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NIAGARA MOHAWK POWER CORPORATION

NINE MILE POINT NUCLEAR STATION UNIT 2

OPERATING PROCEDURES

N2-OP-29

REVISION 06

REACTOR RECIRCULATION SYSTEM

FOR INFORMATION ONLY

Approved By:
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Date

THIS PROCEDURE IS A GENERAL REWRITE

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NOT TO BE USED AFTER November 1991
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FSK 25.1A through E Reactor Recirculation System

PID 29A through D Reactor Recirculation System

3.2 Electrical Diagram

ESK 5RCS, 6RCS and 7RCS Series, Reactor Recirculation System

GE Elementary Diagram; Reactor Recirculation System; 761E791TY Sheets 1-30

3.3 Instruction Manuals

GEK 83310 Vol. III, Part 1, Recirculation Flow Control System and Recirculation Flow Control Equipment

Type RV Reactor Recirculation Pump, Bingham Williamette Co.; GE VPF 3726-49-3

GE Low Frequency Motor Generator Vendor Manual; GE VPF 5670-116-2

GEK-83313A Recirculation Flow Control System

24-inch Type SS-15- Vee-Ball Valve Assembly. GE VPF 3662-400-3

EDC2E00591B (N20367) Vendor Manual

EDC2M10279 Reactor Recirc. Pumps Vibration Monitoring Guideline | TCN-64

4.0 Commitments

None

B. SYSTEM DESCRIPTION

The reactor recirculation system (RCS) provides forced circulation of water through the reactor core. In conjunction with the flow control system, it provides a means of controlling reactor power over a limited range without adjusting control rods.

The reactor recirculation system provides the driving force to circulate coolant through the reactor core. The system consists of two parallel loops external to the reactor vessel and jet pumps internal to the reactor vessel.

Each external loop has a recirculation pump, a hydraulically operated flow control valve, a motor operated suction valve, a motor operated discharge valve, instrumentation and connecting piping to the reactor vessel.

B. SYSTEM DESCRIPTION (Cont)

The reactor recirculation pump speed is determined by the arrangement of breakers supplying the RCS pump drive motor with power.

When the pump is running at 100% speed power is supplied to the drive motor from the 13.8 KV bus. When the pump is running at 25% speed power to the drive motor is supplied from the Low Frequency Motor Generator (LFMG) set. The LFMG set drive motor receives its power from the 4.16 KV bus.

The RCS pump control logic will provide either full or reduced pump speed, depending on conditions prevailing in the reactor vessel. The RCS pumps are operated in high speed when reactor power levels are greater than 40% and operated at low speed at reactor power levels below 40%.

The reactor recirculation flow rate is varied by throttling the pump discharge with the hydraulically operated flow control valve.

Each recirculation flow control valve has an individual Manual/Automatic flow control station. This M/A flow controller allows adjustment of valve position to meet a demanded change in loop flow and consequently a change in core flow and core power.

Each recirc. flow control valve hydraulic actuator is provided hydraulic fluid (Fyrquel EHC) at a nominal operating pressure of 1900 psi from a hydraulic power unit (HPU). Each HPU consists of two identical, redundant subloops for generation and control of hydraulic flow and pressure. The subloops are interconnected at the following places:

Open and close actuating headers

Shuttle Valve (pilot header)

Common reservoir and drain header

Each HPU subloop consists of a variable vane positive displacement pump, oil/air heat exchanger, temperature and pressure control valves, and solenoid and hydraulic control valves.

Normally, only one subloop of each HPU will be running, or pressurized, at a time. In the event of a hydraulic malfunction in the subloop controlling the actuating cylinder, the subloop will shutdown and the other subloop will automatically startup and resume control. If a malfunction then occurs in this subloop it will automatically shutdown and the recirc. flow control valve motion will be inhibited.

Remote manual control is provided by the flow control valve M/A flow controller. At each individual M/A station, two speed manual control is available.

B. SYSTEM DESCRIPTION (Cont)

Remote manual ganged control is available with the Neutron Flux Controller in manual and each individual M/A controller in automatic. Two speed control is also available from this controller.

Normal operating flow control will be in the ganged manual; control with the Master Controller in manual and each flow control valve M/A station in automatic.

Each recirculation pump has two seal monitoring systems. One is a seal cooling monitoring system which ensures that recommended seal operating temperatures are not exceeded. The other system monitors seal performance and allow for seal condition evaluation.

Purge water to the RCS pump seal is supplied by control rod drive (CRD) pumps. An interlock is provided on the seal purge staging valve for each loop such that on a loss of both CRD pumps and a trip of a recirculation pump, the seal purge staging valve automatically shuts. This is to prevent possible seal damage in a non-operating loop with no seal purge flow.

Pump & Speed		GE Breaker #	NMP2 Breaker #	2CEC*PNL602 Switch Designation
2RCS-PIA,	15Hz	B35-CB1A	2NNS-SWG011 ACB 11-9	BRKR 1A
	15Hz	B35-CB2A	2NPS-SWG004 ACB 4-1	BRKR 2A
	60Hz	B35-CB3A	2EPS*SWG001 ACB 1-1	BRKR 3A
	60Hz	B35-CB4A	2EPS*SWG002 ACB 2-1	BRKR 4A
	60Hz	B35-CB5A	2NPS-SWG001 ACB 1-6	BRKR 5A
2RCS-PIB,	15Hz	B35-CB1B	2NNS-SWG013 ACB 13-1	BRKR 1B
	15Hz	B35-CB2B	2NPS-SWG005 ACB 5-1	BRKR 2B
	60Hz	B35-CB3B	2EPS*SWG003 ACB 3-1	BRKR 3B
	60Hz	B35-CB4B	2EPS*SWG004 ACB 4-1	BRKR 4B
	60Hz	B35-CB5B	2NPS-SWG003 ACB 3-4	BRKR 5B

C. OPERATING REQUIREMENTS

The following prerequisites shall be satisfied prior to conducting the system startup evolution:

1.0 Systems

1.1 Control Rod Drive (RDS) Hydraulic System in operation per N2-OP-30 to provide seal water flow to each recirculation pump seal assembly.

1.2 Reactor Building Closed Loop Cooling water (CCP) in operation per N2-OP-13 to provide cooling water to the motor coolers and seals of the reactor recirculation pump.

C. OPERATING REQUIREMENTS (Cont)

1.3 Flow control valves' Hydraulic Power Units in operation per section E of this procedure.

1.4 Normal AC High Voltage Distribution in operation per N2-OP-71 to supply electric power to system motors, instrumentation and associated control logic.

1.5 Normal DC distribution in operation per N2-OP-73A to supply circuit breaker control power.

1.6 Process Computer in operation per N2-OP-91A to enable monitoring of system performance from the control room.

2.0 Other

2.1 System electrical lineup completed per Table 2.

2.2 System valve lineup completed per Table 1.

2.3 The temperature differential between the core exit coolant (from reactor pressure vessel saturation temperature) and the bottom head drain line coolant is less than 145°F.

2.4 The temperature differential between the reactor coolant within the idle loop to be started up and the coolant in the reactor vessel is less than 50°F.

2.5 The temperature differential between the reactor coolant within the idle loop and the operating loop is less than 50°F.

D. PRECAUTIONS/LIMITATIONS

1.0 Motor Start Limitations

a. Two starts in succession from ambient temperature or one start from rated temperature. For subsequent starts allow 15 minutes running time or 45 minutes idle time.

2.0 Monitor the following reactor recirculation pump/motor parameters:

2.1 Motor amps should not exceed 341 amps continuous.

2.2 Motor winding temperatures should not exceed 248°F continuous or 266°F intermittent.

2.3 Motor bearing temperature should not exceed 194°F continuous.

D. PRECAUTIONS/LIMITATIONS (Cont)

3.0 For two-pump operation, the recirculation loop flow (as read on meters at 2CEC*PNL602 in lbs/hrx10^6) mismatch must be maintained within:

a. 5% of rated core flow (5.4x10^6lbs/hr) with effective core flow greater than or equal to 70% of rated core flow (as read at recorder on 2CEC*PNL603).

b. 10% of rated core flow (10.8x10^6lbs/hr) with effective core flow less than 70% rated core flow (as read at recorder on 2CEC*PNL603).

Effective core flow shall be the core flow that would result if both recirculation loop flows were assumed to be at the smaller value of the two loop flows.

4.0 Avoid operation of the recirculation pumps with air in the seal cavities by thoroughly venting the seal cavities whenever seal maintenance has been performed or whenever an isolated loop is returned to service. It is particularly important to avoid operation with air in the cavities at low reactor pressure.

5.0 The following conditions will result in the trip of a reactor recirculation pump from 60 Hz to off:

a. Suction valves 2RCS*MOV10A (B) not full open.

b. Discharge valve 2RCS*MOV18A (B) not full open.

c. Pump motor lock out relay trip.

d. Reactor vessel Level 2 (108.8") Redundant Reactivity Control (RRCS) trip.

e. High speed control switch, BRKR 5A (5B) in Pull-To-Lock.

f. High speed control switch(s): BRKR 3A or BRKR 3B or BRKR 4A or BRKR 4B in pull-to-lock.

g. Pump motor phase overcurrent protection tripped.

h. Incomplete sequence relay activated.

i. Loss of control power during start sequence.

6.0 The following conditions will result in the trip of a reactor recirculation pump from 15 Hz to off:

a. Suction valves 2RCS*MOV10A (B) not full open.

b. Discharge valves 2RCS*MOV18A (B) not full open.

c. Pump motor lockout relay trip.

d. Low Frequency Motor Generator (LFMG) generator lockout relay trip.

e. Loss of 240 VAC to LFMG voltage regulator.

f. Low speed control switches BRKR 1A (1B) or BRKR 2A (2B) trip or in Pull-To-Lock.

g. RRCS trip, high RPV pressure (1050 psig) and if the APRM are not downscale after a time delay of 25 seconds.

h. RRCS level 2 (108.8") trip.

7.0 An auto sequence incomplete or loss of control power during speed transfer will result in a trip from both 60 Hz and 15 Hz to off. This trip seals in and prevents further pump starts. The seal in can be reset by taking the respective high speed control switch (BRKR 5A or BRKR 5B) to Pull-To-Lock.

8.0 The following conditions will result in the transfer of a reactor recirculation pump from 60 Hz to 15 Hz:

a. High to low speed transfer (BRKR 5A & 5B simultaneously positioned to LFMG).

b. During a low speed start when pump speed reaches 95%.

c. Main turbine stop valves closure (less than 90% open) or control valve closure (less than 530 psi EHC pressure) when the reactor power is greater than 30%.

d. A differential temperature between the reactor recirculation pump suction and the steam dome less than 10.7°F for 45 seconds. 16425

e. Redundant Reactivity Control System (RRCS) high reactor pressure 1050 psig.

f. Low water level 159.3" (level 3).

g. Total feed flow less than 3.35 million lb/hr (Approx. 24% power) for 15 seconds.

9.0 To prevent exceeding reactor vessel and recirculation system thermal shock interlocks when starting the recirculation pump, verify the following temperatures and flow rates within 15 minutes prior to starting the idle recirculation pump and enter the applicable temperature differences and time they were checked in the CSO log (T.S. 4.4.1.4 and 4.4.1.1.2)

9.0 (Cont)

a. Steam dome to reactor vessel bottom head drain delta T is less then 145°F.

1. Steam dome temperature can be determined either by reactor pressure (greater than 212°F) using steam table, Computer Point RCSTA102, or reactor shell temperatures (below 212°F) at P614.

2. Vessel bottom drain temperature can be determined by Computer Point RCSTA101 (if greater than 212°F) or WCS bottom head drain temperature at P602.

b. Steam dome to idle loop delta T less than 50°F (Both loops idle).

1. Steam dome temperature can be determined either by reactor pressure (greater than 212°F) using steam table, computer point RCSTA102, or reactor shell temperature (below 212°F) at P614.

2. Idle loop temperature can be determined from recirculation pump suction temperature at P602.

c. Operating loop to idle loop delta T less than 50°F.

1. Recirculation suction temperatures can be determined from suction temperature recorder at P602 or from WCS suction temperature meter (Pt. 1) at P602 (selected to affected loop only).

d. Operating loop flow rate is less than or equal to 50% of rated jet pump loop flow (27.125 mlb/hr sum jet pump flow indicator on P602). To ensure this requirement is met, it will be necessary to have the operating pump running in slow speed prior to starting the idle pump.

e. When both recirculation pumps are idle, ΔT between reactor coolant (use WCS inlet or RHS Hx inlet) and idle loop temperature is <50°F.

10.0 Operation of the Reactor Recirculation System shall be within the limitations of the "Power-to-Flow Operating Map," Figure 1, or Figure 2 of N2-OP-101D.

11.0 If both CRD seal purge injection and cooling flow (CCP) are lost when the pump temperature is greater than 200°F, the pump must be tripped within 90 seconds.

12.0 Fyrquel EHC becomes corrosive when mixed with water. If splashed in the eyes, flush with copious amounts of water for at least 15 minutes and seek medical attention.

13.0 Prevent spillage of Fyrquel EHC. If a spill or leak develops, immediately wipe it up with a dry rag and take action to correct the problem.

14.0 Plant operation at low recirc. flow and near the 100% rod line can result in increased APRM and LPRM noise levels. (Refer to Tech: Spec. Fig. 3.4.1.1-1 limitation)

15.0 Do not place recirc. flow control in the Flux Auto Mode until greater than 65% power.

16.0 Do not operate recirc. pump when a RHR pump is operating in the SDC mode in the same loop.

17.0 Cycling of recirc flow control valve to stop (0%) in fast speed may cause fluctuation in hydraulic line isolation valve due to hydraulic pressure transients at extent of ram travel.

18.0 The Flux Manual Mode of the recirc. control system should be avoided whenever possible to minimize degradation of the Flow Control Valves (FCVs). Bi-stable recirculation flow will cause cycling of the FCVs in this mode. Master manual with the flux estimator in service is the preferred mode of operation at higher powers. This mode of operation will help dampen the effects of bi-stable recirc. flow on core thermal power.

