U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-410/87-28

Docket No. 50-410

License No. NPF-69

Licensee: Niagara Mohawk Power Corporation
301 Plainfield Road
Syracuse, New York 13212

Facility Name: Nine Mile Point Nuclear Station, Unit 2

Inspection At: Scriba, New York

Inspection Conducted: July 20 - July 24, 1987

Inspector: M. D. Evans 8/10/87
for L. J. Wink, Reactor Engineer, DRS date

Approved by: P. W. Eselgroth 8/13/87
P. W. Eselgroth, Chief date
Test Programs Section, DRS

Inspection Summary:
Inspection on July 20 - July 24, 1987 (Report No. 50-410/87-28)

Areas Inspected: Routine, unannounced inspection by one region-based inspector of the overall power ascension test program including test procedure review and test results evaluation, licensee action on previous inspection findings, engineering support of the PATP, QA interfaces, and independent measurements and verifications.

Results: No violations were identified.

Note: For acronyms not defined, refer to NUREG-0544, "Handbook of Acronyms and Initialisms."

## DETAILS

### 1.0 Persons Contacted

Niagara Mohawk Power Corporation

*R. Abbott, Station Superintendent
G. Carlisle, Lead STD&A Engineer
J. Conway, Power Ascension Manager
*P. Eddy, Site Representative, New York State, PSC
R. Gayne, Assistant Superintendent of Operations
D. Helms, Lead Shift Test Supervisor
G. Moyer, Station Shift Supervisor
*R. Neild, Technical Assistant to Station Superintendent
D. Oakes, Startup Test and Operations Engineer
H. Pao, Shift Test Supervisor
*A. Pinter, Site Licensing Engineer
P. Wilde, Supervisor, Operations Surveillance (QA)

NRC Personnel

*W. Cook, Senior Resident Inspector
C. Marschall, Resident Inspector
*W. Schmidt, Resident Inspector

*Denotes those present at the exit meeting on July 24, 1987.

The inspector also contacted other members of the licensee's Operations, Technical, Test and QA staffs.

### 2.0 Licensee Action on Previous Inspection Findings

(Closed) Unresolved Item (410/87-06-01) Adequacy of planned testing for single reactor recirculation loop operation (SLO). The licensee plans to test in four power-to-flow conditions to bound possible operation with a single reactor recirculation loop (see Inspection Report 50-410/87-16). During the current inspection, the licensee responded to the inspector questions concerning the testing that would be required at these power-to-flow conditions for thermal expansion, the transversing incore probe (TIP) and the process computer.

The licensee stated that additional thermal expansion testing will not be required based on General Electric analysis of the recirculation piping with an isolated (gate valves closed) loop. The analysis demonstrated that the increase in thermal stress does not result in exceeding any ASME Code or pipe break postulation criterion. Based on this analysis and the successful completion of recirculation pipe thermal expansion testing during Test Condition Heatup, the inspector agreed that additional thermal expansion testing was not required.

The licensee stated that additional TIP testing to evaluate the uncertainties associated with SLO would not be necessary. TIP uncertainty is composed of a geometric and a random noise component. The total TIP uncertainty for two recirculation loop operations will be measured during the performance of power ascension test N2-SUT-18-6. The geometric component is unaffected by the mode of recirculation operation and the effects on the random noise component, which is a function of neutronic, electronic and boiling noise, of SLO have been benchmarked using data obtained at Brown's Ferry Unit 1 and have been included in the uncertainties used in the determination of the fuel cladding safety limit. The inspector agreed that additional TIP testing was not required.

The licensee stated that the process computer correctly calculates core flow (WT) from direct flow signals from the jet pump diffusers. During SLO, the idle loop's jet pump diffuser flows are subtracted from the active loop's flows to account for reverse flow in the idle loop diffusers. A potential problem exists since, during SLO, the process computer will compare this direct measure of core flow (WT) to an internal array (WTSUB) which is currently based on two recirculation loop operation. If WT does not agree with WTSUB within 5%, then WTSUB will be used to calculate thermal limits. To prevent the process computer from incorrectly using WTSUB during SLO testing, the licensee proposes to manually enter the correct value of core flow (WT) into the process computer. This will force the process computer to accept this value and will result in an accurate calculation of thermal limits. The proposal will allow testing of SLO to be performed. During this testing, the licensee will be able to obtain the data for SLO required to establish a WTSUB array for SLO. This array would be used in the future if operation in SLO were necessary. The inspector agreed that this proposal was acceptable.

