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SUBJECT: Forwards addl info to questions re startup & test abstracts raised during 840719 meeting. Revised test abstracts will be included in FSAR Amend 16.

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NIAGARA MOHAWK

NIAGARA MOHAWK POWER CORPORATION/300 ERIE BOULEVARD WEST, SYRACUSE, N.Y. 13202/TELEPHONE (315) 474-1511

November 9, 1984
(NMP2L 0230)

Mr. A. Schwencer, Chief
Licensing Branch No. 2
Division of Licensing
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Schwencer:

Re: Nine Mile Point Unit 2
Docket No. 50-410

Attached is additional information to questions on startup and test abstracts raised during the July 19, 1984 meeting.

The revised test abstracts will be included in Final Safety Analysis Report Amendment 16.

Very truly yours,

C. V. Mangan
Vice President
Nuclear Engineering & Licensing

DS:ja
Attachment
xc: R. A. Gramm, NRC Resident Inspector
Project File (2)

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of Niagara Mohawk Power Corporation (Nine Mile Point Unit 2)	)))))	Docket No. 50-410

AFFIDAVIT

C. V. Mangan, being duly sworn, states that he is Vice President of Niagara Mohawk Power Corporation; that he is authorized on the part of said Corporation to sign and file with the Nuclear Regulatory Commission the documents attached hereto; and that all such documents are true and correct to the best of his knowledge, information and belief.

C. V. Mangan

Subscribed and sworn to before me, a Notary Public in and for the State of New York and County of Onondaga, this 9 day of November, 1984.

Janis M. Macro
Notary Public in and for
Onondaga County, New York

My Commission expires:

JANIS M. MACRO
Notary Public in the State of New York
Qualified in Onondaga County No. 4784555
My Commission Expires March 30, 1985

Question 1: The General Discussion of Initial Startup Tests (FSAR Subsection 14.2.12.2) should define Level 3 acceptance criteria or FSAR Tables 14.2-206, 221, 222, 233, 234 should be modified to remove reference to Level 3 acceptance criteria.

Response: See revised Startup Test Abstracts 14.2-206, 221, 222, 233, 234.

Question 2: The Intermediate Range Monitor Performance Test (FSAR Table 14.2-209) should reinstate Level 1 acceptance criteria regarding IRM produced scram at 96% of full scale in the startup mode or technical justification should be provided as to why this protective feature was deleted.

Response: See revised Startup Test 14.2-209.

Question 3: The Drywell Atmospheric Cooling System (FSAR Table 14.2-301) test should state which tests are to be accomplished (test to be supplied later). This concern is part of the draft SER open item #140.

Response: Balance of plant test abstracts are presently being developed and will be submitted by March 1985.

TABLE 14.2-206

CONTROL ROD DRIVE SYSTEM

Startup Test (SUT-5)

Test Objectives

1. To demonstrate that the CRD system operates properly over the full range of primary coolant temperatures and pressures from ambient to operating.

2. To determine the initial operating characteristics of the entire CRD system.

Prerequisites

The appropriate preoperational tests have been completed. The SORC has reviewed and approved the test procedures and initiation of testing. The CRD manual control system preoperational testing must be completed on CRDs being tested. The reactor vessel, closed loop cooling water system, condensate supply system, and instrument air system must be operational to the extent required to conduct the test.

Test Procedure

The CRD tests performed during the startup test program are designed as an extension of the tests performed during the preoperational CRD system tests. Thus, after it is verified that all CRDs operate properly when installed, they are tested periodically during heatup to assure that there is no significant binding caused by thermal expansion of the core components. A list of all CRD tests to be performed during startup testing is as follows:

CONTROL ROD DRIVE SYSTEM TESTS

12

		Test Conditions Reactor Pressure with Core Loaded psig (kg/cm^2)			
Action	Accumulator Pressure	0	600(42.2)	800(56.2)	Rated
Position Indication		All			

TABLE 14.2-206 (Cont)

CONTROL ROD DRIVE SYSTEM TESTS

		Test Conditions Reactor Pressure with Core Loaded psig (kg/cm^2)			
Action	Accumulator Pressure	0	600(42.2)	800(56.2)	Rated
Normal Stroke Times Insert/ Withdraw		All			4*
Coupling		All***			
Friction		All			All
Scram	Normal	All	4*	4*	All
Scram	Minimum	4*			
Scram	Zero				4*
Scram	Normal				4**

12

* Refers to four CRDs selected for continuous monitoring based on slow normal accumulator pressure scram times or unusual operating characteristics, at zero reactor pressure or rated reactor pressure when this data is available. The four selected CRDs must be compatible with the rod worth minimizer, RSCS system, and CRD sequence requirements.