19.0 When isolating Reactor Water sample flow using 2RCS*SOV104 or 2RCS*SOV105, the Chemistry Department should be notified to ensure that the Reactor Water GEZIP is secured and that alternate Reactor Water Conductivity Samples are obtained per Technical Specifications.

20.0 Applicable radiological precautions shall be observed, radiation protection shall be contacted for guidance, as required. All ALARA practices shall be observed to minimize personnel exposure and spread of contamination.

21.0 Prior to shifting recirculation flow control from Flux Manual (Loop Auto) to Flux Auto verify that either APRM-C or E is unbypassed and operating properly.

22.0 Total drive flow (RHR Shutdown Cooling and Recirculation Drive Flow) through the jet pumps shall not exceed 5700 gpm when incore instrumentation is not surrounded by the fuel or blade guides (all four corners).

23.0 IF pump is being started in accordance with refuel tech spec requirements and installed vibration instrumentation is unavailable THEN notify I/C to perform baseline vibration data collection.

24.0 If the RWCU influent sample becomes unavailable, then the manual isolation for the RCS sample line (2RCS-V145) must be opened and Chemistry must be notified to line up the sample system for continuous sample from the RCS System. TCN-68

25.0 If the Recirc sample is auto isolated while in service, the manual isolation valve, 2RCS-V145 must be shut prior to reopening the SOVs.

E. START-UP PROCEDURE

1.0 Hydraulic Power Unit Startup

NOTE: The startup procedure below is used whenever the equipment has been idle for 2 or more hours or if controls on the HPU have been repositioned since the last shut down. If neither applies, position the RETURN FILTER ISOL VALVES 2011A(B) and 2011C(D) to NORMAL and enter the startup procedure at Step 1.12. TCN-70

NOTE: The Loop A(B) HYDR FLUID OUTSIDE ISOL VALVES may be closed, to prevent control valve drift during an HPU/Control System failure. They can be left closed until after the applicable HPU is restored to operation. TCN-7

1.1 Verify the following at the HPU:

a. System valve lineup completed per Table I.

b. System electrical lineup completed per Table II.

c. Reservoir level between LOW (70 gal.) and FULL (80 gal.) mark on the tank sightglass (to fill see paragraph F.1.0).

d. Reservoir fluid temperature between 40° and 150°F.

e. Louvers on both heat exchangers fully open.

f. Both SUCTION LINE ISOLATION VALVE controls in "NORMAL" position, handle parallel to flow axis.

g. Both RETURN FILTER ISOL VALVES in the closed position, handle perpendicular to flow axis. TCN-

h. Both OPEN LINE ISOLATION VALVE controls in "NORMAL" position, handle vertical.

i. Both CLOSE LINE ISOLATION VALVE controls in "NORMAL" position, handle vertical.

j. Both PILOT LINE ISOLATION VALVE controls in "NORMAL" position, handle offset from horizontal.

1.2 Verify the following indicators are illuminated at the Hydraulic Power Unit Status Panel (2CEC-PNL 634).

a. Subloop 1:

1. Pump/Fan Mtr. Stop.
2. Maintenance.

E. START-UP PROCEDURE (Cont)

1.2 (Cont)

b. Subloop 2:

1. Pump/Fan Mtr. Stop.
2. Maintenance.

c. Either - Subloops LEAD light is illuminated.

1.3 If reservoir temperature is less than 70°F, set RELIEF VALVE (1-8 or 2-8) on the sub loop to be started to minimum prior to starting the pump. Set the relief valve (1-8 or 2-8) to 500 psi after the pump is started, and reset it to 1900 psi after temperature increases above 70°F. (Counterclockwise rotation lowers relief valve setting pressure - always lock after setting.)

NOTE: If during the performance of steps 1.4 and 1.5 temperature increases to 145° before stabilizing, pump should be stopped to allow reservoir to cool to 140°F.

1.4 Momentarily depress either subloops PUMP/FAN MTR Run pushbutton and verify the following:

a. PUMP/FAN MTR Stop light extinguishes.

b. PUMP/FAN MTR RUN light illuminates.

c. PRESSURIZED light illuminates if relief valve (1-8 or 2-8) setting is undisturbed.

d. Local pressure gauge indicates 1850-1950 psi if relief valve (1-8 or 2-8) settings were not disturbed.

1.5 Allow pump to operate for a minimum of 30 minutes or until reservoir temperature stabilizes. After temperature stabilizes, verify that:

a. Subloop pressure 1850-1950 psi.

b. Reservoir temperature 120-140°F.

c. PRESSURIZED light illuminated.

d. Sub loop pump suction vacuum indicator does not show red (may be reset if necessary by depressing the button on the vacuum indicator at the HPU).

e. PRESSURE FILTER light is extinguished.

f. No leakage occurs.

E. START-UP PROCEDURE (Cont)

1.6 Slowly open the operating subloop Return Filter Isol Valve 2011A(B) or 2011C(D) and verify that: TCN-70

a. Return filter pressure indicator shows less than 50 psi.

b. RETURN LINE FILTER light remains extinguished.

1.7 Secure the operating subloop by depressing the PUMP/FAN MTR STOP pushbutton and verify:

a. Pressure decreases slowly to 1500-1725 psi then quickly to zero.

b. PUMP/FAN MTR STOP light illuminated.

c. PUMP/FAN MTR RUN light extinguishes.

d. PRESSURIZED light extinguishes (time delay is normal).

1.8 Start the other subloop by depressing the PUMP/FAN MTR RUN pushbutton and verify the following:

a. PUMP/FAN MTR RUN light illuminates.

b. PUMP/FAN STOP light extinguishes.

c. PRESSURIZED light illuminates.

d. PRESSURE FILTER light remains extinguished or if it illuminates, extinguishes within several minutes.

e. Pump suction vacuum indicator does not show red; it may be reset by depressing the button on top of the indicator if necessary.

f. Pressure gauge indicates 1850-1950 psi.

g. No leakage occurs.

1.9 Allow pump to operate until reservoir temperature stabilizes at 120-140°F.

1.10 Slowly open the operating subloop Return Filter Isol Valve 2011A(B) or 2011C(D) and verify: TCN-70

a. RETURN LINE FILTER light remains extinguished.

b. Pressure indicator shows less than 50 psi on return line filter.

E. START-UP PROCEDURE (Cont)

1.11 Depress the operating subloop PUMP/FAN MTR STOP pushbutton and verify:

a. PUMP/FAN MTR STOP light illuminates.

b. PUMP/FAN MTR RUN light extinguishes.

c. Pressure decreases slowly to 1500-1725 psi then quickly to zero.

d. PRESSURIZED light extinguishes.

1.12 Momentarily depress both READY pushbuttons and verify:

NOTE: Prior to placing HPU in READY mode it may be necessary to reset the HPU excessive dx/dt or position feedback signal (R/C/L) at P634 Rack 1 for HPUA and Rack 2 for HPUB. Red indicating lights adjacent to the reset pushbuttons indicate the need to be reset. TCN-70

a. READY light illuminates.

b. MAINTENANCE light extinguishes.

c. Annunciator 601103(104) "RECIRC FCV A(B) HYDRAULICS INOPERABLE" clears. TCN-70

1.13 Decide which subloop is to control actuator and depress its PUMP/FAN MTR RUN pushbutton and verify that:

a. PUMP/FAN MTR STOP light extinguishes.

b. PUMP/FAN MTR RUN light illuminates.

c. The selected loop LEAD light is illuminated (depress if necessary) and other loop LEAD light is extinguished.

d. PRESSURIZED light illuminates.

e. Annunciator 601101(102) RECIRC FCV A(B) hydraulics inoperable clears. TCN-70

1.14 Using the LOOP FLOW CONTROL M/A Station at P602 reduce SERVO ERROR to ZERO.

E. START-UP PROCEDURE (Cont'd)

1.15 At P602, verify:

a. Annunciator 602111(112), "RECIRC FCV A(B) HYDRAULICS MAINT REQ'D" cleared.

b. Annunciator 602103(104), "RECIRC FCV A(B) BACK UP HYDR INOPERABLE" cleared.

c. Annunciator 602127(128), "DRYWELL HIGH PRESSURE SWITCH A(B) TEST POSITION" cleared.

d. Annunciator 602133(134), "DRYWELL HIGH PRESSURE SYSTEM A(B) INTERLOCK" cleared.

e. Annunciator 602105(106) "RECIRC FCV A(B) MOTION INHIBIT", in alarm condition.

1.16 Depress the applicable MOTION INHIBIT (Reset) pushbutton at P602 and verify:

a. LEAD sub loop OPERATIONAL light illuminated

b. Flow CONTROL VALVE "A(B)" MOTION INHIBIT annunciator extinguishes.

1.16.1 Open Loop A(B) HYDR FLUID OUTSIDE ISOL VLVES if closed. TCN-70

1.17 Equipment is now operational and will control the actuator in response to a demand signal.

2.0 Placing the Seal Purge System in Service and Pump Seal Vent

NOTE: Recirculation pump seal vent is required whenever seal maintenance has been performed or whenever an isolated loop is returned to service.

* *

CAUTION

Do not place the seal purge in service if the recirculation pump is isolated.

* *

2.1 Verify the Control Rod Drive Pump is operating.

2.2 Verify the recirculation pump suction 2RCS*MOV10A(B) or 2RCS*MOV18A(B) is open on P602.

2.3 Remove pipe cap downstream of 2RCS*HYV17A(B) bonnet vent and connect a temporary hose to the floor drain. Vent the recirculation loop by opening 2RCS*V150A(B) and 2RCS*V151A(B).

2.4 Shut 2RCS*V150A(B), 2RCS*V151A(B), remove the temporary hose and reinstall pipe cap after venting.

2.5 Remove pipe cap and install a temporary hose on 2RCS*MOV10A(B) bonnet vent valve. Open 2RCS*V131A(B) and 2RCS*V130A(B).

2.6 Shut 2RCS*V131A(B), 2RCS*V130A(B), remove the temporary hose and reinstall pipe cap after venting.

2.7 Remove pipe cap and install a temporary hose on 2RCS*MOV18A(B) bonnet vent valve. Open 2RCS*V140A(B) and 2RCS*V141A(B).

2.8 Shut 2RCS*V140A(B), 2RCS*V141A(B), remove the temporary hose and reinstall pipe cap after venting.

2.9 Open or verify open 2RCS-V58A(B), RCS-FCV2A(B) isolation, by the RDS flow control station at 261' reactor building.

2.10 Open 2RCS-V57A(B), seal purge line isolation, by the RDS flow control station at 261' reactor building.

2.10.1 If recirc loop is isolated per Section H.1.0 then clear yellow holdout for jumper installed for 2RCS*SOV90A(B). Independent Verification of jumper and tag removal is required. SSS shall sign on holdout sheet to authorize jumper and tag removal. TCN-67

2.11 Verify the seal staging flow is between 3 to 5 gpm as indicated on RCS-FCV2A(B). Adjust the RCS-FCV2A(B) as necessary.

2.12 Verify 2RCS-RV46A(B) is not lifted by observing no water is coming out at the end of piping.

2.13 Route the water to the floor drain and vent the seal purge line by opening 2RCS*V77A(B) and 2RCS*V78A(B). Shut the valves and reinstall the plug when venting is completed.

2.14 Vent the recirculation pump seal inside the drywell as follows:

a. For A Pump

1. Remove the pipe cap on 2RCS-V92A.

2. Shut 2RCS-V91A and open 2RCS-V92A until no air bubble is observed.

3. Shut 2RCS-V92A and reopen 2RCS-V91A.

4. Reinstall pipe cap on 2RCS-V92A.

E. START-UP PROCEDURE (Cont)

2.14 (Cont)

b. For B Pump

1. Shut 2RCS-V98B and open 2RCS-V92B and 2RCS-V91B until no air bubble is observed.

2. Shut 2RCS-V91B and 2RCS-V92B.

3. Open 2RCS-V98B.

2.15 If pump seal is replaced, perform N2-PM-@03 to verify the seals are installed properly and meet the Bingham Pump requirement.

3.0 Startup From No Flow (Low Speed Operation)

3.1 Observe Precaution/Limitation 9.0 temperature requirement prior to starting the recirculation pump. Insure that the required log entries are made as per TS 4.4.1.4.

3.2 Place the seal purge system in service and pump seal vent as required per step E.2.0 of this procedure.

3.3 Verify the following interlocks for the Reactor Recirculation System Controls on P602 for the loops to be started are reset:

a. VESSEL LOW LEVEL INTK A/B (S111 A/B)

b. VLV MOTION INHIBIT A/B (S109 A/B)

c. Recirculation loop Flow Controller M/A Station A/B in M(Manual) with flow control valve 2RCS*HYV17A/B at minimum position. TCN-58

3.4 Verify pump motor and MG set generator lockout relays reset locally at LFMG control panel.

3.5 If RHR is in shutdown cooling operation for the loop to be started, secure the RHR pump per N2-OP-31.

a. IF pump is being started in accordance with refuel tech spec requirements and installed vibration instrumentation is unavailable THEN notify I/C to perform baseline vibration data collection. TCN-57

3.6 Place the following reactor recirculation pump control switches in the CLOSE position:

a. 2RCS*P1A BRKR 3A
BRKR 4A

b. 2RCS*P1B BRKR 3B
BRKR 4B

3.7 Reactor Recirculation Valves:

a. 2RCS*MOV10 A/B Suction valve OPEN

b. 2RCS*MOV18 A/B Discharge valve OPEN

3.8 Verify Breakers 2A and 2B are open and control switches are in "NORMAL."

3.9 Verify seal cavity temperatures are less than 185°F at P614.

3.10 Low speed operating sequence as follows:

a. Initiate recirc. pumps vibration monitoring program gerom data collecting mode and start recorders as follows:

1. Using any phone and dial extension 2636.

2. Enter access code "123".

3. Push "1" to turn the computer power OFF. After several seconds proceed. TCN-64

4. Push "2" to turn computer power ON.

5. Hang up the phone. The gerom program will start taking vibration raw data and records it on the PC hard disc at a preset interval. Each set of data requires about 5 to 6 minutes.

b. Notify I&C to start vibration monitoring recorders 2RCS-NBR85A/86A and/or 2RCS-NBR 85B/86B at 2RCS-PNL100.

c. Place the high speed power supply BRKR 5A(B) control switch in the START position and verify BRKR 5A(B) closes.

d. Observe that the LFMG 1A(B) drive motor BRKR 1A(B) closes.

e. Observe the starting current in rush and verify that it decreases as pump speed increases.

f. At 95% of recirculation pump rated speed, the high speed supply BRKR 5A(B) trips and the pump begins to coast down.

g. When the pump speed has decreased to between 20 and 26% of rated and LFMG 1A(B) is at rated output voltage, the LFMG 1A(B) output BRKR 2A(B) closes to energize the recirculation pump motor.

