FLORIDA POWER AND LIGHT COMPANY
TURKEY POINT UNITS 3 AND 4
OFF-NORMAL OPERATING PROCEDURE 3208.1
NOVEMBER 18, 1986

1.0 Title:

MALFUNCTION OF RESIDUAL HEAT REMOVAL SYSTEM

2.0 Approval and List of Effective Pages:

2.1 Approval:

Change Dated 11/18/86 Reviewed by Plant Nuclear Safety Committee: 86-294

and Approved by Plant Manager - Nuclear: 11/18/86

2.2 List of Effective Pages:

Page	Date	Page	Date	Page	Date	Page	Date
1	11/18/86	4	3/28/86	7	11/18/86	10	11/18/86
2	11/18/86	5	11/18/86	8	11/18/86		
3	3/28/86	6	11/18/86	9	11/18/86		

3.0 Purpose and Discussion

3.1 Purpose:

This procedure provides instructions to follow in the event of an RCS leak from an RHR system component. It also provides instructions for a loss of CCW to the RHR system. If a loss of RHR flow has occured, Procedure 3/4-ONOP-050, Loss of RHR, should be refered to.

3.2 Discussion:

3.2.1 The failure or malfunction of one RHR pump under any system condition will not put the system in jeopardy, however, the loss of the second RHR pump or the loss of component cooling water flow to the RHR heat exchangers can affect the ability to remove system decay heat.

3.2.2 Every effort shall be utilized to maintain two trains of RHR available when the system is drained and opened for maintenance.

It is realized that certain maintenance requires the loss of both RHR pumps, under these conditions special controls will be established prior to commencing work that will ensure the equipment ability to be restarted as needed for decay heat removal.

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3.2.3 Whenever possible, maintenance on the RHR system should be done when the following conditions exist:

1. The reactor Head is in place, and the steam generator manways are on, or -

2. The reactor refueling cavity is flooded. This will allow for an alternate method of decay heat removal to be utilized.

3.2.4 When equipment malfunctions occurs, alternate equipment, if available, should be placed in service as required.

3.2.5 MOV's are constructed such that they can be hand operated when the motor operator fails. Hand operation of these valves can be done as long as it is safe for the personnel operating them, and all interlock provisions are complied with.

3.2.6 Coolant loop redundancy as per Technical Specifications 1.23 and 3.4 shall be maintained.

3.2.7 |MOV-*-872 has been set at 2 1/2 inches of valve travel to maintain the required differential pressure across the pumps during single pump operation when utilizing the alternate RHR line. The pump discharge valve (*-754A or B) should not require throttling when using the alternate RHR line. If valve throttling during single pump operation is required the Technical Department is to be notified to investigate the throttle position of MOV-*-872. A differential pressure across the pump must be maintained in accordance with the following formula:

$$PSID = 107.2 - .039T \begin{array}{l} + 10 \text{ PSID} \\ - 0 \text{ PSID} \end{array}$$

Where T = RCS temperature °F from 60° - 350°F

Normal pump differential pressure should be between 105 to 115 psig.|

4.0 Symptoms:

4.1 Any of the following alarms may indicate a leak in or a loss of CCW to the RHR system.

4.1.1 Residual Heat Removal Room A Sump High Level

4.1.2 Residual Heat Removal Room B Sump High Level

4.1.3 Residual Heat Removal Heat Exchanger Room Sump High Level

4.1.4 Residual Heat Exchanger Low Flow

4.1.5 Residual Heat Removal Pumps A CC Water Low Flow |(6.2 gpm FIA*637)|

4.1.6 Residual Heat Removal Pumps B CC Water Low Flow |(6.2 gpm FIA*638)|

4.2 Malfunction of motor operated valves can be detected in the control room by observing the operation of the indicating lights.

4.2.1 When valve is closed, Green Light should be on.

4.2.2 When valve is open, Red Light should be on.

4.2.3 Whenever the valve is not fully closed or open, both red and green lights should be on.

NOTE: Lights could be burned out.

4.3 Both A and B RHR pumps are equipped with an alarm that actuates on high temperature of the pump seal water leaving the seal water cooler. The temperature indication TA-*-679A and/or B for these alarms is at the individual pump.

4.4 The increased running frequency of sump pumps located in the RHR pump rooms A and B or the heat exchanger room may indicate RCS leakage from an RHR component at one of these locations.

4.5 Increased running frequency of the containment sump pumps may indicate RCS leakage from RHR components inside the containment.

4.6 An abnormal change in the RCS heatup or cooldown rate when no changes have been made in the operation of the RHR system, may indicate a malfunction of an RHR system component or an interruption of, or change in, component cooling water flow to the RHR heat exchangers.