** Scram times of the four slowest CRDs (based on scram data at rated pressure) will be determined at test conditions 2, 3, and 6 during planned reactor scrams.

*** Establish that this check is normal operating procedure.

NOTE: Single CRD scrams should be performed with the charging valve closed. (Do not ride the charging pump head.)

TABLE 14.2-206 (Cont)

Criteria

Level 1:

a) Each CRD must have a normal withdraw speed less than or equal to 3.6 inches per second (9.14 cm/sec), indicated by a full 12-foot stroke in greater than or equal to 40 seconds.

b) The mean scram time of all operable CRDs must not exceed the following times: (Scram time is measured from the time the pilot scram valve solenoids are deenergized.)

Position Inserted from Fully Withdrawn	Scram Time (Seconds)
45	0.43
39	0.86
25	1.93
05	3.49

12

c) The mean scram time of the three fastest CRDs in a two-by-two array must not exceed the following times: (Scram time is measured from the time the pilot scram valve solenoids are deenergized.)

Position Inserted from Fully Withdrawn	Scram Time (Seconds)
45	0.45
39	0.92
25	2.05
05	3.70

Level 2:

a) Each CRD must have a normal insert or withdraw speed of 3.0 ± 0.6 ips (7.62 ± 1.52 cm/sec), indicated by a full 12-ft stroke in 40 to 60 sec.

b) With respect to the CRD friction tests, if the differential pressure variation exceeds 15 psid (1.1 kg/cm^2) for a continuous drive in, a settling test 12
must be performed, in which case the differential settling pressure should not be less than 30 psid (2.1 kg/cm^2) nor should it vary by more than 10 psid 12
(0.7 kg/cm^2) over a full stroke.

TABLE 14.2-206 (Cont)

TABLE 14.2-221

PRESSURE REGULATOR

Startup Test (SUT-22)

Test Objectives

1. To determine the optimum settings for the pressure control loop by analysis of the transients induced in the reactor pressure control system by means of the pressure regulators.

2. To demonstrate the takeover capability of the backup pressure regulator upon failure of the controlling pressure regulator and to set spacing between the set points at an appropriate value.

3. To demonstrate smooth pressure control transition between the control valves and bypass valves when reactor steam generation exceeds steam used by the turbine.

4. To demonstrate that other affected parameters are within acceptable limits during pressure-regulator-induced 12
transient maneuvers.

Prerequisites

The preoperational tests have been completed, and the SORC has reviewed and approved the test procedures and initiation of testing. Instrumentation has been checked or calibrated as appropriate.

Test Procedure

The pressure set point is decreased rapidly and then increased rapidly by about 10 psi, and the response of the system is measured in each case. It is desirable to accomplish the set point change in less than 1 sec. At specified test conditions the load limit set point is set so that the transient is handled by control valves, bypass valves, or both. The backup regulator is tested by simulating a failure of the operating pressure regulator so that the backup regulator takes over control. The response of the system is measured and evaluated, and regulator settings are optimized. At certain conditions the test 12
results will be included with the test report in Core

TABLE 14.2-221 (Cont)

Power - Void Mode Response (Test 21). This testing yields
12 valuable core stability data in the midfrequency range
(i.e., 0.1 to 3.0 Hz).

The following test is performed:

Action: Operating Mode	Input	Test Condition: 1	2	3	4	5	6
CV	Set point	No	Yes	Yes	Yes	Yes	Yes
CV	Fail to backup	No	Yes	Yes	Yes	Yes	Yes
BPV	Set point	Yes	Yes	No	Yes	Yes	Yes
BPV	Fail to backup	Yes	Yes	No	Yes	No	Yes
12	Recirculation modes*	MAN	MAN	MAN	MAN	MAN	MAN

Acceptance Criteria

Level 1:

The transient response of any pressure control system-related variable to any test input must not diverge.

