ROCHESTER GAS AND ELECTRIC CORPORATION

GINNA STATION

CONTROLLED COPY NUMBER 71

PROCEDURE NO. PT-7 REV. NO. 36

HYDRO TEST OF REACTOR COOLANT SYSTEM

TECHNICAL REVIEW

PORC REVIEW DATE 5-18-88

S M Spector
PLANT SUPERINTENDENT

5-26-88
~~5-24-88~~
EFFECTIVE DATE

QA X NON-QA _____ CATEGORY 1.0

REVIEWED BY: _____

THIS PROCEDURE CONTAINS 14 PAGES

GINNA STATION
START:
DATE _____
TIME _____
COMPLETED:
DATE _____
TIME: _____

PT-7

HYDRO TEST OF REACTOR COOLANT SYSTEM

1.0 PURPOSE:

1.1 To verify leak tightness following maintenance and modification and to hydrostatically test the Reactor Coolant system.

1.2 To perform VT-2, visual leakage inspection of the Reactor Coolant System as per reference 3.3.

2.0 TEST REQUIREMENTS:

2.1 Following opening, modification and repair of the Reactor Coolant System, qualified test personnel shall maintain a pressure of 2235 psig for 10 minutes and as long as qualified inspection personnel require to verify leak tightness of the items specified in attached Check List #1.

2.2 Prior to the end of each ISI inspection interval (12-31-79, 12-31-89, 12-31-99, 12-31-09) qualified test personnel shall maintain a Reactor Coolant System pressure in accordance with paragraph IWB-5222 of Reference 3.3 and temperature in accordance with Figure 3.1-1, Section 3.1 of Reference 3.4 for 4 hours and as long as qualified inspection personnel require to verify leak tightness of the items specified in attached Check List #2. (340° at 2352 psig is acceptable for current Technical Specification revision).

3.0 REFERENCES:

3.1 QA Manual, Appendix B.

3.2 Reactor Coolant System Flow Diagram in Q.A. Manual, Appendix A.

3.3 A.S.M.E., Section XI.

3.4 Technical Specifications.

3.5 Environmental Equipment Qualifications Form EEQ-1 Package No. 3A (located in Maintenance Office) Reactor Head Vent Solenoid Valves 590, 591, 592 & 593.

4.0 INITIAL CONDITIONS:

4.1 Residual Heat Removal Loop is in service to control residual core heat or isolated per O-1.1. _____

4.1.1 Overpressure protection system in service whenever RHR system is in operation. _____

4.2 Operating Procedure O-1.1 is done up to step 5.31 or N/A if crevise cleaning in progress. _____

4.2.1 Operating Procedure 0-10 is done up to step 5.30 or N/A if procedures 0-1.1 is being used. _____

4.3 Primary system temperature is $\geq$ test temperature of 340°F. _____

4.4 The following systems and/or equipment are available for service:

4.4.1 Excess letdown. _____

4.4.2 Block valves for pressurizer power operated relief valves (MOV-515 and MOV-516). _____

4.4.3 Sufficient personnel are available to completely check, tighten, and/or repair all areas of probable leakage. _____

4.4.4 Steam Generators' "A" and "B" are filled to normal operating level and secondary system is intact and ready to receive steam up to the closed Main Steam Isolation valves. _____

4.4.5 One atmospheric power relief valve is operable. _____

4.4.6 All vent hoses have been disconnected from system component vents and blank flanges reinstalled. _____

4.5 Quality Control has been notified to assign qualified inspector and provide list of maintenance items for check list. _____

NOTE: If any change occurs in the normal operation of the 4 head vent valves #590, 591, 592, or 593 such as increased seat leakage or stroke time, initiate a Maintenance Work Request.

4.6 A Health Physics Work Permit has been obtained. Any areas not normally entered (e.g. - Sump A) should be surveyed prior to entry.

5.0 PRECAUTIONS:

5.1 To protect NIS detectors a Reactor Compartment fan cooler must be in service when temperature in RCS is above 135°.

5.2 A rod control shroud fan must be in operation when RCS temperature is greater than 135°F.

5.3 The Safety Injection signal from secondary side (Low steam Pressure, ≤ 514 psig) must be defeated, during hydro, whenever RCS pressure is in excess of 1992 psig (automatic unblock of S.I.).