E. START-UP PROCEDURE (Cont)

3.11 Open recirculation FLOW CONTROL VALVES 2RCS*HYV17 A/B by manually increasing the respective loop flow controller output signal to 100%; maximum valve position is about 85% indicated or less than 5700 gpm drive flow during refueling outage when incore instruments are not surrounded by fuel and/or blade guides.

RECIRC LOOP A FLOW CONTROL (K603A)

RECIRC LOOP B FLOW CONTROL (K603B)

3.12 Repeat Steps 3.1 to 3.11 to start second recirculation pump.

3.13 Monitor recirculation pump/LFMG parameters.

a. LFMG motor rated current is about 73 amps.

b. LFMG generator set voltage 1250 V, amps less than 98.5 (continuous load)

c. Recirc pump speed 445 rpm.

4.0 <u>Transfer of Reactor Recirculation Pump Speed From Low (15 Hz) to High Speed (60 Hz)</u>

<u>NOTE</u>: Low to high speed transfer are to be performed at about 35% to 40% power as directed by N2-OP-101A.

4.1 Verify the following prerequisites at P602:

a. BRKR3A(B) and BRKR4A(B) are closed by the breaker red indication lights.

b. Both RECIRC LOOP A and RECIRC LOOP B Flow Control Stations at P602 are in the M (Manual) position.

c. Feedwater flow greater than 3.35 million pounds per hour (24% of rated), and FW FL < 30% interlock white light is off. (Depress the pushbutton to reset if required) TCN- 66

d. Differential temperature between recirculation pump suction and steam dome temperature is greater than 10.7°F, and DOME/SUCT LOW DIFF TEMP interlock white light is off. (Depress the pushbutton to reset if required)

e. Reactor water level is between 178.3 inches and 187.3 inches, and LEVEL 3 interlock white light is off. (Depress the pushbutton to reset if required)

f. Reactor is at about 35% to 40% thermal power and is below 80% Rod Line. Consult with Reactor Analyst as required.

g. Verify APRMs indicate less than 50%.

4.2 Close Loop A (2RCS*HYV17A) flow control valve to minimum position, about 14% to 17% indicated open on P602 by manually decreasing the output of the recirculation loop flow controller. TCN-82

4.3 Place the high speed control switch (BRKR 5A) for pump 2RCS*P1A to START and observe the following:

a. BRKR 2A trips.

b. BRKR 1A trips.

c. Pump speed decreases to 20% of rated speed (350 rpm) and BRKR 5A closes. (3 seconds time delay)

d. This step has been deleted. TCN-32

e. Pump accelerates to 100% rated speed (1782 rpm).

4.4 Close Loop B (2RCS*HYV17B) flow control valve to minimum position (about 14% to 17% indicated open on P602). Place the high speed control switch (BRKR 5B) for 2RCS*P1B to start and observe the following: TCN-62

a. BRKR 2B trips.

b. BRKR 1B trips.

c. Pump speed decreases to 20% of rated speed (350 rpm) and BRKR 5B closes. (3 seconds time delay)

d. This step has been deleted. TCN-82

e. Pump accelerates to 100% rated speed (1782 rpm).

4.5 If recirculation flow control valve is stuck, increase hydraulic power unit pressure to 2100 psig maximum by adjusting relief valve and open the flow control valve.

Once the recirculation flow control valve is operational, return hydraulic power unit pressure to between 1850 and 1950 psig.

4.6 Monitor operation of the Reactor Recirculation System at minimum flow with the recirculation pumps on the fast speed power supply (See precautions for motor parameters and allowed flow mismatch between loops.)

4.7 Monitor Recirc Pump vibrations per Section E.3.10.a and using frequency per Note CC of N2-OSP-LOG-S@ALL or S001 if Flow Control Valve is less than 15% open. TCN-65

4.8 Control Reactor recirculation flow using the LOOP FLOW CONTROL M/A Stations.

E. START-UP PROCEDURE (Cont)

5.0 Flow Control Transfer from Loop Manual to Loop Auto (Flux Manual)

* *

CAUTION

Loop Auto Mode should not be used for extender periods of time. See Section D.18.0.

* *

Reactor recirculation system flow control system transfer to Loop Auto (flux manual) control from loop manual control may be conducted anytime following the shift of recirculation pumps to high speed operation when fuel is not being preconditioned. Consult with Reactor Analyst prior to placing control system in LOOP AUTO.

If desired to operate recirc. flow control system in Flux Manual proceed as follows:

5.1 Verify the Reactor Recirculation and Flow Control System Configuration is established as follows:

a. Both reactor recirculation pumps in operation at High Speed. (60Hz)

b. LOOP A FLOW CONTROL and LOOP B FLOW CONTROL in operation in the MANUAL mode.

c. Both Flow Control valves (2RCS*HYV17A and 2RCS*HYV17B) at about same position

d. Recirc Flux Control in MANUAL mode.

NOTE: Manual adjustment of Loop Manual Controller may be required to perform steps 5.2 and 5.3 below.

5.2 Adjust Recirc Flux Control output signal using the controller INCREASE/DECREASE positions until the % FLOW ERROR meters for LOOP A and LOOP B are zeroed.

5.3 Adjust Recirc LOOP A and LOOP B FLOW CONTROL output signals using the controller INCREASE/DECREASE positioners until the % M/A ERROR meters for LOOP A and B are zeroed.

5.4 Depress the AUTO pushbutton of the Recirc LOOP A FLOW CONTROL to transfer the positioning control of Loop A FLOW CONTROL valve (2RCS*HYV17A) to the Flux Controller.

5.5 Depress the AUTO pushbutton of the RECIRC LOOP B FLOW CONTROL to transfer the positioning control of LOOP B FLOW CONTROL valve (2RCS*HYV17B) to the Flux Controller.

5.6 Both loop flow control valves are now in gang control via manual operation of the Flux controller in conjunction with the loop flow feedback circuit.

5.7 Power level changes shall be within the limitations of the "Power-to-Flow Map". N2-OP-101D, Figure 1.

6.0 Flow Control Transfer from LOOP AUTO to FLUX AUTO (MASTER MANUAL)

NOTE: The recirc. flow control system should be operated in FLUX AUTO when fuel is not being preconditioned. Consult with Reactor Analyst prior to placing control system in FLUX AUTO.

* *

CAUTION

Do not place recirc flow control in flux auto when reactor power is less than 65%.

* *

6.1 Place the flux estimator bypass switch (S122) in the OPERATIONAL position, (not bypassed). The white light above the switch should be on.

NOTE: With recirc. flow control in FLUX AUTO the flux estimator should not be placed in the bypass position. If the flux estimator is not available, or malfunctions, the system should be returned to FLUX MANUAL or LOOP MANUAL.

6.2 Depress then release the flux estimator alarm reset pushbutton on P602. Verify the flux estimator FAILURE and NEEDS MAINTENANCE lights are not lit.

6.3 Verify the flux estimator filter select switch (H13-P634 rack 2 in the Control Room) is in the Hi-P position or place in Lo-P position if plant will stay at less than 75% rod line or during test.

6.4 Zero the flux error meter by operating the manual control lever on the MASTER M/A station.

6.5 Verify APRM-C or E is unbypassed and operating properly.

6.6 Depress A (auto) pushbutton on the FLUX M/A station. Both loops are now being controlled in manual from the MASTER M/A station in conjunction with the flux feedback circuit.

F. NORMAL OPERATION

1.0 Filling the HPU Reservoir

* *

CAUTION

Fyrquel EHC becomes corrosive when mixed with water. If splashed in the eyes, flush with copious amounts of water for at least 15 minutes and seek medical attention. Prevent spillage of Fyrquel EHC. If a spill or leak develops, immediately wipe it up with a dry rag and take action to correct the problem.

* *

1.1 Verify the reservoir breather (C-38) is open to atmosphere.

1.2 Verify the drain valve (C-28) is closed and its outlet plugged.

NOTE: Only Fyrquel EHC fluid shall be used.

1.3 Assemble transfer pump for filling.

1.4 Thoroughly clean and dry the top of the fluid drum and transfer pump drum probe using only clean lint free rags and chloride free solvents.

1.5 Insert drum probe in drum.

1.6 Pump and discard 2 to 3 gallons through the transfer pump while monitoring the filter dirty alarm.

1.7 Connect transfer pump outlet to fill connection of reservoir.

NOTE: Transfer pump dirty filter indication and reservoir level should be monitored continuously during filling. TANK EMPTY light shall extinguish shortly before fluid becomes visible in the sight glass. TANK LOW light shall extinguish when fluid level is approximately at the low level mark on the sight glass.

1.8 Operate the transfer pump as required to fill reservoir to one inch below the "High" mark.

1.9 Disconnect the transfer pump outlet from filling connection and recap or plug both.

1.10 Withdraw and cap drum probe. Return transfer pump to storage area.

F. NORMAL OPERATION (Cont)

2.0 Hydraulic Power Supply - Subloop Transfer

2.1 Verify Sub loop 1 (2) HPU operational and controlling Flow Control Valve.

2.2 Momentarily depress SUB LOOP 2 (1) READY pushbutton if necessary to obtain:

a. SUB LOOP 2 (1) READY light illuminated.

b. SUB LOOP 2 (1) MAINTENANCE light extinguished.

2.3 Momentarily depress Sub Loop 2 (1) PUMP/FAN MTR RUN pushbutton and verify the following Sub Loop 2 (1) indications are illuminated.

a. SUB LOOP 2 (1) FAN MTR RUN light.

b. SUB LOOP 2 (1) PRESSURIZED light.

2.4 Depress Sub Loop 2 (1) LEAD pushbutton and verify the following indications illuminated.

a. SUB LOOP 2 (1) LEAD light.

b. SUB LOOP 2 (1) OPERATIONAL light.

c. SUB LOOP 2 (1) PRESSURIZED light.

d. SUB LOOP 1 (2) PUMP/FAN MTR STOP light.

e. SUB LOOP 1 (2) READY light.

3.0 Restart of a Tripped Recirculation Pump

3.1 Check the annunciators for cause of pump trip and decide whether it should be restarted.

a. Review Precautions/Limitations D.1.0, D.3.0 and D.5.0 through D.8.0 and perform the required surveillance on Precaution/Limitation D.9.0. Insure that the required log entries are made.

3.2 Verify that the pump control switches are lined up for starting sequence and that their breakers are operable.

a. BRKR 3A Closed
b. BRKR 3B Closed
c. BRKR 4A Closed
d. BRKR 4B Closed

F. NORMAL OPERATION (Cont)

3.3 Verify that the Dome/Suct. Lo. Diff. Temp. back lit interlock switch for the affected pump at P602 is off. Depress the back lit switch to determine if the light goes out. If it does, the interlock is clear. If it does not, the pump will not start.

3.4 Verify that annunciator 602213 (214) "RECIRCU PMP 1A (B) MOTOR AUTO TRANSFER NOT COMPLETE" is not lit.

3.5 Verify that control power is available to the high speed control switch(s) BRKR 5A (5B).

a. Green indicating light above the switch is lit.

b. Annunciator windows 602207 (208) "RECIRC PMP 1A (B) LOW SPEED AUTO TRANSFER NOT AVAILABLE" is not lit.

3.6 Verify that annunciator 602131 (602132) "RECIRC PMP 1A (B) MG SET INTERLOCK BYPASSED" is clear.

3.7 Verify that the LFMG sets are available and that the LFMG lockout relays are not in lock out.

3.8 Verify that the pump suction valves are open (2RCS*MOV10A (B)).

3.9 Verify that the pump discharge valves are open (2RCS*MOV18A(B)).

3.10 Verify the idle recirculation loop flow controller M/A station A (B) in manual with the flow control valves 2RCS*HYV 17A (B) at minimum (about 8% to 11% open as indicated on P602).

3.11 Verify the reactor is below the 80% Rod Line. Consult with Reactor Analyst as required.

3.11.a Transfer the running recirc pump to slow speed IAW Sect. G.1.0.

3.12 Verify idle pump seal cavity temperatures are less than 185°F at P614.

3.13 Verify the operating loop rated jet pump flow to less than 50% of rated (27.125 mlb/hr on sum jet pump flow indicator on P602).

NOTE: If the total feedwater flow is less than 24% of rated (3.35 million lbs/hr) the idle loop will start in high speed and trip to 15 Hz, otherwise, it will remain in 60 Hz. This transfer to slow will occur if TOTAL FW LO FLO INTK "A" ("B") RESET remains lit after being depressed. TCN-66

F. NORMAL OPERATION (Cont)

3.14 Start the pump motor by placing the control switch for BKR 5A (5B) to the START position. Monitor the appropriate pump speed indicator. For low speed starts (feedwater flow less than 24% NBR), observe the full speed trip as the pump reaches 95% speed and closure of the low speed breaker as the pump speed approaches 25%. For high power starts (feedwater flow greater than 24% NBR), the pump will accelerate to 100% speed and remain at full speed. TCN-66

3.15 This step has been deleted.

3.16 If the recirculation flow control valve is stuck, increase hydraulic power unit pressure to 2100 psig maximum by adjusting relief valve and open the flow control valve.