Level 2:

1. Pressure control system-related variables may contain oscillatory modes of response. In these cases, the decay ratio for each controlled mode of response must be less than or equal to 0.25. (This criterion does not
12 apply to tests involving simulated failure of one regulator with the backup regulator taking over.)

2. The pressure response time from initiation of pressure set point change to the turbine inlet pressure peak is ≤10 sec.

3. Pressure control system deadband, delay, etc, is small enough that steady-state limit cycles (if any) produce steam flow variations no larger than ±0.5 percent of rated steam flow.

---

12 *Either POS or FLO

TABLE 14.2-221 (Cont)

4. The regulator selection logic must not cause a disturbance to the reactor that will result in less than a 7.5 percent neutron flux scram margin and less than a 10-psi vessel pressure scram margin. (Maintain a plot of power versus the peak variable values along the 100-percent rod line.)

5. The variation in incremental regulation (ratio of the maximum to the minimum value of the quantity, "incremental change in pressure control signal/incremental change in steam flow," for each flow range) shall meet the following:

Steam Flow Obtained With Valves Wide Open (Percent)	Variation
0 to 85	≤4:1
85 to 97	≤2:1
85 to 99	≤5:1

TABLE 14.2-222

WATER LEVEL SET POINT,
MANUAL FEEDWATER FLOW CHANGES

Startup Test (SUT-23A)

Test Objective

To verify that the feedwater control system has been adjusted to provide acceptable reactor water level control.

Prerequisites

The preoperational tests have been completed; the SORC has reviewed and approved the test procedures and initiation of testing. Instrumentation has been checked or calibrated as appropriate.

Test Procedure

Reactor water level set point changes of approximately 3 to 6 in are used to evaluate (and adjust if necessary) the feedwater control system settings for all power and feedwater flow control valve modes. The level set point changes will also demonstrate core stability to subcooling changes.

The following tests are performed:

Action: Operating Mode	Input	Test Condition: 1	2	3	4	5	6
3-element	Set point	No	Yes	Yes	Yes	Yes	Yes
1-element	Set point	No	Yes	Yes	Yes	Yes	Yes
NORM	Manual flow steps*	No	Yes	Yes	No	No	Yes
	Recirculation modes**	MAN	MAN	MAN	MAN	MAN	MAN

12

*Manual flow steps to be done on each flow control valve only when two pumps or more are on, with one or more in automatic mode and the valve to be tested in manual mode.

**Either POS or FLO 12

TABLE 14.2-222 (Cont)

Acceptance Criteria

Level 1

The transient response of any level control system-related variable to any test input must not diverge.

Level 2

1. Level control system-related variables may contain oscillatory modes of response. In these cases, the decay ratio for each controlled mode of response must be less than or equal to 0.25 in.

2. The open loop dynamic flow response of each feedwater actuator (control valve) to small (>10 percent) step disturbances shall be:

a)	Maximum time to 10 percent of a step disturbance	≤1.1 sec
b)	Maximum time from 10 percent to 90 percent of a step disturbance	≤1.9 sec
c)	Peak overshoot (percent of step disturbance)	≤15 percent
d)	Settling time to within ±5 percent of final valve	≤14.0 sec

3. The average rate of response of the feedwater actuator to large (>20 percent of pump flow) step disturbances
12 | shall be between 10 and 25 percent rated feedwater flow/second. This response criteria is applicable everywhere over the entire operational flow map. Rated pump flow is equivalent to the capacity of a single feedwater pump. This average response rate will be assessed by determining the time required to pass linearly through the 10 percent and 90 percent response points.

12 | 4. At steady-state operation for the 3/1 element systems, input scaling to the mismatch gains should be adjusted such that the mismatch gain output should be within ±1 in.

TABLE 14.2-222 (Cont)

TABLE 14.2-233

RECIRCULATION FLOW CONTROL
VALVE POSITION CONTROL

Startup Test (SUT-29A)

Test Objective

To demonstrate the recirculation flow control system's capability, which is the valve position (POS) mode.