5.4 The over pressure protection system shall be in operation whenever RHR is in service.

5.5 The Residual Heat Removal System must be isolated from the Reactor Coolant System before increasing system pressure above 450 psig.

5.6 Both pressurizer PORVs must be operable with a lift setting of ≤ 410 psig (435 psig. T.S.) and aligned per O-7 whenever the temperature of one or more of the RCS cold legs is ≤ 350°F (330°F T.S.), or the residual heat removal system is in operation, except one PORV may be inoperable for seven days. If these conditions cannot be met, the Primary System must be depressurized and vented through a ≥ 1.1 square inch vent(s) within next 8 hours. Maintain RCS in a vented condition until both PORVs have been restored to operable status. Venting of system is accomplished by using step 5.39 of O-2.2.

5.7 Reactor coolant temperature must be less than 350°F before Residual Heat Removal System is returned to service.

5.8 When the RHR system is in operation, and the RCS temperature is greater than 200°F, a maximum of 2 charging pumps are to be operated to prevent over-pressuring the RHR system. Below 200°F, the operation of 3 charging pumps is allowable but should be avoided if possible.

5.9 If RHR system Hx begins to flash, it may be necessary to further open MOV-738A and MOV-738B to cool them below flash temperature.

6.0 INSTRUCTIONS:

6.1 Perform the following to simulate normal operating pressure for 2 of 3 pressure channels per steam generator:

6.1.1 Place both steam header Atmospheric Relief Valves in MANUAL. _____

6.1.2 Direct I&C to simulate normal operating steam generator pressure for 2 of 3 pressure channels per steam generators (700 to 900 psig). _____

6.1.3 Place both steam header Atmospheric Relief Valves in Auto, if desired. (N/A step if not desired). _____

6.2 Stop one of the two operating Reactor Coolant Pumps. _____

6.3 Place excess letdown system in service per following steps:

6.3.1 Open Component Cooling Water to excess letdown HX. AOV-745 Open _____

6.3.2 Open AOV-310 (Excess Letdown Stop Valve). _____

6.3.3 Place AOV-312 (Excess Letdown Diversion Valve) to normal. _____

6.3.4 Control Reactor Coolant System Pressure with HCV-123 (Excess Letdown Flow Control Valve) and/or charging pump speed, closely watching that primary system pressure is being controlled at about 350 psig as read on PR-420. _____

6.4 Close or verify closed, RHR letdown valve HCV-133.
HCV-133 Closed _____

6.4.1 Close normal letdown orifices isolation valves.
200A Closed _____

200B Closed _____

202 Closed _____

NOTE: With removal of Residual Heat Removal Loop from service, the primary system cooling capability will be reduced to that of heat removal via the S/G. If more cooling is required, primary system temperatures may be controlled by steam release from S.G.'s to the atmosphere.

6.5 Stop RHR pump(s) if operating.
A RHR Pump _____

B RHR Pump _____

6.6 Close or verify closed, RHR Isolation Valves:

6.6.1 MOV 700 Closed _____

6.6.2 MOV 701 Closed _____

6.6.3 MOV 720 Closed _____

6.6.4 MOV 721 Closed _____

6.7 Throttle MOV-738A and MOV-738B Component Cooling Water to the "A" and "B" RHRS HX.

MOV-738A Throttled _____

MOV-738B Throttled _____

CAUTION: If RHRS HX begins to flash, it may be necessary to further open MOV-738A and MOV-738B to cool them below flash temperature.

6.7.1 Close or verify closed, HCV 624 and HCV 625.
HCV 625 Closed _____

HCV 625 Closed _____

NOTE: When RCS temperature $\geq 340^{\circ}F$ and after RHR system removed from service, the reactor vessel overpressure protection system is to be taken out of service before pressure increases above ~ 350 psig.