3.17 Once the recirculation flow control valve is operational, return hydraulic power unit pressure to between 1850 and 1950 psig.

3.18 Check the Servo error meters on the Flow M/A Station for 0% error.

3.19 Observe temperatures of the pump motor windings and bearing temperature of all components for normal indication.

3.20 Balance the flow between the two loops by adjusting 2RCS*HYV17A (B) as required.

3.21 Verify the following Tech. Spec. are met:
TS 3.4.1.2 Jet Pumps and
TS 3.4.1.3 Recirculation Loop Flow and
TS 3.4.1.1 Recirculation Loops

3.22 Return both recirc pumps to fast speed IAW Sect. E.4.

4.0 Normal Flow Control Valve Operation

NORMAL OPERATION USING M/A FLOW CONTROLLERS will be to increase or decrease recirculation flow according to power demands. This will be accomplished by operating the control lever of the appropriate M/A Station in control. Loop Manual or Master Manual control of the individual FCV M/A station will be the normal mode of operation. See Section D.18.0.

F. NORMAL OPERATION (Cont)

5.0 Operational Checks

During normal operations, MONITOR THE PUMP PERFORMANCE parameters as stated in the following table.

NOTES:

1. If operating parameter exceeds Alert, contact Operations Management to investigate the cause. If the operating parameter has not been decreased below Alert within 72 hours, pump may require shutdown.

2. If operating parameter approaches Danger Limit, immediate Operation Management evaluation is required. Pump shutdown may be required.

3. Alarm response procedure provides required operator actions if the operating parameters are exceeded.

PUMP INSTRUMENTATION PARAMETERS

Description	Normal	Without Injection	Alert	Danger	
Injection fluid inlet pressure, P1	1020 psig ± 50 psig	<1020 psig	N/A	1200 psig.	TCN-64 TCN-65
Upper seal staging pressure P2	510 psig ± 50 psig	Between 255 to 765 psig	<255 psig*** OR >765 psig	<100 psig OR >920 psig	TCN-64
Seal recirculation outlet temp. T1 TE29A(B) RCSTA17(18)	88°F ** AND 115°F*	150°F*	>185°F	N/A	TCN-65
Upper seal fluid outlet temp T3 TE28A(B) RCSTA15(16)	96°F** AND 127°F*	153°F*	>185°F	>200°F	
Cooling water (CCP) design inlet temp	60 - 105°F	60 - 105°F	N/A	110°F	TCN-65
Seal staging design flow Q1	1.3 gpm	1.3 gpm	0.8 gpm LOW 1.6 gpm HI	1.8 gpm	
Seal Heat Exc to lower seal chamber temp T2 TE30A/B RCSTA19(20)	86°F	N/A	>185°F	>200°F	
Seal leakage Q2	<0.3 gpm	0.3 gpm	>0.8 gpm	1.2 gpm	

***Based on injection fluid inlet pressure (P1) of 1020 psig. TCN-65

F. NORMAL OPERATION (Cont)

5.0 (Cont)

PUMP INSTRUMENTATION PARAMETERS (Cont)

Description	Normal	Without Injection	Alert	Danger
Motor frame vibration NBS88A(B) RCSNC03(04)	2 mils**	2 mils**	>3 mils**	>5 mils**
Shaft vibration NBS86A(B) RCSNC03(04)	6 mils **	N/A	>13.5 mils	>15 mils TCN-62

* Expected temperatures at 533°F pumpage temperature, minimum cooling water flow and seals staged.

** At design conditions

G. SHUTDOWN PROCEDURE

1.0 Transfer of Reactor Recirculation Pump Speed From High (60HZ) To Low (15HZ) Speed

1.1 Verify the following at P602:

a. BRK 1A/B control switches in "NORMAL".

b. BRK 2A/B is open ("NORMAL").

c. LFMG generator and pump motor lockout relays reset at LFMG control panel.

NOTE: Recirc Loop Flow Control will automatically be transferred to Loop Flow Manual.

1.2 Simultaneously position both Pump Drive Motor BRKR 5A and BRKR 5B switches to TRANSFER-MG position and observe the following:

a. BKR 5A trips.

b. BKR 5B trips.

c. BKR 1A and BKR 1B close.

d. Pump speed decreases to between 460 and 350 rpm.

e. BKR 2A and BRKR 2B close.

f. Pump speed stabilizes at about 445 rpm.

* *

CAUTION

If in single loop operation, log in the CSO log, the differential temperatures required by T.S. 4.4.1.1.2 within 15 minutes prior to performance of the next step.

* *

1.3 Use the RECIRC LOOP A and LOOP B FLOW CONTROL M/A CONTROLLERS to open flow control valve to maximum open (about 85%).

1.4 Monitor recirculation pump/LFMG parameters.

a. LFMG motor rated current 73 amps.

b. LFMG generator set voltage 1250 V, amps less than 98.5 Amps (continuous load).

2.0 Reactor Recirculation Pump Shutdown

NOTE: It is desirable to maintain forced coolant flow using recirculation pumps during plant shutdown until the loop is placed in shutdown cooling.

2.1 Notify Reactor Analyst, reduce power by inserting rods if necessary. Predict the power flow map region to be entered after one pump trip and take appropriate actions per N2-OP-101D, Sudden Decrease of Core Flow.

2.2 Stop the reactor recirculation pump as follows:

a. Reduce flow for the pump to be tripped by closing 2RCS*HYV17A(B) to approximately 14% to 17% indicated. TCN-62

b. If pump is operating at high speed, open BRKR5A(B) by momentarily placing control switch to stop at P602.

c. If pump is operating at low speed, open BRKR1A(B) by momentarily placing control switch to stop at P602. Verify BRKR2A(B) opens automatically.

d. Observe that the pump coasts down. Verify that pump speed indicates 0 rpm at P602 after coast down.

e. If the pump motor speed fails to reach 0 rpm one minute after pump trip, shut the pump discharge valve 2RCS*MOV18A(B). Reopen 2RCS*MOV18A(B) if necessary five minutes after the valve is fully closed.

2.3 If recirculation loop isolation is required, refer to Section H.1.0.

2.4 Refer to Section H.7.0, Single Loop Operation.

G. SHUTDOWN PROCEDURE (Cont)

3.0 Hydraulic Power Supply - Shutdown

3.1 Momentarily depress either the SHUTDOWN pushbutton at P602 or at P634 to shutdown the HPU.

3.2 Verify the following lights illuminated for BOTH Sub Loops.

a. PUMP/FAN MTR STOP lights.

b. MAINTENANCE lights.

c. FCV MOTION INHIBIT light at P602.

H. OFF NORMAL PROCEDURES

1.0 Recirculation Loop Isolation

* *

CAUTION

CRD seal injection flow should be isolated before recirculation loop isolation to prevent overpressurizing the recirculation pump casing.

* *

If recirculation loop isolation is required, perform the following:

1.1 Verify recirculation pump is shut down.

NOTE: Issuing yellow holdout on jumpers provides for SSS notification, documentation, and Independent Verification to satisfy AP-6.1 Exclusion requirements of Step 1.3.1.

1.2 Issue yellow holdout to SSS for jumpers installed in Step 1.3. Independent Verification of tag placement is required. SSS shall sign holdout sheet authorizing tag placement. TCN-67

1.3 Shut seal staging valve 2RCS*SOV90A(B) by applying jumper.

a. For 2RCS*SOV90A, jumper EE-7 to EE-8 at 13.8 KV switchgear 2NPS-SWG001 Cubicle 1-6.

b. For RCS*SOV90B, jumper EE-7 to EE-8 at 13.8 KV switchgear 2NPS-SWG003 Cubicle 3-4.

1.4 Shut 2WCS*MOV105(104) WCS Suction Isolation.

1.5 Shut 2RCS*MOV18A(B) Recirculation Discharge Isolation.

1.6 Shut CRD seal injection valve 2RCS-V57A(B).

1.7 Shut 2RCS*MOV10A(B) Recirculation Suction to isolate the pump.

2.0 Recirculation Pump Trip

2.1 For one recirculation pump trip:

a. If reactor scram occurs:

1. Perform the scram recovery per N2-OP-101C, Section H.

2. Determine the cause for the recirc. pump trip and consider restarting the pump per Section F.3.0.

b. If reactor does not scram:

NOTE: It takes about three hours for I&C technician to adjust APRM Scram and Rod Block setpoint for single loop operation. I&C Department should be notified immediately after pump trip.

1. If a single pump trip results in natural circulation (i.e. single pump trip from single loop operation) while the plant is in the RUN mode, immediately place the mode switch in SHUTDOWN. See N2-OP-101C for scram recovery.

2. If the plant is not in natural circulation, refer to N2-OP-101D, Sudden Decrease of Core Flow for immediate actions as required.

3. Reduce flow rate of operating loop to less than 41,800 gpm (volumetric flow rate; recorder at 2CEC*PNL602).

4. Transfer the recirc flow controller to LOOP MANUAL on both loops.

5. Notify I&C to perform APRM Scram and Rod Block setpoint change.

6. Close the Flow Control valve for the tripped pump to 0% indicated.

7. Reduce thermal power to less than 70% of rated thermal power (Within the normal operation zones, Figure 2 of N2-OP-101D).

8. Verify the core flow and thermal power limitation per T.S. Fig. 3.4.1.1-1.

9. Verify that tripped pump motor speed indicates 0 rpm at P602 after coast down.

10. If the pump motor speed fails to reach 0 rpm one minute after pump trip, shut the pump discharge valve RCS*MOV18A(B). Reopen RCS*MOV18A(B) five minutes after the valve is fully closed.

2.1.b (Cont)

11. Determine the cause for recirc. pump trip and consider restarting the pump per Section F.3.0

12. If the second recirculating pump cannot be restarted refer to Section H.7.0, Single Recirculation Loop Operation.

13. If the second recirculating pump can be restarted successfully, recover using N2-OP-101A or N2-OP-101D as a guide.

2.2 For two recirculation pump trips:

a. If reactor scram occurs:

1. Perform the scram recovery per N2-OP-101C, Section H.

2. Determine the cause for the recirc. pump trip(s) and consider restarting the pump(s) per Section F.3.0.

3. Use N2-OP-101C as a guide for decay heat removal, vessel thermal stratification, and cool down.

b. If reactor scram does not occur while in RUN mode:

1. Immediately place the mode switch in the SHUTDOWN position.

2. Refer to N2-OP-101C for scram response.

c. If reactor scram does not occur while in STARTUP mode:

1. Start the tripped pump per Section F.3.0 of this procedure.

2. If one pump can be restarted, refer to Section H.7.0, Single Recirculation Loop Operation.

3. If both pumps can be restarted, use N2-OP-101A as a guide to recovery.

4. If neither pump can be restarted, continue with plant shutdown as required by T.S.3.4.1.1 action b. Use N2-OP-101C as a guide.

3.0 Loss of Seal Injection Water

3.1 If seal injection water is lost, operation of the recirc. pumps may continue providing that RBCLC is available to the effected pump(s). Monitor pump temperatures at P614, and take appropriate actions if any parameter exceeds F.5.0) table.

II. OFF NORMAL PROCEDURES (Cont)

3.2 If reactor is in cold Shutdown and recirculation pump is NOT being used as an only mechanism for the forced core circulation, trip the recirculation pump.

4.0 Loss Of Cooling Water to the Recirc. Pump(s)

If Reactor Building CLOSED LOOP COOLING (CCP) to the recirculation pump IS LOST, operation may continue without detrimental effects. Seal temperatures will rise approximately 40°F above injection water temperature. Restore CCP as soon as possible and:

a. Monitor Motor winding temperatures (P614), shutdown the affected pump if temperature exceeds 248°F continuous or 266°F intermittent.

b. The loss of CCP to the pump motor winding cooler will be a limiting factor in continuing pump operation.

5.0 Loss of Both Seal Injection and Cooling Water.

If both seal injection and cooling water flow are lost, the pump must be shut down.

a. Manually trip the affected pump by placing the BRKR5A(B) or BRKR1A(B) to STOP.

b. Refer to N2-OP-101D, Sudden Decrease of Core Flow and take appropriate action.

c. Verify 2RCS*SOV90A(B) is closed by the upper seal pressure increased to approximately same as lower seal pressure.

NOTE: Step d. and e. should be performed if loop isolation is being considered.

d. Shut the seal purge valve 2RCS-V57A(B) to prevent over pressurizing the recirculation pump casing.

e. Isolate the pump by closing 2RCS*MOV10A(B), 2RCS*MOV18A(B) and RWCU suction valve 2WCS*MOV105(104) at P602.

f. The pump must remain shutdown until CRD Seal Injection Flow has been restored and the Seal Cavity Temperature has been gradually cooled.

g. If pump seal cavity temperature exceeds 200°F, the pump should not be restarted. Establish CRD seal injection, remove seals for inspection during the outage.

h. If core coolant mixing is required, during hot shutdown, verify CRD and Reactor Building Closed Cooling Water is restored to normal. Restart the pump per F.3.0 of this procedure.

H. OFF NORMAL PROCEDURES (Cont)

6.0 Seal Failure

Seal Failure is indicated as following:

a. Failure of No. 1 Seal only. (Lower Seal)

No. 2 Seal pressure would approach No. 1 Seal pressure. Resulting in FS-N007 (FS 40A/B) alarming. (Alarm window 602115, (602116) "RECIRC PMP 1A(B) SEAL STAGING FLOW HIGH/LOW") and slight seal cavity temperature increase.

b. Failure of No. 2 Seal only. (Upper Seal)

No. 2 Seal pressure would drop, dependent upon magnitude of the failure. Leakage through FS-N002 (FS 39A/B) will exceed the set point and alarm. (Alarm window 602109 (602110) "RECIRC PUMP 1A(B) OUTER SL LEAKAGE HIGH"). Annunciator 602115 (602116) "RECIRC PUMP 1A(B) SEAL STAGING FLOW HIGH/LOW" in alarm due to low flow, computer point RCSFC05 (RCSFC06).

c. Failure of both seals.