The inspector had no further questions on the scope of SLO testing. This item is closed.

## 3.0 Power Ascension Test Program (PATP)

### 3.1 References

- Regulatory Guide 1.68, Revision 2, August 1978, "Initial Test Program for Water Cooled Nuclear Power Plants."
- ANSI N18.7-1976, "Administrative Controls and Quality Assurance for Operations Phase of Nuclear Power Plants."
- Nine Mile Point Unit 2 (NMP-2) Technical Specifications, July 2, 1987.
- Nine Mile Point Unit 2 Final Safety Analysis Report (FSAR) Chapter 14, "Initial Test Program."
- Nine Mile Point Unit 2 Safety Evaluation Report.
- Nine Mile Point Unit 2 AP-1.4, Startup Test Phase, Revision 3

3.2 Overall Power Ascension Test Program

The inspector held discussions with the Power Ascension Manager (PAM), the Lead Startup, Design and Analysis (STD&A) Engineer and other members of the PATP staff to assess the status of testing, the test results evaluation process and the preparation and approval of test procedures. In addition, the inspector attended the daily Power Ascension Management meetings and Site Operations Review Committee (SORC) meetings involving the PATP.

At the beginning of the inspection period, the unit was in the process of restarting and heating up to rated conditions. The unit had scrammed on July 11, 1987 when the EHC hydraulic line to the #4 Main Turbine Control Valve failed and depressurized the EHC system. This caused the bypass valve to fail close and resulted in increasing reactor pressure and a High Reactor Pressure scram. The restart was delayed until July 19, 1987 due to service water intake temperatures exceeding technical specification limits and standby gas treatment system operability concerns related to reactor building to service water temperature differential.

During the inspection period, operations were limited to less than 5% of rated power while troubleshooting continued on the offgas system (see discussion in Section 4.0). The test results review of Test Condition Heatup was completed by the SORC on July 17, 1987 and accepted by the General Superintendent on July 21, 1987. Approval to commence TC-1 testing was given in a SORC meeting on July 20, 1987 subject to the completion of all technical specification mode 1 surveillances and a satisfactory review of outstanding work items.

At the conclusion of the inspection, troubleshooting was continuing on the offgas system and unit operation remaining constrained to less than 5% of rated power.

3.3 Power Ascension Test Procedure Review

Scope

The procedures of Attachment A were reviewed for the attributes identified in Inspection Report No. 50-410/86-38, Section 4.3.

Discussion

The procedures reviewed were new revisions of previously reviewed procedures which reflect an ongoing licensee follow-up review of issued procedures.

Findings

The procedures reviewed were found to be acceptable. No deficiencies were identified.

## 3.4 Power Ascension Tests Results Evaluation

### Scope

The power ascension test results listed in Attachment B and discussed below were evaluated for the attributes identified in Inspection Report No. 50-410/86-64, Section 2.1.

### Discussion

#### N2-SUT-14-HU, RCIC System

A portion of these test results was reviewed during a previous inspection (Inspection Report 50-410/87-23). During this inspection, the results of the CST injection testing at a reactor pressure of 150 psig were reviewed.

The test was performed at a reactor pressure of 156 psig. The inspector verified from GETARS traces that the RCIC system was capable of reaching and maintaining rated flow (600 GPM) within 30 seconds. The actual time was 24.1 seconds. The inspector also verified that the maximum turbine speed (2747 RPM) was less than the acceptance criterion limit of 4777 RPM (overspeed trip avoidance margin). All other acceptance criteria were satisfied.

#### N2-SUT-16-HU, Selected Process Temperatures and Water Level Measurements Test Condition Heatup

Portions of these test results were reviewed during a previous inspection (Inspection Report 50-410/87-23). During this inspection, the results of temperature stratification testing with minimum recirculation flow (minimum flow control valve position and recirculation pumps running on the LFMG sets) and during single recirculation loop operation were evaluated. In addition, the inspector reviewed a reperformance of the water level calibration check. This testing was repeated at the higher reactor building temperatures required to satisfy standby gas treatment system operability concerns.