6.8 RCS $\geq 340^{\circ}F$. _____

6.8.1 RHR System out of service. _____

6.9 To remove reactor vessel overpressure protection system, perform the following steps:

6.9.1 Block relief valve PC-430 actuation by SOV-8619A switch to the block position.

_____

6.9.2 Block relief valve PC-431 actuation by SOV-8619B switch to the block position.

_____

6.9.3 Place Surge Tank V-802A charge valve SOV-8616A switch to the closed position.

_____

6.9.4 Place Surge Tank V-802B charge valve SOV-8616B switch to the closed position. _____

6.9.5 Place PORV switches in Auto Position.

PCV-431C Auto _____

PCV-430 Auto _____

6.9.6 Open MOV 516 (Block valve for PCV 430).

Open _____

6.9.7 Open MOV-515 (Block valve for PCV-431C).

Open _____

6.10 Verify DC power available to the Reactor Head Vent solenoid valves, green lites on, valves closed.

_____

NOTE: If any change occurs in the normal operation of the 4 head vent valves #590, 591, 592, or 593 such as increased seat leakage or stroke time, initiate a Maintenance Work Request.

6.10.1 SOV 590 & 592 _____

6.10.2 SOV 591 & 593 _____

6.10.3 Open the two (2) lower Reactor Head Vent solenoid valves.

SOV-592 open _____

SOV-593 open _____

NOTE: If Hydro is terminated before all pressure plateaus have been reached, N/A steps not performed on procedure and data sheet. Continue with Step 6.14.

6.11 Ensure set point of HCV 431K is at 2235 and auto mode. If for 10 year test, set to 2350 and auto mode.

Auto _____

2235 _____

2350 _____

CAUTION: Avoid rapid rate of change in pressure or set point to prevent operation of the power operated relief valves.

6.12 Indicate which Check Sheet will be completed and indicate the final pressure in Step 6.13.4.

Check Sheet # _____

CAUTION: Raise pressure slowly to avoid opening PCV 430 and PCV 431C.

6.12.1 The following are desired pressure plateaus during Hydro:

6.13 Begin system pressure increase starting at 325 psig by adjusting excess letdown controller HCV-123 and/or charging pump speed, stopping long enough at each pressure level for a complete inspection of the components under pressure. _____

NOTE: When making a visual inspection of reactor coolant system, specifically cover the areas as per attached check sheets. These are areas which are more susceptible to leakage as well as areas which must be verified for integrity to conform to Technical Specification requirements. Areas listed on Check Sheet 1 are to be checked to meet Step 2.1. Areas listed in Check Sheet 2 need only be verified to meet Step 2.2.

6.13.1 325 psig plateau reached and inspection completed. _____

6.13.1.1 Switch off PI-420 before 700 psig. _____

CAUTION: Do not exceed 1600 psig unless the S.I. accumulators are aligned for operation.

6.13.2 When RCS pressure is at 1500 psig align S.I. accumulators for service as follows:

6.13.2.1 S.I. accumulator Boron Concentration >1800 PPM.

"A" Accumulator _____

"B" Accumulator _____

6.13.2.2 S.I. accumulator pressure >700 psig.

"A" Accumulator _____

"B" Accumulator _____

6.13.2.3 S.I. accumulator levels 50 - 82%.

"A" Accumulator _____

"B" Accumulator _____

6.13.2.4 S.I. accumulator discharge valves open.

MOV-841 Open _____

MOV-865 Open _____

6.13.2.5 Open breakers and leave fuses in for MOV-841 and 865.

MOV-841 Breaker Open _____ Fuse In _____

MOV-865 Breaker Open _____ Fuse In _____

6.13.2.6 1500 psig plateau reached and inspection completed. _____

6.13.3 If for ten year test, close PCV 430 isolation, MOV-516, & PCV-431C isolation valve MOV-515 upon reaching 2000 psig. N/A other years.

MOV-516 Closed _____

MOV-515 Closed _____

6.13.4 Final pressure of _____psig and _____°F reached and inspection completed. _____

6.13.5 If it is desired to verify leak tightness of MOV-516, perform the following:

6.13.5.1 Close MOV-516 MOV-516 closed _____

6.13.5.2 Open PCV-430 PCV-430 open _____

6.13.5.3 Check MOV-516 for leakage:_____ gpm _____

6.13.5.4 Close PCV-430 PCV-430 closed _____

6.13.5.5 Open MOV-516 MOV-516 open _____

6.13.5.6 Perform leakage calculation as follows:

PRT level: Start _____% Finish ____% Delta level _____%

Time: Start _____ Finish _____ Delta time _____ min.