Prerequisites

The appropriate preoperational tests have been completed; the SORC has reviewed and approved the test procedures and initiation of testing. All controls are checked and instrumentation calibrated.

Test Procedure

The testing of the recirculation flow control system follows a building-block approach while the plant is ascending from low to high power levels. Components and inner control loops are tested first, followed by drive flow control and plant power maneuvers to adjust and then demonstrate the outer loop controller performance. Preliminary component and valve position loop tests are run when the plant is in cold shutdown in order to visually observe the hydraulic cylinder response. While operating at low power with the pumps using the low-frequency -10power supply, small step changes are input into the position controller and the responses recorded.

The following test is performed:

Action	Test Conditions	
1. Small and large step changes input into position controller.	a. Prior to plant heatup, reactor shutdown, recirc pumps off. (Preoperational testing results may be used to satisfy this testing requirement.)	12

TABLE 14.2-233 (Cont)

12 2. Small step changes input into position controller.	a. Before or at TC-1 with pumps using low frequency power supply; at TC-3; between TC-5 and 6. b. Recirculation system in POS mode; other systems in NORM mode.

Acceptance Criteria

Level 1:

12 The transient response of any recirculation system-related variables to any test input must not diverge.

Level 2:

1. Recirculation system-related variables may contain oscillatory modes of response. In these cases, the decay ratio for each controlled mode of response must be less than or equal to 0.25.

2. Maximum rate of change of valve position shall be 10 ± 1 percent/sec.

   During TC-3 and TC-6 while operating on the high speed (60 Hz) source, gains and limiters shall be set to ob-
   12 tain the following response.

3. Delay time for position demand step shall be:

   For step inputs of 0.5 percent to 5 percent ≤0.15 sec

   For step inputs of 0.2 percent to 0.5 percent (see Figure 14.2-234-1)

4. Response time for position demand step shall be:

   For step inputs of 0.5 percent to 5 percent ≤0.45 sec

   For step inputs of 0.2 percent to 0.5 percent (see Figure 14.2-234-1)

TABLE 14.2-233 (Cont)

5. Overshoot after a small position demand input (1 to 5 percent) step shall be <10 percent of magnitude of input.

TABLE 14.2-234

RECIRCULATION FLOW LOOP CONTROL

Startup Test (SUT-29B)

Test Objectives

1. To demonstrate the core flow system's control capability over the entire flow control range including core flow, neutron flux, and load-following modes of operation.

2. To determine that all electrical compensators and controllers are set for desired system performance and stability.

Prerequisites

The preoperational tests have been completed; the SORC has reviewed and approved the test procedures and initiation of testing. All controls are checked and instrumentation calibrated.

Test Procedure

Following the initial position mode tests of Part 1 the final adjustment of the position loop gains, flow loop gains, and preliminary values of the flux loop adjustments are made on the midpower line. This is the most extensive testing of the recirculation control system. The core power distribution is adjusted by control rods to permit a broad range of maneuverability with respect to PCIOMR. In general, the controller dials and gains are raised to meet the maneuvering performance objectives. Thus the system is set to be the slowest that will perform satisfactorily, in order to maximize stability margins and minimize equipment wear by minimizing actuator motion.

Because of PCIOMR power maneuvering rate restrictions, the fast flow maneuvering adjustments are performed along a mid-power rod line, and an extrapolation is made to the expected results along the 100-percent rod line. The utility has the option to decide to:

1. Perform the faster power changes on the 100-percent rod line that are greater than what the PCIOMR allows, or

2. Accept the mid-power load line demonstrations as acceptable proof of maneuverability.

TABLE 14.2-234 (Cont)

For immediate commercial operation, the flux loop and automatic load-following loop are set slower, and the operator limits his action in the manual mode. If PCIOMRs are ever withdrawn, the tested faster auto settings can be inserted onto the controller with only a brief dynamic test, rather than a full startup test.

The following tests are performed:

	Action	Test Conditions
12	1. Large and small step and ramp inputs.	a. Between TC-2 and 3. b. Recirculation system in FLO and FLX modes; other systems in NORM mode. c. Both normal and low frequency power sources to be used as applicable.
12	2. Step and ramp input changes to demonstrate satisfactory response.	a. Between TC-5 and 6. b. Recirculation system in FLO and FLX modes; other systems in NORM mode.