4.7 An abnormal change in the indication of FI-*-605 RHR loop flow indicator, when no operating changes have been made on the system, is an indication of the malfunction of an RHR system component.

4.8 An abnormal variation of the RHR pump discharge temperatures and/or the heat exchanger outlet temperatures recorded on temp. recorder TR-*-604, vertical panel B, when no operating changes have been made on the system, is an indication of the malfunction of an RHR system component or an interruption of, or change in, component cooling water flow to the RHR heat exchangers.

4.9 A high level alarm on the component cooling water surge tank and/or a high activity radiation alarm in the component cooling water system is an indication of a possible RCS leak to the component cooling system which may be from the RHR heat exchangers, or the RHR pump seal water coolers.

4.10 RCS leakage from the RHR system to the atmosphere may be detected by:

4.10.1 Plant Vent Radiation Monitor R-14.

4.10.2 Containment Radioactive Gas Monitor and Air Particulate Monitor R11 and R12.

4.10.3 Visual observation.

4.11 Cavitation of an RHR pump is an indication of either low suction head, or air/steam binding in either the pump or Heat Exchanger.

5.0 Instructions:

5.1 Immediate Automatic Action:

5.1.1 RCS leakage to containment from RHR

Containment purge supply and exhaust duct valves and pressure relief line valves are closed on actuation of the high containment air particulate monitor alarm or the high radioactive gas monitor alarm due to leakage from the RCS.

5.1.2 RCS leakage to CC through RHR component.

Component cooling water surge tank vent valve RCV*609 closes on high activity alarm from the component cooling loop radiation monitor R-17A and B due to leakage from the RCS.

5.2 Immediate Operator Action:

5.2.1 Upon receiving indication of RCS leak through the RHR system, the operator will immediately take steps to verify that the correct automatic actions occurred as listed in Section 5.1. If these actions are required, but have not occurred, the operator will take steps to manually execute the actions required. |Plant Supervisor -Nuclear| shall be notified immediately.

NOTE: RHR malfunctions may require notification of a significant event to the NRCOC.

5.2.2 If the indication of the RHR malfunction is such that no automatic actions are required, the operator must evaluate the available information on the condition of the system in order to perform the necessary actions to assure the safety of personnel and equipment.

5.2.3 If TR-*-604 indicates an increasing temperature on the outlet of the RHR heat exchanger, verify the following:

1. RHR flow exists as indicated by FI-*-685.

2. Verify component cooling water flow on FI-*-613A ("A" CCW Header) and FI-*-613B ("B" CCW Header).

   NOTE: With "A" RHR heat exchanger in service, flow on "A" header should be greater than 4,500 gpm. With "B" RHR heat exchanger in service flow on "B" header should be greater than 9,000 gpm.

3. Verify MOV-*-749A and MOV-*-749B are open, Vertical Panel B.

   CAUTION: The position of valves *-748A and B is preset as determined by the CCW System flow testing. If the position of these valves is changed, the Technical Department Supervisor shall be notified immediately.

4. Notify the Nuclear Operator to visually verify *-748A and *-748B heat exchanger outlet butterfly valves, in the pipe and valve room, are throttled to the required preset positions *-748A approx 35% and *-748B approx 38% and RHR heat exchanger, CCW, Inlet Valves *-746A and *-746B open. (Reach Rods)

   NOTE: If malfunction exists in the component cooling water system, refer to 3/4-ONOP-030, Loss of Component Cooling Water System.

5.2.4 If an RHR pump exhibits signs of cavitation immediately stop the pump and take the following actions:

1. Verify proper CCW System Operation per 5.2.3 above.

2. Increase pumps suction head by cycling open, then closed, MOV-872 (RWST to RCS) to increase the RCS inventory 500 gallons. Repeat as necessary.

3. Start the pump and throttle the bypass flow around the heat exchangers via FCV-605.

4. Re-establish normal cooling rates.

5.3 Subsequent Operator Action:

5.3.1 If both MOV-*-744 A and B, RHR to RCS cold legs, fails to open, an alternate path may be provided as follows:

1. Close valve *-887 (normally locked approximately 30% open)

2. Unit 4 only) - Throttle the applicable RHR Pump Discharge Valve *-754A or *-754B to 95 turns from full open.

   NOTE: MOV-*-872 has been set at 2 1/2 inches of valve travel to prevent pump runout during alternate RHR line use with a single pump operating.