Obtain gallons per % level from PRT curve _____ gal/%

$$\frac{\%\ \text{change} \times \text{gal}/\%}{\text{delta time}} = \text{gpm}$$

6.13.6 If it is desired to verify leak tightness of MOV-515, perform the following:

6.13.6.1 Close MOV-515 MOV-515 closed _____

6.13.6.2 Open PCV-431C PCV-431C open _____

6.13.6.3 Check MOV-515 for leakage _____ gpm _____

6.13.6.4 Close PCV-431C PCV-431C closed _____

6.13.6.5 Open MOV-515 MOV-515 open _____

6.13.6.6 Perform leakage calculation as follows:

PRT level: Start _____% Finish _____% delta level ____%

Time: Start _____ Finish _____ delta time _____ min.

Obtain gallons per % level from PRT curve _____gal/%

$$\frac{\%\ \text{change} \times \text{gal}/\%}{\text{delta time}} = \text{gpm}$$

NOTE: Leakage acceptance criteria for block valves:

- o Less than 10 gpm - Continue operation
- o Greater than 10 gpm on one valve
- o Leakage acceptance criteria for PORV's - Tech Spec limits.

NOTE: The volume control tank may not accommodate all the water on depressurization so it may be necessary to either divert excess letdown to the Reactor Coolant Drain Tank or letdown through an orifice and divert to a CVCS holdup tank.

6.14 After Hydro is completed or terminated, reduce system pressure to <1500 psig by decreasing charging pump speed and/or HCV-123 controller output. _____

CAUTION: DO NOT reduce RCS pressure <1000 psig until S.I. accumulators are isolated.

6.14.1 Close S.I. accumulator discharge valves MOV-865 & MOV-841. _____

6.14.2 Reduce system pressure to 350 psig. _____

6.14.3 Place switch to "ON" for P.I.-420 when system pressure is less than 700 psig. _____

NOTE: If heatup is to continue and placing RHR in service is not desired, mark steps 6.15.4 - 6.15.8 N/A.

NOTE: If RSSP 1.1 is required, do not re-pressurize RHR system until test is completed.

6.14.4 At 350 psig, align overpressure protection system per O-7, if RHR is to be placed in service. _____

6.15 When 350 psig is obtained, the RHR Loop may be cut in as follows:

6.15.1 Maintain 350 psig as read on PR-420 or PI-420 using PCV-135. _____

6.15.2 Open orifice valves AOV-200A, AOV-200B and AOV-202.
Open _____

6.15.3 Remove excess letdown system from service by closing HCV-123, making sure that PCV-135 is controlling pressure at 350 psig.
_____

6.15.3.1 Close AOV 310, excess letdown stop valve.
AOV 310 Closed _____

6.15.4 If RHR system is to be used, slowly open HCV-133 to raise the RHR loop pressure to that of the low pressure letdown closely watching that primary system pressure is being controlled at about 350 psig as read on PR-420 or PI-420.
SLOWLY HCV-133 Open _____

6.15.5 Open RHR loop isolation valves MOV-720 and MOV-721.
MOV-720 Open _____
MOV-721 Open _____

6.15.6 Open RHR loop isolation valves MOV-700 and MOV-701.
MOV-700 Open _____
MOV-701 Open _____

6.15.7 Open 738A & 738B as needed to provide component cooling water.
_____

6.15.8 Start an RHR Pump and maintain temperature by regulating flow through RHR Heat Exchangers using HCV-624, HCV-625 and HCV-626.
_____

CAUTION: RCS pressure must be maintained below 1992 psig until secondary side steam pressure is greater than 514 psig to prevent inadvertant Safety Injection actuation.

6.16 If hydro has been completed satisfactorily and system pressure reduced, block SI.
_____

6.17 Return HCV-431K to normal setting, if changed.
_____

6.17.1 Open MOV-516, if closed. MOV-516 Open _____

6.17.2 Close the two (2) lower Reactor Head Vent solenoid valves.

SV-592 closed _____

SV-593 closed _____

6.18 Consult with Operations Section as to whether RCS is to be returned to cooldown (via RHR) or if pressurizer bubble formation is desired.