Acceptance Criteria

Flow Loops Criteria

Level 1:

12 The transient response if any recirculation system-related variable to any test input must not diverge.

Level 2:

1. The decay ratio of the flow loop response to any test inputs must be <0.25.

2. The flow loops provide equal flows in the two loops during steady-state operation. Flow loop gains should be set to correct a flow imbalance in about 20 ± 5 sec.

3. The delay time for flow demand step (≤5 percent) must be 0.4 sec or less. 12

TABLE 14.2-234 (Cont)

4. The response time for flow demand step (≤5 percent) must be 1.1 sec or less.

5. The maximum allowable flow overshoot for step demand of ≤5 percent of rated must be 6 percent of the demand step.

6. The flow demand step settling time must be ≤6 sec.

Flux Loop Criteria

Level 1:

The flux loop response to test inputs must not diverge.

Level 2:

1. Flux overshoot to a flux demand step must not exceed 2 percent of rated for a step demand of ≤20 percent of rated.

2. The delay time for flux response to a flux demand step must be ≤0.8 sec.

3. The response time for flux demand step must be ≤2.5 sec.

4. The flux setting time must be ≤15 sec for a flux demand step ≤20 percent of rated.

TABLE 14.2-234 (Cont)

Load Following Loop Criteria

Level 1:

The load following loop response to test inputs must not diverge.

Level 2:

1. The decay ratio of the load following response must be <0.25.

2. The response to a step input of less than 10 percent in load demand must be such that the load demand error is within 10 percent of the magnitude of the step within 10 sec.

3. When a load demand step of greater than 10 percent is applied (n percent), the load demand error must be within 10 percent of the magnitude of the step within N sec.

Scram Avoidance and General Criteria

Level 1:

Not applicable.

Level 2:

For any one of the above loops' test maneuvers, the trip avoidance margins must be at least the following:

1. For APRM ≥7.5 percent.

2. For simulated heat flux ≥5.0 percent.

3. The load following loop response must produce steam flow variations no larger than 0.5 percent of rated steam flow.

TABLE 14.2-234 (Cont)

Flux Estimator Test Criteria

Level 1:

Not applicable.

Level 2:

1. Switching between estimated and sensed flux should not exceed 5 times/5 min at steady state.

2. During flux step transient there should be no switching to sensed flux or if switching does occur, it should switch back to estimated flux within 20 sec of the start of the transient.

Flow Control Valve Duty Test Criteria

Level 1:

Not applicable.

Level 2:

The flow control valve duty cycle in any operating mode must not exceed 0.2 percent - Hz. Flow control valve duty cycle is defined as:

Total distance traveled (in % of total travel) in a time period/2 x time span (in seconds). 12

TABLE 14.2-209

INTERMEDIATE RANGE MONITOR PERFORMANCE

Startup Test (SUT-10)

Test Objective

To adjust the IRM system to obtain an optimum overlap with the SRM and APRM systems.

Prerequisites

The preoperational tests have been completed. The SORC has reviewed and approved the test procedures and the initiation of testing. All SRMs and pulse preamplifiers, IRMs and voltage preamplifiers, and APRMs have been calibrated in accordance with vendor's instructions.

Test Procedure

Initially the IRM system is set to maximum gain. After the APRM calibration, the IRM gains are adjusted to optimize the IRM overlap with the SRMs and APRMs.

The following tests are performed:

Action	Test Conditions
1. Verify IRM-SRM overlap.	Flux level sufficient for IRM response.
2. Verify IRM response to neutron flux.	
3. Adjust IRM gain, if necessary, for proper IRM-APRM overlap.	During first APRM calibration based on a heat balance.

Acceptance Criteria

Level 1:

a) Each IRM channel must be on scale before the SRMs exceed their rod block setpoint.

b) Each APRM must be on scale before the IRMs exceed their rod block setpoint.

c) The IRM's produce a scram at 96 percent of full scale in the startup mode.

TABLE 14.2-209 (Cont)

Level 2:

12 Each IRM channel must be adjusted so a half-decade overlap with the SRMs and one-decade overlap with the APRMs are assured.