3. Open MOV-*-872

4. Open MOV-*-863A and MOV-*-863B

5. |Close HCV-*-758 and FCV-*-605

NOTE: MOV-*-872 has been set at 2 1/2 inches valve travel to prevent pump runout during alternate RHR line use with a single pump operating. This should maintain the required differential pressure without throttling the discharge valves. If the discharge valves (*754A or B) are throttled to obtain proper pressure, the Technical Department is to be notified to investigate throttle position of MOV-*-872.

6. Ensure that the differential pressure across the RHR pump is being maintained at 105 to 115 psig. Throttle the applicable RHR Pump Discharge valve *-754A or *-754B as required to maintain differential pressure.

CAUTION: By not closely monitoring the differential pressure across an RHR pump in a range of 105 to 115 psig, RHR pump damage may occur.

CAUTION: The position of valves *-748A and B is preset as determined by the CCW System flow testing. If the position of these valves is changed, the Technical Department Supervisor shall be notified immediately.

7. Cooldown rate must now be controlled by throttling the component cooling water outlet valves on the RHR heat exchanger, valves No. *-748A and/or *-748B.

CAUTION: 1) Caution must be used so as not to reduce CC flow to a point that CC will generate steam in RHR HX. Return the above valves to their original position when MOV-*-744A and B are operable and are required to be put back in service.

2) Maintain a close watch on RWST level in case valve *-887 leaks.

5.3.2 If there is a leak in the line between MOV-*-751 and V-*-752 A and B, RHR pump suction valves, 741B and MOV-*-862B, RWST to RHR:

1. Shutdown RHR pumps.

2. Close MOV-*-750 and MOV-*-751 C (Unit 3), A (Unit 4) hot leg to RHR.

3. Close MOV-*-744A and B RHR to cold legs.

4. Verify closed MOV-*-862A and B RWST to RHR.

5. Verify closed MOV-*-863A and B RHR rec. and alt. SIS

6. Close HCV-*-758 RHR HX Outlet control valve.|

7. Close FCV-*-605 RHR HX bypass.

8. Close V-*-752A and B RHR pump suction (locked open).

9. Close V-*-741A and B RHR rec. (locked open).

10. If continued cooldown is required then fully isolate RHR and use charging and letdown to bring pressure up so a RCP can be put in service in accordance with 3/4-OP-041.1, Reactor Coolant Pump. Then use steam dump to complete cooldown.

NOTE: When starting a RCP, it may be necessary to manually operate the PROV's for pressure control if they do not respond automatically. A pressure spike may result when starting a RCP, if a ΔT exists between the steam generators and primary system temperature.

5.3.3 If there is a leak in the C (Unit 3), A (Unit 4) loop hot leg line between MOV-*-750 and MOV-*-751.

1. Shutdown RHR pumps.

2. Close both MOV-*-750 and MOV-*-751 immediately.

3. If continued cooldown is required, then fully isolate the RHR system and bring RCS pressure to 400 - 450 psig; put one RCP in service according to 3/4-OP-041.1, Reactor Coolant Pump; and use steam dump for cooldown.

NOTE: When starting a RCP, it may be necessary to manually operate the PROV's for pressure control if they do not respond automatically. A pressure spike may result when starting a RCP, if a ΔT exists between the steam generators and primary system temperature.

5.3.4 If there is a leak in the RHR pump suction line, pump casing, and/or pump discharge line, including instrument lines, between valves *-752A and *-754A and 861A for A pump and *-752B and *-754B and 861B for B pump:

1. Stop the RHR pump involved.

2. Isolate the pump and its suction and discharge lines by closing V-*752A and (B), *-861A and (B), and V-*754A and (B).

5.3.5 If there is a leak in the RHR cold leg line between the following valves: MOV's-*-744A and B, and HCV-*-758, and FCV-*-605, V-*-734 and -*-741A.

1. Shutdown both RHR pumps.

2. Close MOV-*-750 and MOV-*-751 C (Unit 3), A (Unit 4) hot leg to RHR.

3. Close MOV-*-744A and B, check to be closed V-*-734 RHR to refueling canal.

4. Close *-757 C and D RHR HX bypass

5. Close *-760 RHR to CVCS.

6. Close *-741A and B (locked open) RHR recirculating line.

   CAUTION: The position of valves *-748A and B is preset as determined by the CCW System flow testing. If the position of these valves is changed, the Technical Department Supervisor shall be notified immediately.