The temperature stratification testing satisfied all acceptance criteria both for single recirculation loop operation and two recirculation loop operation at minimum flow. The maximum temperature differentials measured (bottom head to reactor steam dome) were 15°F for single recirculation loop operation and 67°F for two recirculation loops at minimum flow (acceptance criterion $\leq$ 145°F). The reperformance of the water level calibration check at higher reactor building temperatures yielded similar results to the initial run but with small margins to the acceptance criterion limits.

N2-SUT-77-HU, BOP and Small Bore Piping Vibration

Steady state and transient piping vibration were measured for selected portions of the RCIC and CRD Systems. Five test exceptions (TEs) were identified, one Level 1 and four Level 2. The Level 1 test exception was identified during the CRD scram testing, at 0 psig reactor pressure, of rod 58-31. The measured displacement of the CRD hydraulic line was 44 mils (acceptance criterion 11 mils). An investigation revealed that the acceptance criterion was based on the assumption of no movement at a support point. The actual support point consisted of a sliding clamp with a design gap of 1/16 inch. To verify that this was the cause of the high vibration reading, a test was conducted to evaluate the piping response to a test engineer's manual shaking of the line. The measured response was 42 mils. Based on this information, the results of the test were accepted "as-is". The four Level 2 test exceptions (one for RCIC and three for CRD 58-31) were dispositioned as acceptable "as-is."

N2-PP-HU, Heatup Plateau Procedure

The inspector reviewed this procedure to insure that all planned testing for Test Condition Heatup had been completed and that all open Test Exceptions could be safely carried forward to later test conditions. The licensee has deferred three planned tests to later test conditions and has deferred the completion of the analysis of a fourth test.

The testing deferred includes N2-SUT-70-HU, Reactor Water Cleanup; N2-SUT-71-HU, RHR Suppression Pool Cooling Mode; and N2-SUT-74-HU, Offgas System. RWCU testing could not be performed due to operational restrictions imposed because of the feedwater temperature stratification problems. The test will be run in Test Condition 2 following the corrective actions for the feedwater temperature stratification problem. Currently this modification is scheduled for the outage following Test Condition 1. The inspector reviewed the safety evaluation covering this deferral (SER 87-091 dated July 9, 1987).

The testing planned for the Suppression Pool Cooling mode of RHR could not be performed due to insufficient differential temperature between the service water and the suppression pool. The temperature in the suppression pool was administratively limited to 90°F to allow the continuation of heatup testing while the RRCS was out of service for troubleshooting. This testing is now planned for Test Condition 1.

The testing planned for the Offgas System could not be performed due to operability problems with this system (see discussion in Section 4.0). Testing will be performed following the correction of system problems and prior to exceeding 5% of rated power.

The analysis of the final portion of the BOP Thermal Expansion Test, N2-SUT-78-HU, was deferred to allow the comprehensive analysis of the test data. All Level 1 acceptance criteria have been verified and all Level 1 test exceptions have been resolved.

The inspector also reviewed all open test exceptions from Test Condition Heatup. Only six test exceptions remained open, four Level 2 exceptions and two other exceptions not directly related to acceptance criteria.

The inspector concluded that the identified tests and open test exceptions could be safely carried forward to subsequent test conditions.

Findings

All test results reviewed and the resolutions of test exceptions were found to be acceptable. No unacceptable conditions were identified.

4.0 Engineering Support During the PATP

Scope

The inspector followed the troubleshooting efforts involving the Offgas System to assess the quality and effectiveness of the engineering support provided to resolve problems identified during the PATP. The Offgas System was selected since the inability to place this system in service has significantly delayed the PATP.

Discussion

Efforts to place the Offgas System in service have been in process for at least two weeks prior to the start of the current inspection. The lead responsibility had been assigned to Operations, with Station Shift Supervisors routinely working 4 hours of overtime each day to direct this effort. During the current inspection period, engineering support was provided in an attempt to expedite the identification and resolution of problems being experienced with the system.

On July 21, 1987, the inspector attended an engineering coordination meeting called to assess progress to date and assign responsibilities and establish priorities for the resolution of identified problems. The engineer-in-charge used a preexisting list of possible problems with the system in an attempt to determine the current status. Disagreements were noted among various participants concerning the significance and current status of problems noted. These disagreements arose because of the anecdotal nature of the observation with an apparent lack of documentation of the troubleshooting actions taken and results achieved. The meeting resulted in a list of twenty (20) items requiring resolution. Priorities and responsibilities were assigned for each item. Engineering responsibilities were limited to verification of design. Five hardware related items, including steam supply pressure to the recombiner preheaters, recombiner condenser level control, freeze-out dryer freon leaks and replacement of an inoperable moisture sensing element were identified as required to be complete before another attempt was made to place the system in service.