Pressure in both seal cavities would drop, depending on the magnitude of the failures. (Lower seal cavity pressure may not drop significantly unless failure was large.) Both FS-N002 and FS-N007 would alarm (Annunciators 602115 (602116) and 602109 (602110), seal cavity temperature will be increased.

6.1 The condition of the intact seal must be constantly monitored. Take appropriate action if seal operating parameter exceeds Table F.5.0.

6.2 Leakage rates to the Drywell equipment and floor drain tanks must be monitored closely. Refer to T.S. 3.4.3.2 for reactor coolant system leakage requirements.

7.0 Single Recirculation Loop Operation

7.1 If idle recirculation loop isolation is required, refer to H.1.0 of this procedure.

7.2 During single loop operation, the following Tech. Spec. Limiting Condition of Operation shall be complied within four hours (T.S. 3.4.1.1). TCN 6

NOTE: Reactor Recirculation System operation shall be within the Power/Flow Map (Figure 2 of N2-OP-101D).

a. Notify Reactor Engineer to reduce the thermal limit per N2-RESP-1 and perform N2-RESP-7. TCN 6

b. Place the recirculation flow control system in LOOP MANUAL.

c. Reduce thermal power to less than 70% of rated thermal power and to within Normal operation zones of Figure 2.

d. Increase Minimum Critical Power Ratio (MCPR) by 0.01 to 1.08.

e. Reduce the Maximum Average Planar Linear Heat Generation Rate (MAPLHGR) limit to 0.81/0.79 times the two recirculation loop operation limit. TCN 6

f. Reduce the Average Power Range Monitor (APRM) Scram and Rod Block and Rod Block Monitor Trip Setpoint and Allowable Value for single loop operation.

g. Reduce the volumetric flow rate of the operating recirculation loop to less than 41800 gpm.

h. Within 15 minutes prior to either Thermal Power increase or recirculation loop flow increase, verify and enter in N2-OSP-LOG-@001 that the differential temperature are met (T.S. 4.4.1.1.2) if Thermal Power is less than or equal to 30% of Rated Thermal Power or the operating loop flow is less than or equal to 50% of rated jet pump loop flow.

7.3 Perform N2-OSP-LOG-D001 Appendix "B" as required per Tech. Spec. 4.4.1.2.b.

7.4 Perform N2-OSP-LOG-S001 or N2-OSP-LOG-S@ALL as required to satisfy Tech. Spec. 4.4.1.1.1.

7.5 Refer to N2-OP-101D Section 10.2, Equipment Out-of-Service Analysis, for continued operation. TCN 6

8.0 <u>Bypassing Recirc Pump 1A(1B) Interlocks To Allow FAST Speed Recirc Pump Operation During Hydrostatic Testing</u>

8.1 Obtain SSS permission to perform the following steps.

8.2 Log permission in SSS log.

NOTE: RECIRC PMP 1A MG SET INTERLOCK BYPASSED and RECIRC PMP 1B MG SET INTERLOCK BYPASSED annunciators 602131 and 602132 will alarm when the following steps are performed.

8.3 Place the POWER INTLK BYPASS switch in BYPASS at panel B35-P001A(1B).

8.3.1 Log switch(s) in BYPASS in SSS log.

8.3.2 Log verification of switch(s) in BYPASS in SSS log.

8.4 Place the LOW TOTAL FW FLOW INTLK BYPASS switch in BYPASS at panel B35-P001A(1B).

8.4.1 Log switch(s) in BYPASS in SSS log.

8.4.2 Log verification of switch(s) in BYPASS in SSS log.

8.5 Place the STEAM LINE/PUMP SUCTION ΔT INTLK BYPASS switch in BYPASS at panel B35-P001A(1B).

8.5.1 Log switch(s) in BYPASS in SSS log.

8.5.2 Log verification of switch(s) in BYPASS in SSS log.

8.6 When desired to remove BYPASS (allow SLOW speed recirc pump operation), obtain SSS permission to perform the following steps. TCN-61

8.7 Log permission in SSS log to restore switch(s) to NORMAL.

NOTE: RECIRC PMP 1A MG SET INTERLOCK BYPASSED and RECIRC PMP 1B MG SET INTERLOCK BYPASSED annunciators 602131 and 602132 will clear when the following steps are performed.

8.8 Place the POWER INTLK BYPASS switch in NORMAL at panel B35-P001A(1B).

8.8.1 Log switch(s) in NORMAL in SSS log.

8.8.2 Log verification of switch(s) in NORMAL in SSS log.

8.9 Place the LOW TOTAL FW FLOW INTLK BYPASS switch in NORMAL at panel B35-P001A(1B).

8.9.1 Log switch(s) in NORMAL in SSS log.

8.9.2 Log verification of switch(s) in NORMAL in SSS log.

8.10 Place the STEAM LINE/PUMP SUCTION ΔT INTLK BYPASS switch in NORMAL at panel B35-P001A(1B).

8.10.1 Log switch(s) in NORMAL in SSS log.

8.10.2 Log verification of switch(s) in NORMAL in SSS log.

*7
TCN-60

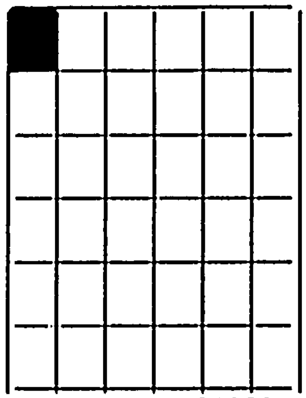
I. PROCEDURES FOR CORRECTING ALARM CONDITIONS

1.0 602101 - Reactor Recirculation Pump 1A Flow Control Valve Hydraulic System is Inoperable.

Reflash: No

RECIRC
FCV A
HYDRAULICS
INOPERABLE

602101



602101

1.1

Computer Point	Computer Printout	Source
RCSBC07	RCS FCV A HYDR INOP	No control of the actuator by either subloop and no equipment response when the MOTION INHIBIT reset push-button is depressed as sensed by device AMC-6.

1.2 Automatic Response

FCV A locks as is.

1.3 Corrective Action

a. At P634 check the status of the HPU for FCV A.

b. If no subloop is Ready and Operational, check for any of the following:

1. TANK EMPTY alarm illuminated.
2. OIL HOT alarm illuminated.
3. Both OVERLOAD/UNDERVOLTAGE alarms illuminated.

c. If a TANK EMPTY alarm is illuminated, check the following:

1. TANK LOW alarm is illuminated.

2. Level of the hydraulic fluid tank.

3. The HPU for leakage.

If the tank empty alarm is valid and the leak is in one subloop, isolate the subloop and refill the tank in accordance with this procedure. After the refill, place the operable subloop back in service in accordance with this procedure.

If the tank empty alarm is valid and the leak is not at the HPU, it must be assumed to be on the common actuator open, close or pilot piping within the primary containment. With the flow control valve inoperable, the reactor recirculation pump should be removed from service in accordance with this procedure.

Technical specifications shall be referred to for the applicable Limiting Condition for Operation and Action Statements.

d. If an OIL HOT alarm is illuminated, check the following:

1. OIL WARM alarm is illuminated.

2. Subloop cooling fans are operational.

3. Subloop heat exchanger air inlet dampers are open.

4. A high area ambient temperature does not exist.

5. At the HPU, pump discharge pressure is less than 1950 psig.

Use portable fans to reduce tank temperature and area ambient temperature if necessary. After oil temperature has decreased to less than 140°F, restart a subloop in the maintenance mode in accordance with this procedure. Verify that the cooling components of the subloop are functioning correctly prior to placing it back in service in accordance with this procedure.

Check that pump discharge pressures are between 1850 and 1950 psig. If pressures are higher than 1950 psig, adjust the relief valve to reduce the pressure and increase flow to the heat exchanger.

e. If both OVERLOAD/UNDERVOLTAGE alarms are illuminated, check the following:

1. Thermal overloads exist.

2. Undervoltage condition is present.

If both pumps have tripped on overload, prior to restarting have the motors and motor controllers checked.

If one or both drive motors check out satisfactory, restart the operable subloop in the maintenance mode in accordance with this procedure. Verify that pump discharge pressures are between 1850-1950 psig and reduce the pressure if necessary by adjusting relief valve. Check the operating pump for normal operation.

Return one or both subloops to READY service in accordance with this procedure.

f. If neither READY light is illuminated and no other alarms are illuminated depress each READY pushbutton alternately. If neither READY light will illuminate then check the following:

1. dx/dt Lock Up Card (Red indicating lights in P634 indicate trip condition. Rack 1 South side for HPUA.)

2. Velocity alarm unit

3. Stability detector

4. Stability alarm unit

5. Analog electrical circuit for a fault

6. Logic circuit for a fault

The components listed above should be checked by the Instrument and Control Department.

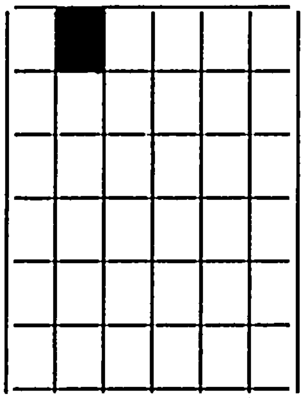
I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

2.0 602102 - Reactor Recirculation Pump 1B Flow Control Valve Hydraulic System is Inoperable.

Reflash: No

RECIRC
FCV B
HYDRAULICS
INOPERABLE

602102



602102

2.1

Computer Point	Computer Printout	Source
RCSBC08	RCS FCV B HYDR INOP	No control of the actuator by either subloop and no equipment response when the MOTION INHIBIT reset push-button is depressed as sensed by device BMC-6.

2.2 Automatic Response

FCV B lock as is.

2.3 Corrective Action

a. At P634 check the status of the HPU for FCV B.

b. If no subloop is Ready and Operational, check for any of the following:

1. TANK EMPTY alarm illuminated.

2. OIL HOT alarm illuminated.

3. Both OVERLOAD/UNDERVOLTAGE alarms illuminated.

c. If a TANK EMPTY alarm is illuminated, check the following:

1. TANK LOW alarm is illuminated.

2. Level of the hydraulic fluid tank.

3. The HPU for leakage.

If the tank empty alarm is valid and the leak is in one subloop, isolate the subloop and refill the tank in accordance with this procedure. After the refill, place the operable subloop back in service in accordance with this procedure.

If the tank empty alarm is valid and the leak is not at the HPU, it must be assumed to be on the common actuator open, close or pilot piping within the primary containment. With the flow control valve inoperable, the reactor recirculation pump should be removed from service in accordance with this procedure.

Technical specifications shall be referred to for the applicable Limiting Condition for Operation and Action Statements.

d. If an OIL HOT alarm is illuminated, check the following:

1. OIL WARM alarm is illuminated.

2. Subloop cooling fans are operational.

3. Subloop heat exchanger air inlet dampers are open.

4. A high area ambient temperature does not exist.

5. At the HPU, pump discharge pressure is less than 1950 psig.

Use portable fans to reduce tank temperature and area ambient temperature if necessary. After oil temperature has decreased to less than 140°F, restart a subloop in the maintenance mode in accordance with this procedure. Verify that the cooling components of the subloop are functioning correctly prior to placing it back in service in accordance with this procedure.

Check that pump discharge pressures are between 1850 and 1950 psig. If pressures are higher than 1950 psig, adjust the relief valve to reduce the pressure and increase flow to the heat exchanger.

e. If both OVERLOAD/UNDERVOLTAGE alarms are illuminated, check the following:

1. Thermal overloads exist.

2. Undervoltage condition is present.

If both pumps have tripped on overload, prior to restarting have the motors and motor controllers checked.

If one or both drive motors check out satisfactory, restart the operable subloop in the maintenance mode in accordance with this procedure. Verify that pump discharge pressures are between 1850-1950 psig and reduce the pressure if necessary by adjusting relief valve. Check the operating pump for normal operation.

Return one or both subloops to READY service in accordance with this procedure.

f. If neither READY light is illuminated and no other alarms are illuminated depress each READY pushbutton alternately. If neither READY light will illuminate then check the following:

1. dx/dt Lock Up Card (Red indicating lights in P634 indicate trip condition, Rack 2 South side for HPUB).

2. Velocity alarm unit

3. Stability detector

4. Stability alarm unit

5. Analog electrical circuit for a fault

6. Logic circuit for a fault

The components listed above should be checked by the Instrument and Control Department.

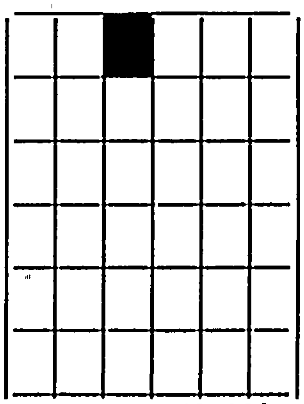
I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

3.0 602103 - Reactor Recirculation Pump 1A Flow Control Valve Back Up Hydraulic Subloop is Inoperable

Reflash: No

RECIRC
FCV A
BACK UP HYDR
INOPERABLE

602103



602103

3.1

Computer Point	Computer Printout	Source
RCSBC09	RCS FCV A BU HYDR INOP	One hydraulic sub-loop is not in the ready mode as sensed by device AMC-7. *

3.2 Automatic Response

NONE

3.3 Corrective Action

a. At P634 check the status of the HPU for FCV A.

b. If a subloop's MAINTENANCE alarm is illuminated, check for any of the following:

1. TANK LOW alarm illuminated.

2. OIL WARM alarm illuminated.

3. OVERLOAD/UNDERVOLTAGE alarm illuminated.

c. If a TANK LOW alarm is illuminated, check the following:

1. Level of the hydraulic fluid tank.

2. The HPU for leakage.

If the tank low alarm is valid and the fluid loss is due to leakage at the shut down subloop, isolate the subloops in accordance with this procedure. Refill the hydraulic fluid tank in accordance with this procedure. Initiate the appropriate measurer to repair the out of service subloop and restore it to READY status in accordance with this procedure.