_____

6.19 If heat up is to continue, return to operating procedure O-1.1.

_____

6.20 Notify I&C to return steam generator pressure channels to normal as follows:

6.20.1 Place both steam header Atmospheric Relief Valves in Manual and closed.

_____

6.20.2 I&C remove simulators from steam generator pressure channels simulated in step 6.1.2.

_____

6.20.3 Place both steam header Atmospheric Relief Valves in Auto, if desired. (N/A step if not desired).

_____

6.21 Quality Control shall update the ISI program to reflect completion of this procedure.

QC _____

COMPLETED BY: _____

DATE COMPLETED: _____

HEAD CONTROL OPERATOR: _____

SHIFT SUPERVISOR: _____

QC SUPERVISION REVIEW: _____ DATE _____

RESULTS & TEST REVIEW: _____ DATE _____

REACTOR COOLANT SYSTEM HYDRO CHECK LIST #1

INSPECTION ACCEPTANCE CRITERIA: A VT-2 Visual Inspection of the Reactor Coolant System and items listed herein, shall be completed at the pressures indicated. No leakage shall be allowed through pipe, vessels, or valve bodies. Leakage through packing, flange gasketing, etc., shall be noted and quantified, if possible, for further evaluation by Operations or Plant Supervision.

		(psig)	325	1500	2235	(10 yr. only) 2352
1.0	PRESSURIZER					
1.1	Safety valve inlet flange gaskets		____	____	____	____
1.2	Spray valves 431A, 431B flange gaskets		____	____	____	____
1.3	Power operated relief inlet flange gaskets 430, 431C - MOV open		____	____	____	____
1.4	Valve packing		____	____	____	____
1.5	Heater connections		____	____	____	____
1.6	Manway		____	____	____	____
1.7	Vent flanges		____	____	____	____
2.0	REACTOR					
2.1	Flange - Head Closure		____	____	____	____
2.2	Head Vent Flange		____	____	____	____
2.3	Conoseal Thermocouples (4)		____	____	____	____
2.4	Incore Seal Table		____	____	____	____
3.0	STEAM GENERATOR					
3.1	"A" Primary Inlet and Outlet Manway		____	____	____	____
3.2	"B" Primary Inlet and Outlet Manway		____	____	____	____
4.0	RESIDUAL HEAT REMOVAL (RHR)					
4.1	Valve 721 RHR discharge Loop "B"		____	____	____	____
	NOTE: Quantify leakage (_____)					
5.0	MAINTENANCE ITEMS AS LISTED BY Q.C. ENGINEER (Not Applicable steps may be marked N/A.)					
5.1	_____		____	____	____	____
5.2	_____		____	____	____	____
5.3	_____		____	____	____	____
5.4	_____		____	____	____	____
5.5	_____		____	____	____	____
5.6	_____		____	____	____	____
5.7	_____		____	____	____	____
5.8	_____		____	____	____	____
5.9	_____		____	____	____	____
5.10	_____		____	____	____	____

REMARKS:

Inspected By: _____ Date: _____
Level II QC Inspector

_____
Operations Personnel

Reviewed By: _____ Date: _____
QC Supervision

REACTOR COOLANT SYSTEM HYDRO - 10 YEAR ONLY
CHECK LIST #2

INSPECTION ACCEPTANCE CRITERIA: A VT-2 Visual Inspection of the Reactor Coolant System and items listed herein, shall be completed at the pressures indicated. No leakage shall be allowed through pipe, vessels, or valve bodies. Leakage through packing, flange gasketing, etc., shall be noted and quantified, if possible, for further evaluation by Operations or Plant Supervision.

