. However, the Control Bank B rod worth did not meet the individual bank rod worth acceptance criteria of ±15%. The rod worth for the Control Bank A and Shutdown Bank were not measured in this cycle's startup physics testing. The inspector expressed concern that it is difficult to establish a high level of confidence that the sum of all rod worth is within 10% of predicted value when individual bank worth has more than 15% deviation than the predicted value. The licensee representative stated that additional bank worth (e.g. Control Bank A) will be measured in the future under similar conditions.

The inspector noticed that the measured values were consistently less than the predicted ones and raised a question with regarding the validity of shutdown margin (SDM) calculation. The licensee nuclear engineering group performed an evaluation and concluded that adequate SDM existed at the beginning of cycle (BOC). This result was presented to the PORC (Meeting #076) and subsequently received its approval.

The inspector performed an independent evaluation based on a conservative assumption of 15% total rod worth margin, rather then the assumed 10% margin used in the fuel design report. The result indicates that the TS required shutdown margin can be satisfied for cycle life from BOC to approximately 5500 MWD/MTU. The failure of Control Bank B to meet the acceptance criteria is therefore considered to have only minor impact on the plant safety at the BOC. However, as core life progresses toward the end of cycle where the SDM is at the minimum, further evaluation and/or administrative actions are required. The licensee and its fuel vendor are currently conducting an investigation and evaluation as to the cause of rod worth overprediction and its effects on future plant operation. This is an unresolved item. (244/84-15-01)

4.2 Power Ascension Tests

4.2.1 Core Power Distribution

The procedure and method used by the licensee to verify that the plant is operating within the power distribution limits defined in TS were reviewed and discussed with cognizant licensee personnel. The data taken by the Moveable Incore Detector System (MIDS) was digitized and stored by the plant process computer. This information was then fed into a large scale computer at Corporate Headquarters which performed the core power distribution calculation using the Westinghouse "Incore" code.

Before plant was shutdown from 25% power level, core map XIV-01 was made. The preliminary results indicated that TS limits for power distribution were met. However, due to lack of time for MIDS preparation, only 13 out of 36 thimbles were ready when the flux map was taken. In addition, some thimbles were found not in good alignment. As a result, a notable deviation between the predicted and measured $F_{\Delta h}$'s occurred at some fuel assemblies, specially around location I-5. A licensee representative stated that another flux mapping at 25% power level will be reperformed when stable power operation is resumed.

4.2.2 Test Procedure Review

The inspector reviewed test procedures which will be used for the Power Ascension Tests. The procedures which were reviewed and discussed are the following:

-- PT-6.4, Excore/Incure Recalibration, Rev. 10

-- O-6.4.1, Reference Equilibrium Indicated Axial Flux Difference Determination, Rev. 10

-- O-6.3, Maximum Unit Power, Rev. 12

-- O-6.4, Core Quadrant Power Tilt Calculation, Rev. 8

The inspector identified that test procedure PT-6.4 is not adequate in the following respects: i) Linearity check between excore and incore detectors was not detailed, and, ii) a stepwise calculational method to determine calibration currents was not included in the procedure. The inspector also identified that the comparison of measured values versus predicted values was not included in the test procedures used for LPPT (PT 34.1 to PT 34.5). The licensee's representative acknowledged the inspector's findings, and stated that these procedures will be revised for future cycle startup testing. This is an unresolved item (244/84-15-02).

5. QA Role in Cycle 14 Startup Testing

The inspector reviewed refueling procedure RF-59, Cycle XIII-XIV Refueling, and noted that QA personnel were monitoring the core loading activities. The personnel responsible for refueling outage activities also acknowledged that QA was actively involved in their activities. Approximately 40 QC surveillance inspections were conducted since April 15, 1984, about one month prior to plant startup. A review of deficiency reports, indicates that prompt and complete corrective actions were taken. However, the inspector did not find evidence that QA had an active surveillance program which covered startup physics testing. To further strength QA coverage in this area, a licensee QA representative stated that QA plans to verify test results and surveillances at appropriate power plateaus for future cycle startup testing.

The inspector had no further questions.

6. Control Room Observations and Facility Tours

The inspector observed control room operations for control room manning and facility operation in accordance with the administrative procedures and Technical Specification requirements.

No unacceptable conditions were identified.

7. 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 at the conclusion of the inspection on May 18, 1984. 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.