If the tank low alarm is valid and the fluid loss is not due to leakage at the HPU, then it must be assumed to be on the open, close or pilot line piping within the primary containment.

d. If an OIL WARM alarm is illuminated, check the following:

   1. Shut down subloop's cooling fan is operational.

   2. Shut down subloop's heat exchanger air inlet damper is open.

   3. A high area ambient temperature does not exist.

Use portable fans to reduce tank temperature and area ambient temperature if necessary. After oil temperature has decreased to less than 140°F, restart the subloop in the maintenance mode in accordance with this procedure. Verify that the cooling components of the subloop are functioning correctly prior to placing it back in service in accordance with this procedure.

Check that pump discharge pressure is between 1850 and 1950 psig. If pressure is greater than 1950 psig, adjust the relief valve to reduce pressure and increase flow to the heat exchanger.

e. If the OVERLOAD/UNDERVOLTAGE alarm is illuminated, check the following:

   1. Thermal overload exists.

   2. Undervoltage condition is present.

If the pump has tripped on overload, prior to restarting have the motor and motor controller checked.

If the pump drive motor checks out satisfactory, restart the operable subloop in the maintenance mode in accordance with this procedure. Verify that the pump discharge pressure is between 1850-1950 psig and reduce the pressure if necessary by adjusting relief valve. Check the pump for normal operation.

Return the subloop to ready service in accordance with this procedure.

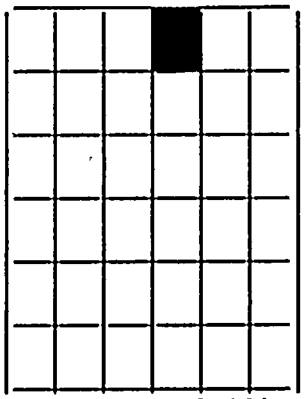
I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

4.0 602104 - Reactor Recirculation Pump 1B Flow Control Valve Back Up Hydraulic Subloop is Inoperable

Reflash: No

RECIRC
FCV B
BACK UP HYDR
INOPERABLE

602104



602104

4.1	Computer Point	Computer Printout	Source
	RCSBC10	RCS FCV A BU HYDR INOP	One hydraulic subloop is not in the ready mode as sensed by device BMC-7. *

4.2 Automatic Response

NONE

4.3 Corrective Action

a. At P634 check the status of the HPU for FCV B.

b. If a subloop's MAINTENANCE alarm is illuminated, check for any of the following:

1. TANK LOW alarm illuminated.

2. OIL WARM alarm illuminated.

3. OVERLOAD/UNDERVOLTAGE alarm illuminated.

c. If a TANK LOW alarm is illuminated, check the following:

1. Level of the hydraulic fluid tank.

2. The HPU for leakage.

If the tank low alarm is valid and the fluid loss is due to leakage at the shut down subloop, isolate the subloops in accordance with this procedure. Refill the hydraulic fluid tank in accordance with this procedure. Initiate the appropriate measures to repair the out of service subloop and restore it to READY status in accordance with this procedure.

If the tank low alarm is valid and the fluid loss is not due to leakage at the HPU, then it must be assumed to be on the open, close or pilot line piping within the primary containment.

d. If an OIL WARM alarm is illuminated, check the following:

1. Shut down subloop's cooling fan is operational.

2. Shut down subloop's heat exchanger air inlet damper is open.

3. A high area ambient temperature does not exist.

Use portable fans to reduce tank temperature and area ambient temperature if necessary. After oil temperature has decreased to less than 140°F, restart the subloop in the maintenence mode in accordance with this procedure. Verify that the cooling components of the subloop are functioning correctly prior to placing it back in service in accordance with this procedure.

Check that pump discharge pressure is between 1850 and 1950 psig. If pressure is greater than 1950 psig, adjust the relief valve to reduce pressure and increase flow to the heat exchanger.

e. If the OVERLOAD/UNDERVOLTAGE alarm is illuminated, check the following:

1. Thermal overload exists.

2. Undervoltage condition is present.

If the pump has tripped on overload, prior to restarting have the motor and motor controller checked.

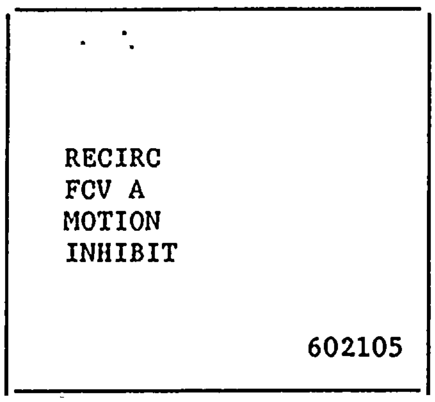
If the pump drive motor checks out satisfactory, restart the operable subloop in the maintenance mode in accordance with this procedure. Verify that the pump discharge pressure is between 1850-1950 psig and reduce the pressure if necessary by adjusting relief valve. Check the pump for normal operation.

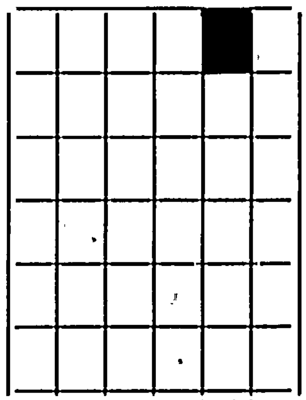
Return the subloop to ready service in accordance with this procedure.

I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

5.0 602105 - Recirculation Flow Control Valve A Motion Inhibit

Reflash: No





5.1	Computer Point	Computer Printout	Source (AMC-4)
	RCSBC05	RCS FCV A MTN INHIB	1. Position setpoint demand signal exceeds limits. 2. Velocity feedback signal exceeds preset limits for more than preset time limit. 3. Position feedback signal rate of exchange exceeds preset limit while signal changes by a preset percentage of full stroke. 4. Large oscillations of velocity controller deviations (error) signal continue for more than a preset time.

5.1 (Cont)

Computer Point	Computer Printout	Source
		5. High Drywell pressure interlock actuated.
		6. No hydraulic subloop in the OPERATIONAL mode.

5.2 Automatic Response

Flow Control Valve A lock as is.

5.3 Corrective Action

a. The excess dx/dt or Position feedback signal can be identified by red indicating lights in P634 Rack 1. These can be reset by depressing the Reset pushbuttons located adjacent to the indicating lights.

b. If the source of the actuator motion inhibit is not attributed to a HPU malfunction or High Drywell Pressure interlock, initiate measures to have the Instrument and Control Department trouble shoot and correct any malfunction in the logic controller.

c. Investigate and correct the cause of the High Drywell Pressure interlock activation if possible.

d. Verify that High Drywell Pressure interlock test is not in progress.

e. At the HPU status board on P634 check for any of the following:

1. OVERLOAD/UNDERVOLTAGE condition on BOTH hydraulic subloops.
2. OIL HOT alarm illuminated.
3. TANK EMPTY alarm illuminated.

f. If an OVERLOAD/UNDERVOLTAGE condition is present on the previously operational subloop and the alternate subloop is not READY for transfer, place the alternate subloop in the OPERATIONAL condition if possible.

Initiate measures to check out the motor electrically. If the motor checks out satisfactory startup the subloop in the MAINTENANCE mode. Verify that the pump discharge pressure is between 1850-1950 psig and reduce the pressure if necessary by adjusting relief valve. Check the pump for normal operation.

g. If the previously operational subloop's PRESSURIZED indication is extinguished and the alternate subloop is not READY for transfer place the alternate subloop in the OPERATIONAL condition if possible.

At the HPU, check for any signs of leakage and initiate measures to correct any if present. If no leaks are present, start up the previously operational subloop in the MAINTENANCE mode and check out the pump for normal operation. Check that the discharge relief valve is properly adjusted to maintain discharge pressure between 1850-1950 psig. Check that pressure switch 1-46 or 2-46 is functioning correctly and that it is valved in correctly. Check discharge accumulator for proper precharge and adjust if necessary.

h. If an OIL HOT alarm is illuminated, check the following:

1. OIL WARM alarm is illuminated.

2. Subloop cooling fans are operational.

3. Subloop heat exchanger air inlet dampers are open.

4. A high area ambient temperature does not exist.

5. At the HPU, pump discharge pressure is less than 1950 psig.

Use portable fans to reduce tank temperature and area ambient temperature if necessary. After oil temperature has decreased to less than 140°F, restart a subloop in the maintenance mode in accordance with this procedure. Verify that the cooling components of the subloop are functioning correctly prior to placing it back in service in accordance with this procedure.

If a high area ambient temperature is the cause of the high temperature condition follow the appropriate OFF NORMAL procedure section.

Check that pump discharge pressures are between 1850 and 1950 psig. If pressures are higher than 1950 psig, adjust the relief valve to reduce the pressure and increase flow to the heat exchanger.

i. If a TANK EMPTY alarm is illuminated, check the following:

   1. TANK LOW alarm is illuminated.

   2. Level of the hydraulic fluid tank.

   3. The HPU for leakage.

   If the tank empty alarm is valid and the leak is in one subloop, isolate the subloop and refill the tank in accordance with this procedure. After the refill, place the operable subloop back in service in accordance with this procedure.

If the tank empty alarm is valid and the leak is not at the HPU, it must be assumed to be on the common actuator open, close or pilot piping within the primary containment. With the flow control valve inoperable, the reactor recirculation pump should be removed from service in accordance with this procedure.

Technical specifications shall be referred to for the applicable Limiting Condition for Operation and Action Statements.

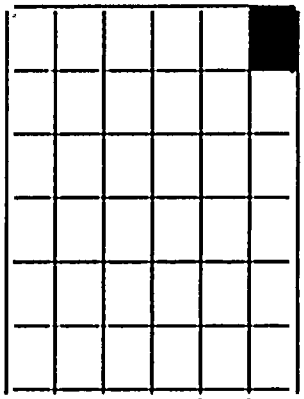
j. If required, null the servo error using LOOP CONTROLLER M/A Station and reset FCV Motion Inhibit by depressing the VLV MOTION INHIBIT RESET Pushbutton for the respective loop on P602 when conditions have been corrected.

6.0 602106 - Recirculation Flow Control Valve B Motion Inhibit

Reflash: No

RECIRC
FCV B
MOTION
INHIBIT

602106



602106

6.1	Computer Point	Computer Printout	Source (BMC-4)
	RCSBC06	RCS FCV B MTN INHIB	1. Position setpoint demand signal exceeds preset limits. 2. Velocity feedback signal exceeds preset limits for more than preset time limit. 3. Position feedback signal rate of change exceeds preset limit while signal changes by a preset percentage of full stroke. 4. Large oscillations of velocity controller deviations (error) signal continue for more than a preset time.

6.1 (Cont)	Computer Point	Computer Printout	Source
			5. High Drywell Pressure interlock actuated.
			6. No hydraulic subloop in the OPERATIONAL mode.

6.2 Automatic Response

Flow Control Valve B will lock up.

6.3 Corrective Action

a. The Excess dx/dt or Position Feedback signal can be identified by red indication lights IN P634 Rack 2 (South Side). These can be reset by depressing the reset pushbuttons located adjacent to the indicating lights.

b. If the source of the actuator motion inhibit is not attributed to a HPU malfunction or High Drywell Pressure interlock, initiate measures to have the Instrument and Control Department trouble shoot and correct any malfunction in the logic controller.

c. Investigate and correct the cause of the High Drywell Pressure interlock activation if possible.

d. Verify that High Drywell Pressure interlock test is not in progress.

e. At the HPU status board on P634 check for any of the following:

1. OVERLOAD/UNDERVOLTAGE condition on BOTH hydraulic subloops.

2. OIL HOT alarm illuminated.

3. TANK EMPTY alarm illuminated.

I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

f. If an OVERLOAD/UNDERVOLTAGE condition is present on the previously operational subloop and the alternate subloop is not READY for transfer, place the alternate subloop in the OPERATIONAL condition if possible.

   Initiate measures to check out the motor electrically. If the motor checks out satisfactory startup the subloop in the MAINTENANCE mode. Verify that the pump discharge pressure is between 1850-1950 psig and reduce the pressure if necessary by adjusting relief valve. Check the pump for normal operation.

g. If the previously operational subloop's PRESSURIZED indication is extinguished and the alternate subloop is not READY for transfer place the alternate subloop in the READY, OPERATIONAL condition if possible.

   At the HPU, check for any signs of leakage and initiate measures to correct any if present. If no leaks are present, start up the previously operational subloop in the MAINTENANCE mode and check out the pump for normal operation. Check that the discharge relief valve is properly adjusted to maintain discharge pressure between 1850-1950 psig. Check that pressure switch 1-46 or 2-46 is functioning correctly and that it is valved in correctly. Check discharge accumulator for proper precharge and adjust if necessary.

h. If an OIL HOT alarm is illuminated, check the following:

   1. OIL WARM alarm is illuminated.

   2. Subloop cooling fans are operational.

   3. Subloop heat exchanger air inlet dampers are open.

   4. A high area ambient temperature does not exist.

   5. At the HPU, pump discharge pressure is less than 1950 psig.

Use portable fans to reduce tank temperature and area ambient temperature if necessary. After oil temperature has decreased to less than 140°F, restart a subloop in the maintenance mode in accordance with this procedure. Verify that the cooling components of the subloop are functioning correctly prior to placing it back in service in accordance with this procedure.

If a high area ambient temperature is the cause of the high temperature condition follow the appropriate OFF NORMAL procedure section.