7. RHR system is now shutdown. Use alternate path if RHR system operation is still required for cooldown purposes.

8. Close valves *-759A and B (normally locked open).

9. Open MOV's *-750 and *-751.

10. Close valve *-887. (normally locked approximately open 30% open)

11. Throttle the applicable RHR Pump Discharge valve *-754A or *-754B to 95 turns from full open.

    NOTE: MOV-*-872 has been set at 2 1/2 inches of valve travel to prevent pump runout during alternate RHR line use with a single pump operating.

12. Open MOV-*-872.

13. Open MOV-*-863A and MOV-*-863B

14. Verify close HCV-*-758 and Close FCV-*-605

15. Start RHR pump or pumps

16. Ensure that the differential pressure across the RHR pump is being maintained at 105 to 115 psig. Throttle the applicable RHR Pump Discharge valve *-754A or *-754B as required to maintain differential pressure.

    CAUTION: By not closely monitoring the differential pressure across on RHR pump in a range of 105 to 115 pisg, RHR pump damage may occur.

    CAUTION: The position of valves *-748A and B is preset as determined by the CCW System flow testing. If the position of these valves is changed, the Technical Department Supervisor shall be notified immediately.

17. Cooldown rate must now be controlled by throttling the component cooling water discharge valves from the RHR heat exchangers, valves *-748A and/or B. Caution must be used so as not to reduce CC flow to a point that CC will generate steam in RHR HX.

5.3.6 If there is a leak in any line, or in the heat exchanger, between the following valves: A side (B side) heat exchanger inlet valve *-757A (*-757B), heat exchanger outlet valve *-759A (*-759B) and alternate low head SIS MOV-*-863B (MOV-*-863A):

1. Stop RHR pumps.

2. If the failure is in the A side (B side) equipment or lines, close valves *-757A (*-757B), *-759A (*-759B), and MOV-*-863B (MOV-*-863A) to isolate the equipment and lines.

3. If the failure is a RHR HX, close the component cooling water inlet valve *-746A, (*-746B) and outlet valve *-748A (*-748B), MOV-*-749A (MOV-*-749B) on RHR heat exchanger where failure occurred.

5.3.7 If there is a leak in the RHR heat exchanger bypass line, between valves *-757 C and D and FCV-*-605.

1. Close valves *-757C and D and FCV-*-605.

2. RHR heat exchanger bypass line is now out of service.

CAUTION: The position of valves *-748A and B is preset as determined by the CCW System flow testing. If the position of these valves is changed, the Technical Department Supervisor shall be notified immediately.

3. Cooldown rate must now be controlled by throttling the component cooling water discharge valves *-748A and B at the RHR heat exchangers. Caution must be used so as not to reduce CC flow to a point that CC will generate steam in RHR HX.

NOTE: MOV-*-872 has been set at 2 1/2 inches valve travel to maintain the required differential pressure across the pumps during single pump operation when utilizing the alternate RHR line. The pump discharge valves (*-754A or B) should not require throttling when using the alternate RHR line. If valve throttling during single pump operation is required the Technical Department is to be notified to investigate the throttle position of MOV-*-872.

4. If FCV-*-605 fails to hold, the alternate RHR line must be used via MOV-*-872 with MOV-*-759A and B (normally locked open) closed.

5.3.8 If a sump pump fails in RHR A pump room sump, B pump room sump or heat exchanger room sump, and room is flooding:

1. If possible, locate source of leak and stop it.

2. Obtain portable sump pump, route its discharge to the waste holdup tank, via nearest floor drain and pump out the flooded area.

6.0 References:

6.1 Technical Specifications Section 3.4.

6.2 |Westinghouse System Description FPL-200/C/4, Aux. Coolant System, RHR.

6.3 FSAR, Figures 6.2-1 and 9.3-2.

6.4 3/4-OP-041.1, Reactor Coolant Pump

6.5 JPES-PTP-85-076, Turkey Point Plant Alternate Low Head Safety Injection Line Isolation Valve, *-872, January 29, 1985.

7.0 Records, Reports and Notification:

7.1 The date, time and section started and the date, time and section completed shall be logged in the Reactor Control Operator (RCO) and the Plant Supervisor-Nuclear (PSN) logbook. Also, any problems encountered while performing the procedure should be logged, i.e., malfunctioning equipment, delays due to a change in plant conditions, etc.

7.2 Completed copies of the below listed section(s) enclosure(s), and/or attachment(s) constitute Quality Assurance Records, and therefore, shall be transmitted to Document Control and be retained for a minimum of 5 years in accordance with Quality Assurance Record Requirements:

None

7.3 Ensure all notifications are made in accordance with the following procedures:

7.3.1 Reporting Reportable Events to NRC

7.3.2 Reports Required Technical Specifications and 10 CFR

7.3.3 Notification of Significant Event to NRC|