		2352 (psig)
1.	Letdown line from RCS loop to orifices	_____
2.	Excess letdown from RCS loop to HCV 123	_____
3.	Charging line from Loop B hot leg to Regen. HX	_____
4.	Charging line from Loop B cold leg to Regen. HX	_____
5.	Charging line from check valve 370A to Regen. HX	_____
6.	Aux. spray line from charging line to pressurizer	_____
7.	Alternate charging line from Loop A cold leg to AOV 392B	_____
8.	Loop A cold leg to Accum. discharge check 842B, S.I. check 878J, and Accum test line to AOV 840B	_____
9.	Loop B cold leg to Accum. Discharge check 842A, S.I. check 878G, and Accum. test line to AOV 839B	_____
10.	Loop A hot leg to check valve 878H	_____
11.	Loop B hot leg to check valve 878F	_____
12.	Reactor vessel to MOV 852A	_____
13.	Reactor vessel to MOV 852B	_____
14.	Loop A hot leg to MOV 701	_____
15.	Loop B cold leg to MOV 720	_____
16.	Loop A drain to Valve 503	_____
17.	Loop B drain to Valve 540	_____
18.	Press. liquid space sample line to AOV 953	_____
19.	A loop hot leg to Valve 998	_____
20.	B loop hot leg to AOV 955	_____
21.	Incore penetrations in Sump A	_____
22.	A loop instrumentation lines	_____
23.	B loop instrumentation lines	_____
24.	Pressurizer instrumentation lines	_____
25.	Mini spray line around PCV 431A	_____
26.	Mini spray line around PCV 431B	_____
27.	Pressurizer to B loop hot leg surge line	_____
28.	Pressurizer steam space sample line to AOV 951	_____
29.	Rx head to head vent valve branch connection	_____
30.	Control rod drive penetrations	_____
31.	Pressurizer heater connections	_____
32.	Check all accessible major components for leakage (i.e. Rx Vessel, Steam Generators etc.) within the Reactor Coolant System boundary, which were not mentioned in preceding steps	_____

REMARKS:

Inspected By: _____ Date: _____
Level II Q.C. Inspector

_____
Operations Personnel

Reviewed By: _____ Date: _____
QC Supervision

ROCHESTER GAS AND ELECTRIC CORPORATION

GINNA STATION PORV BLOCK VALVE REPLACEMENT PROGRAM

ATTACHMENT C.11

MOVATS Motor Operated Valve Database Summary Table

ROCHESTER GAS AND ELECTRIC CORPORATION

GINNA STATION PORV BLOCK VALVE REPLACEMENT PROGRAM

ATTACHMENT C.11

MOVATS Motor Operated Valve Database Summary Table

VALVE DATA USED TO EXTRAPOLATE DP THRUST REQUIREMENTS FOR MOV 515 AND MOV 516. PARALLEL DISK GATE VALVES.

CLOSE TO OPEN MEASURED VALUES

MOVATS DATABASE REC NO	MANU	ORIFICE DIA.	DP	PARAMETERS X: DIFF PRES X ORIFICE AREA	PARAMETERS Y: THRUST
*		0.000	0	0	0
76	AD	2.750	1000	5937	5115
144	AD	2.750	2600	15435	4348
42	AD	2.750	2600	15435	4401
38	AD	2.750	2600	15435	6746
69	AD	2.750	2610	15494	2766
41	AD	2.750	2850	16919	2931

OPEN TO CLOSE MEASURED VALUES

MOVATS DATABASE REC NO	MANU	ORIFICE DIA in	STEM DIA in	DP psi	LINE PRESSURE psi	PARAMETERS X: .3 X DP X ORIFICE AREA + LP X STEM AREA	PARAMETERS Y: THRUST lbs
		0.000	0.000	0	0	0	0
75	AD	2.750	1.250	1000	1000	3008	6714
143	AD	2.750	1.250	2600	2600	7820	5401
39	AD	2.750	1.250	2600	2600	7820	6343
38	AD	2.750	1.250	2600	2600	7820	8947
42	AD	2.750	1.250	2600	2600	7820	9185
69	AD	2.750	1.250	2610	2610	7850	7495
84	AD	2.750	1.250	2750	2750	8271	5004

ROCHESTER GAS AND ELECTRIC CORPORATION

GINNA STATION PORV BLOCK VALVE REPLACEMENT PROGRAM

ATTACHMENT C.12

Gilbert/Commonwealth, Inc. calculation, "PRV Block Valve Thrust Calculation"