Check that pump discharge pressures are between 1850 and 1950 psig. If pressures are higher than 1950 psig, adjust the relief valve to reduce the pressure and increase flow to the heat exchanger.

i. If a TANK EMPTY alarm is illuminated, check the following:

1. TANK LOW alarm is illuminated.

2. Level of the hydraulic fluid tank.

3. The HPU for leakage.

If the tank empty alarm is valid and the leak is in one subloop, isolate the subloop and refill the tank in accordance with this procedure. After the refill, place the operable subloop back in service in accordance with this procedure.

If the tank empty alarm is valid and the leak is not at the HPU, it must be assumed to be on the common actuator open, close or pilot piping within the primary containment. With the flow control valve inoperable, the reactor recirculation pump should be removed from service in accordance with this procedure.

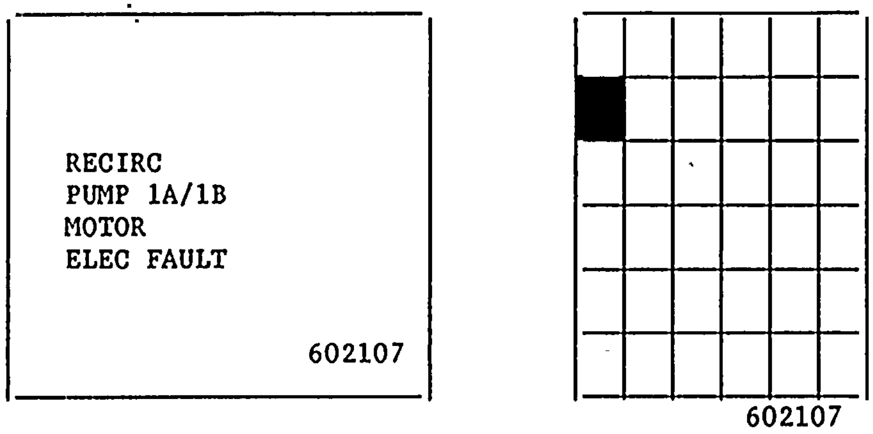
Technical specifications shall be referred to for the applicable Limiting Condition for Operation and Action Statements.

j. If required, null the servo error using LOOP CONTROLLER M/A Station and reset the FCV Motion Inhibit by depressing the VLV MOTION INHIBIT RESET Pushbutton for the respective loop on P602 when conditions have been corrected.

I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

7.0 602107 Recirc. Pump 1A/1B Motor Electrical Fault

Reflash: Yes



7.1

	Computer Point	Computer Printout	Source
a.	RCSUC01	RCS P1A MOT ELEC BRKR5A	Lockout relay 86-2RCSA01
b.	RCSUC02	RCS P1B MOT ELEC BRKR5B	Lockout relay 86-2RCSB01
c.	RCSUC11	RCS P1A MOT ELEC BRKR3A	Lockout relay 86-2RCSA14
d.	RCSUC12	RCS P1A MOT ELEC BRKR4A	Lockout relay 86-2RCSA16
e.	RSCUC13	RCS P1B MOT ELEC BRKR3B	Lockout relay 86-2RCSB14
f.	RCSUC14	RCS P1B MOT ELEC BRKR4B	Lockout relay 86-2RCSB16

*

I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

7.2 Automatic Response

a. Recirc. Pump 1A trips — SWG001 ACB 1-6 opens.

b. Recirc. Pump 1B trips — SWG003 ACB 3-4 opens.

c. Recirc. Pump 1A trips — 2EPS*SWG001 BRK 1-1 opens.

d. Recirc. Pump 1A trips — 2EPS*SWG002 BRK 2-1 opens.

e. Recirc. Pump 1B trips — 2EPS*SWG003 BRK 3-1 opens.

f. Recirc. Pump 1B trips — 2EPS*SWG004 BRK 4-1 opens.

7.3 Corrective Action

a. Determine and correct cause of 86 relay trip.

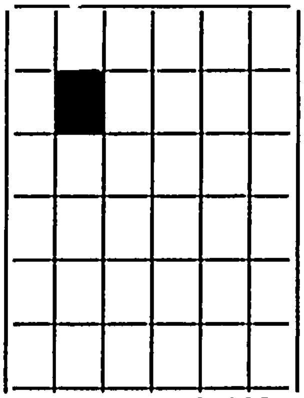
b. Refer to N2-OP-29 Section H.2.0 and take actions as directed.

8.0 602108 - Recirc. Pump 1A/1B Motor Electrical Fault

Reflash: Yes

RECIRC
PUMP 1A/1B
MG SET MOTOR
ELEC FAULT

602108



602108

8.1

	Computer Point	Computer Printout	Source
a.	RCSUC03	RCS LFMG 1A MOT ELEC	Lockout relay 86-2RCSA10
b.	RCSUC04	RCS LFMG MOT OVLD BRKR1B	Lockout relay 86-RCSB10

8.2 Automatic Response

a. LFMG A supply breaker trips (2NNS-SWG011 Brk 11-9 (BRKR 1A) opens).

b. LFMG B supply breaker trips (2NNS-SWG013 Brk 13-1 (BRKR 1B) opens).

8.3 Corrective Action

a. Determine and correct cause of 86 relay trip.

b. If a recirc pump tripped, refer to N2-OP-29 Section H.2.0 Recirc. Pump Trip and proceed as directed.

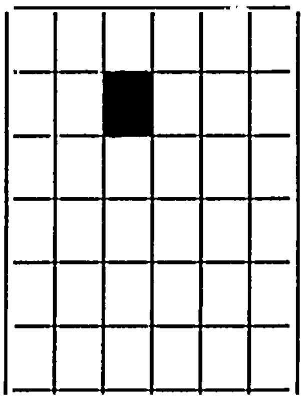
I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

9.0 602109 - Recirc. Pump 1A Outer Seal Leakage High

Reflash: No

RECIRC
PUMP 1A
OUTER SL LEAK
HIGH

602109



602109

9.1

Computer Point	Computer Printout	Source
RCSFC03	RCS P1A OUTER SEAL LEAK	Upper (#2) Seal Leakage above 0.8gpm (FS 39A)

9.2 Automatic Response

None

9.3 Corrective Action

a. Monitor lower (#1) seal cavity pressure.

b. Refer to N2-OP-29 Section H.6.0 and take actions as required.

c. Refer to TS 3.4.3.2 for Reactor Coolant System leakage requirements.

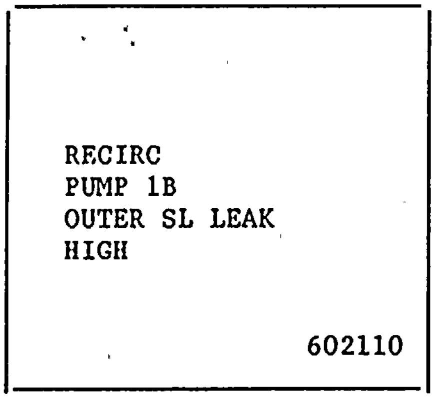
d. If the Drywell Floor Drain Leakage Rate increased by 1.0 gpm or greater due to the outer seal leakage and upper seal cavity pressure is less than 100 psig, manually trip the pump per G.2.0 of this procedure.

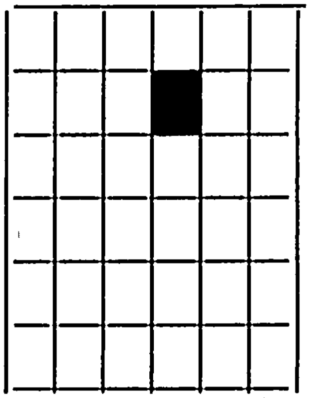
e. Determine and correct cause for high seal leakage when plant conditions allow.

I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

10.0 602110 - Recirc. Pump 1B Outer Seal Leakage High

Reflash: No





602110

10.1	Computer Point	Computer Printout	Source
	RCSFC04	RCS P1B OUTER SEAL LEAK	Upper (#2) Seal Leakage above 0.8gpm (FS 39B) *

10.2 Automatic Response

None

10.3 Corrective Action

a. Monitor lower (#1) seal cavity pressure.

b. Refer to N2-OP-29 Section H.6.0 and take actions as required.

c. Refer to TS 3.4.3.2 for Reactor Coolant System leakage requirements.

d. If the Drywell Floor Drain Leakage Rate increased by 1.0 gpm or greater due to the outer seal leakage and upper seal cavity pressure is less than 100 psig, manually trip the pump per G.2.0 of this procedure.

e. Determine and correct cause for high seal leakage when plant conditions allow.

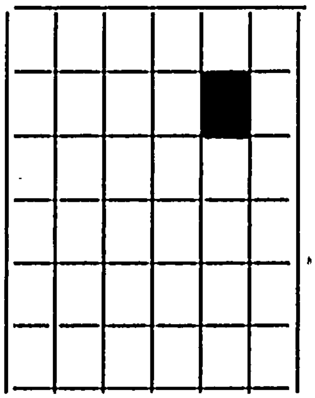
I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

11.0 602111 - Recirc. Flow Control Valve A Hydraulics Maintenance Required

Reflash: No

RECIRC
FCV A
HYDRAULICS
MAINT REQ'D

602111



602111

11.1	Computer Point	Computer Printout	Source (AMC-5)
	RCSBC11	RCS FCV A MAINT REQ'D	AMC-5 HPU pressure filter (35 psid) or return (45 psid) filter differential pressure high or actuator drain flow high (0.5 gpm) *

11.2 Automatic Response

None

11.3 Corrective Action

a. Verify the cause of the alarm by the indication light on P634.

b. Transfer the standby HPU into service.

c. If the alarm is caused by high differential pressure across the filter, have maintenance replace the filter.

d. If high actuator drain flow is the cause, the actuator should be repaired during the outage.

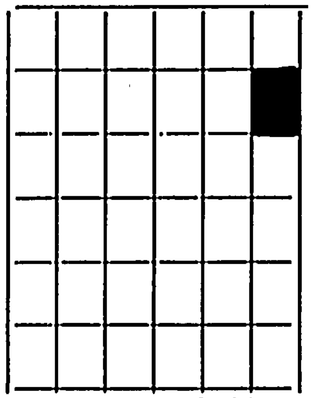
I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

12.0 602112 - Recirc. Flow Control Valve B Hydraulics Maintenance Required

Reflash: No

RECIRC
FCV B
HYDRAULICS
MAINT REQ'D

602112



602112

12.1

Computer Point	Computer Printout	Source
RCSBC12	RCS FCV B MAINT REQ'D	BMC-5 HPU pressure filter (35 psid) or return filter differential pressure high (45 psid) or actuator drain flow high (0.5 gpm)

12.2 Automatic Response

None

12.3 Corrective Action

a. Verify the cause of the alarm by the indication light on P634.

b. Transfer the standby HPU into service.

c. If the alarm is caused by high differential pressure across the filter, have maintenance replace the filter.

d. If high actuator drain flow is the cause, the actuator should be repaired during the outage.

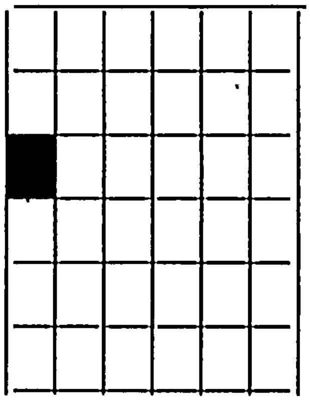
I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

13.0 602113 Recirc. Pump 1A/1B Motor Overload

Reflash: Yes

RECIRC
PUMP 1A/1B
MOTOR
OVERLOAD

602113



602113

13.1		Computer Point	Computer Printout	Source
	a.	RCSTC01	RCS P1A MOT OVLD BRKR5A	Pump Motor Overload (51X)
	b.	RCSTC02	RCS P1B MOT OVLD BRKR5B	Pump Motor Overload (51X)
	c.	RCSTC12	RCS P1A MOT OVLD BRKR3A	Pump Motor Overload (51X)
	d.	RCSTC04	RCS P1A MOT OVLD BRKR4A	Pump Motor Overload (51X)
	e.	RCSTC05	RCS P1B MOT OVLD BRKR3B	Pump Motor Overload (51X)
	f.	RCSTC06	RCS P1B MOT OVLD BRKR4B	Pump Motor Overload (51X)

13.2 Automatic Response

a. 2RCS*P1A trips, 2NPS-SWG001-6 (BRKR5A) opens.

b. 2RCS*P1B trips, 2NPS-SWG003-4 (BRKR5B) opens.

c. 2RCS*P1A trips, 2EPS*SWG002-1 (BRKR4A) opens.

d. 2RCS*P1B trips, 2EPS*SWG003-1 (BRKR3B) opens.

e. 2RCS*P1B trips, 2EPS*SWG004-1 (BRKR4B) opens.

f. 2RCS*P1A trips, 2EPS*SWG001-1 (BRKR3A) opens.

13.3 Corrective Action

a. Refer to N2-OP-29 Section H.2.0 Recirculation Pump Trip.

b. Investigate and correct the cause of motor overload.

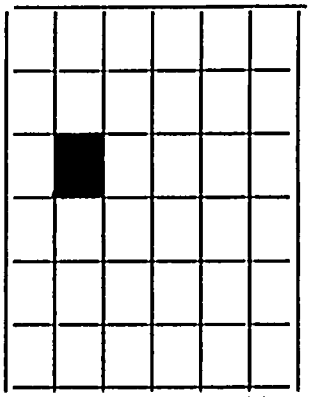
I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

14.0 602114 - Recirc. Pump 1A/1B Motor Generator Set Motor Overload

Reflash: Yes

RECIRC
PUMP 1A/1B
MG SET MOTOR
OVERLOAD

602114



602114

14.1	Computer Point	Computer Printout	Source
	a. RCSUC05	RCS LFMG MOT OVLD BRKR1A	Drive Motor Supply breaker OL (5IX)
	b. RCSUC06	RCS LFMG1B MOT ELEC	Drive Motor Supply breaker OL (5IX)

14.2 Automatic Response

a. 2RCS*P1A trips if running in slow speed, MG1A motor supply brk 2NNS-SWG011-9 (BRKR1A) opens.

b. 2RCS*P1B trips if running in slow speed, MG1B motor supply brk 2NNS-SWG013-1 (BRKR1B) opens.