On July 22, 1987, Operations personnel attempted to place the system in service. The engineer-in-charge was present in the control room for this attempt. System performance was unsatisfactory with little evidence that the steam jet air ejectors (SJAEs) were effective in removing noncondensible gases from the main condenser. Operations personnel performed a system walkdown and identified a piping configuration problem at the discharge of the second stage SJAEs. The configuration resulted in a loop seal which inhibited the effective functioning of the jets. Operations personnel proposed the addition of drain valves, to be used for system startup, to remove the water which had collected in the pipe. This would be a temporary solution pending correction of the poor piping configuration. Engineering was able to expeditiously generate a modification package to install these valves.

At the conclusion of this inspection on July 24, 1987, the new startup drains had been installed but an attempt to place the system in service revealed additional problems including air in-leakage from an unidentified source, possible tube leakage in the SJAE intercondenser and a valve operability problem in the blowdown line of the recombiner preheater. The inspector will continue to follow the Offgas System problems and engineering support of their resolution during a future routine inspection.

Findings

No violations were identified.

5.0 QA Interface With the PATP

The inspector reviewed the QA Surveillance Reports listed below:

QASR-87-10425, "Heatup Plateau Test," dated 7/20/87

QASR-87-10432, "RCIC System Test Performance," dated 7/20/87

QASR-87-10435, "MSIV Test Performance," dated 7/8/87

QASR-87-10514, "MSIV Test Results Review," dated 7/7/87

QASR-87-10541, "RCIC System Test Results Review," dated 7/15/87

The inspector verified that the surveillances were performed in accordance with applicable QA procedures and the commitments made in the Surveillance Plan for the Power Ascension Test Program.

No deficiencies were identified during this review.

## 6.0 Independent Measurements and Verifications

During the evaluation of the results of power ascension test, N2-SUT-14-HU, RCIC System, as discussed in paragraph 3.4, the inspector independently calculated the time for the system to reach and maintain rated flow and the margin to the overspeed trip setpoint, using GETARS traces, and verified that the associated acceptance criteria were satisfied. The inspector's measurements and verifications agreed with the licensee's.

No unacceptable conditions were noted.

## 7.0 Exit Interview

At the conclusion of the inspection on July 24, 1987, an exit meeting was held with licensee personnel (identified in Section 1.0) to discuss the inspection scope, findings and observations as detailed in this report. At no time during the inspection was written material provided to the licensee by the inspector. Based on the NRC Region I review of this report and discussions held with licensee representatives during the inspection, it was determined that this report does not contain information subject to 10 CFR 2.790 restrictions.

## ATTACHMENT A

## POWER ASCENSION TEST PROCEDURES REVIEWED

| | |
|---|---|
| N2-SUT-11-1 | LPRM Flux Response, Revision 2, Approved February 4, 1987 |
| N2-SUT-13-1 | Process Computer - Test Condition 1, Revision 1, Approved February 10, 1987 |
| N2-SUT-19-1 | Core Performance - Test Condition 1, Revision 1, Approved April 16, 1987 |
| N2-SUT-23-1 | Feedwater System, Revision 1, Approved February 18, 1987 |
| N2-SUT-29-1 | Recirculation Flow Control - Test Condition 1, Revision 2, Approved February 10, 1987 |
| N2-SUT-33-1 | Drywell Piping Vibration - Test Condition 1, Revision 1, Approved December 23, 1986 |

## ATTACHMENT B

## POWER ASCENSION TEST RESULTS EVALUATED

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|---|---|
| N2-SUT-14-HU | RCIC System, Revision 4, results accepted July 15, 1987 |
| N2-SUT-16-HU | Selected Process Temperatures and Water Level Measurements Test Condition Heatup, Revision 3, results accepted July 15, 1987 |
| N2-SUT-77-HU | BOP and Small Bore Piping Vibration, Revision 2, results accepted July 15, 1987 |
| N2-PP-HU | Heatup Plateau Procedure, Revision 0, results accepted July 21, 1987 |