14.3 Corrective Action

a. Refer to N2-OP-29 Section H.2.0 Recirculation Pump Trip.

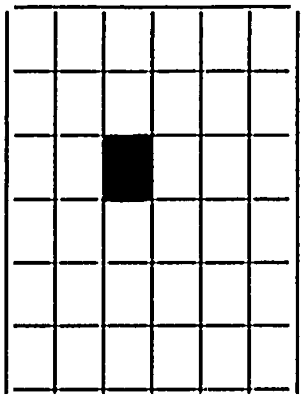
b. Investigate and correct cause of motor overload.

15.0 602115 - Recirc. Pump 1A Seal Staging Flow High/Low

Reflash: Yes

RECIRC PMP 1A
SEAL STAGING
FLOW
HIGH/LOW

602115



602115

15.1	Computer Point	Computer Printout	Source
	a. RCSFC05	RCS P1A SEAL STAGING FLO	Staging flow less than .8 gpm (FS 40A)
	b. RCSFC09	RCS P1A SEAL STAGING FLO	Staging flow greater than 1.6 gpm (FS 40A)

15.2 Automatic Response

None

15.3 Corrective Action

NOTE: Design seal staging flow is 1.3 gpm at rated Rx Pressure. This annunciator will be in the alarm state with RPV pressure less than 400 psig.

a. Monitor DW equipment drain leak rate. Refer to TS 3.4.3.2 for Reactor Coolant System Leakage requirements.

I. <u>PROCEDURES FOR CORRECTING ALARM CONDITIONS</u> (Cont)

b. Check the seal cavity temperature at P614.

c. Monitor the seal cavity pressures at P602.

d. Refer to Section H.6.0 of this procedure and take action as required.

e. If the seal cavity temperature exceeds 200°F, manual trip the pump per G.2.0 of this procedure.

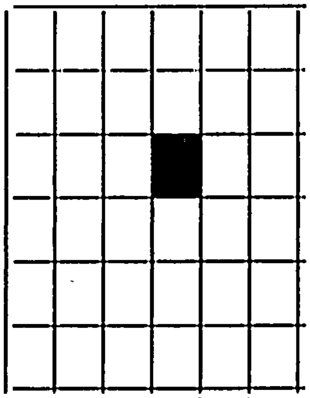
f. If Drywell Equipment Drain Leakage Rate increases by greater than 0.5 gpm due to lower seal leakage and upper seal cavity is greater than 920 psig, manually trip the pump per G.2.0 of this procedure.

16.0 602116 Recirc. Pump 1B Seal Staging Flow High/Low

Reflash: Yes

RECIRC PMP 1B
SEAL STAGING
FLOW
HIGH/LOW

602116



602116

16.1

	Computer Point	Computer Printout	Source
a.	RCSFC06	RCS P1B SEAL STAGING FLO	Staging flow less than .8 gpm (FS 40B)
b.	RCSFC10	RCS P1B SEAL STAGING FLO	Staging flow greater than 1.6 gpm (FS 40B)

*

16.2 Automatic Response

None

16.3 Corrective Action

NOTE: Design seal staging flow is 1.3 gpm at rated RPV Pressure. This annunciator will be in the alarm state with RPV pressure less than 400 psig.

a. Monitor DW equipment drain leak rate. Refer to TS 3.4.3.2 for Reactor Coolant System Leakage requirements.

I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

b. Check the seal cavity temperature at P614.

c. Monitor the seal cavity pressures at P602.

d. Refer to Section H.6.0 of this procedure and take action as required.

e. If the seal cavity temperature exceeds 200°F, manually trip the pump per G.2.0 of this procedure.

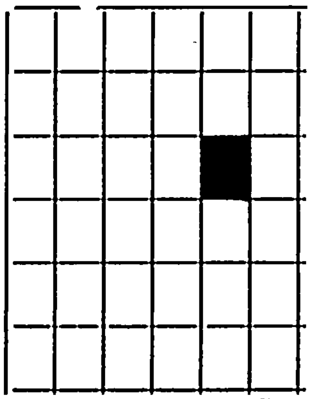
f. If Drywell Equipment Drain Leakage Rate increases by greater than 0.5 gpm due to lower seal leakage and upper seal cavity is greater than 920 psig, manually trip the pump per G.2.0 of this procedure.

17.0 602117 - Recirc. Pump 1A Seal Cooling Water Flow Low

Reflash: No

RECIRC PMP 1A
SEAL CLG WTR
FLOW
LOW

602117



602117

17.1

Computer Point	Computer Printout	Source
RCSFC01	RCS P1A SL CLG WTR FLO	2CCP-FS10A (16 gpm)

17.2 Automatic Response

None

17.3 Corrective Action

a. Check RBCLC flow from *P1A coolers (computer Pt. CCPFA01).

b. Verify proper CCP lineup to 2RCS*P1A, *MOV93A, 17A, 94A, 16A, 15A, 22A open.

c. Monitor seal cavity temperatures on P614 and computer printout RCSTA 15, 17, shutdown the pump if temperature exceeds 200°F.

d. Refer to N2-OP-29 Section H.4.0 Loss of Cooling Water to Recirc Pump(s) and Section H.5.0 Loss of Both Cooling Water and Seal injection. Take action as directed by the appropriate section.

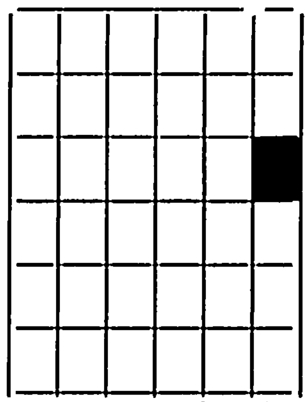
I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

18.0 602118 - Recirc. Pump 1B Seal Cooling Water Flow Low

Reflash: No

RECIRC PUMP 1B
SEAL CLG WTR
FLOW
LOW

602118



602118

18.1	Computer Point	Computer Printout	Source
	RCSFC02	RCS P1B SL CLG WTR FLO	2CCP-FS10B (16 gpm) *

18.2 Automatic Response

None

18.3 Corrective Action

a. Check RBCLC flow from *P1B coolers (Computer Pt. CCPFA02).

b. Verify proper CCP lineup to 2RCS*P1B, *MOV93B, 17B, 94B, 16B, 15B, 22B open.

c. Monitor seal cavity temperatures on P614 and computer printout RCSTA 16, 18, shutdown the pump if temperature exceeds 200°F.

d. Refer to N2-OP-29 Section H.4.0 Loss of Cooling Water to Recirc Pump(s) and Section H.5.0 Loss of Both Cooling Water and Seal Injection. Take actions as directed by the appropriate section.

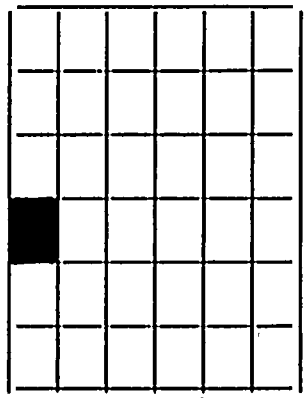
I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

19.0 602119 - Recirc. Pump 1A/1B Motor Automatic Trip

Reflash: Yes

RECIRC
PUMP 1A/1B
MOTOR
AUTO TRIP

602119



602119

19.1

	Computer Point	Computer Printout	Source
a.	RCSUC24	RCS P1A BRKR 3A AUTO TR	Breaker open and control switch in normal after start (S121A and K153A)
b.	RSCUC25	RCS P1A BRKR 4A AUTO TR	Breaker open and control switch in normal after start (S117A and K155A)
c.	RCSUC27	RCS P1B BRKR 3B AUTO TR	Breaker open and control in normal after start (S121B and K153B)
d.	RCSUC28	RCS P1B BRKR 4B AUTO TR	Breaker open and control switch in normal after start (S117B and K155B)

19.2 Automatic Response

a. 2RCS*P1A trip, 2EPS*SWG001-1 (BRKR 3A) opens.

b. 2RCS*P1A trip, 2EPS*SWG002-1 (BRKR 4A) opens.

c. 2RCS*P1B trip, 2EPS*SWG003-1 (BRKR 3B) opens.

d. 2RCS*P1B trip, 2EPS*SWG004-1 (BRKR 4B) opens.

19.3 Corrective Action

a. Refer to N2-OP-29 Section H.2.0 Recirculation Pump Trip.

b. Investigate and correct cause of breaker trip.

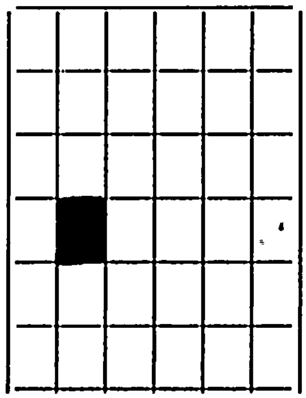
I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

20.0 602120 - Recirculation Pumps Breaker 2A/B. 5A/B Control Circuit Blown Fuse.

Reflash: Yes

RECIRC PUMPS
BKR 2A/B, 5A/B
CONTROL CKT BLOWN
FUSE

602120



602120

20.1	Computer Point	Computer Printout	Source
	RCSBC43	RCS BRKR 5A AUX CKT FUSE	74, CKT-2RCSA01
	RCSBC44	RCS BRKR 5B AUX CKT FUSE	74, CKT-2RCSA11
	RCSBC45	RCS BRKR 2A TR CKT FUSE	74, CKT-2RCSB01
	RCSBC46	RCS BRKR 2B TR CKT FUSE	74, CKT-2RCSB11

20.2 Automatic Response

None

20.3 Corrective Action

a. If the pump trip signal is present, manually trip the pump if required by opening the associated breaker.

b. Verify the cause of the alarm.

c. Replace the blown control fuse.

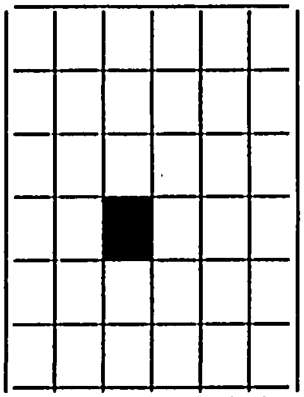
I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

21.0 602121 - Recirc. Flux Controller Output Abnormal

Reflash: No

RECIRC
FLUX CONT
OUTPUT
ABNORMAL

602121



602121

21.1

Computer Point	Computer Printout	Source
RCSBC13	RCS FLUX CONT OUTPUT ABN	Flux Controller output signal (K 619-1) *

21.2 Automatic Response

Flow control shift to Loop Manual control.

21.3 Corrective Action

a. Stabilize flow and power using Loop Controllers in manual.

b. Determine and correct cause for abnormal output.

c. When condition is corrected the output abnormal can be reset at P634 Rack 1 on the North side. The Channel 2 light indicates the output abnormal condition and can be reset by depressing the reset pushbutton adjacent to the red light.

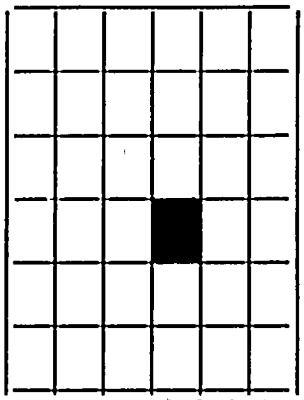
I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

22.0 602122 - Recirc Master Controller Output Abnormal

Reflash: No

RECIRC
MASTER CONT
OUTPUT
ABNORMAL

602122



602122

22.1	Computer Point	Computer Printout	Source
	RCSBC14	RCS MAST CONT OUTPUT ABN	Master Controller Output Signal (K 618-1)

22.2 Automatic Response

Flow control shift to flux manual.

22.3 Corrective Action

a. Place flux controller in manual and stabilize flow and power.

b. If manual operation of the flux controller does not stabilize flow, shift to loop manual control.

c. Determine and correct cause for abnormal output.

d. When conditions have been corrected the output abnormal can be reset in P634 Rack 1 on the North side. The Channel 1 light indicates the abnormal output and can be reset by depressing the reset pushbutton adjacent to the red light.

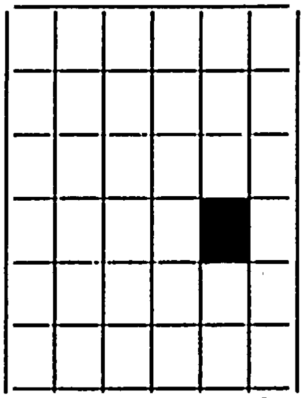
I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

23.0 602123 - Recirc Pump 1A Motor Bearing Oil Level High/Low

Reflash: Yes

RECIRC PMP 1A
MOTOR BRG OIL
LEVEL
HIGH/LOW

602123



602123

23.1

	Computer Point	Computer Printout	Source
a.	RCSLC01	RCS P1A MOT LOR BRG OIL	Oil 1" above normal (LS 32A)
b.	RCSLC03	RCS P1A MOT LOR BRG OIL	Oil 1" below normal (LS 33A)
c.	RCSLC05	RCS P1A MOT UPR BRG OIL	Oil 1" above normal (LS 35A)
d.	RCSLC06	RCS P1A MOT UPR BRG OIL	Oil 1" below normal (LS 34A)

23.2 Automatic Response

None

23.3 Corrective Action

NOTE: The motor bearing temperatures can be monitored via computer printout RCSTA 01, 03, 05, 13 for trending.

a. Monitor bearing temperatures (P614).

b. Low level should be interpreted as a loss of lubricating oil and high level as the presence of cooling water in the oil reservoir. Either condition can result in bearing failure.

c. If the temperature trend on the bearing indicating high/low level shows increasing temperature, shut down RCS-P1A in accordance with N2-OP-29 Section G.2.0 before the temperature reaches 194°F continuous.

I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

d. Refer to N2-OP-29 Section H.7.0 for single loop operation.

e. Correct cause as plant conditions allow.

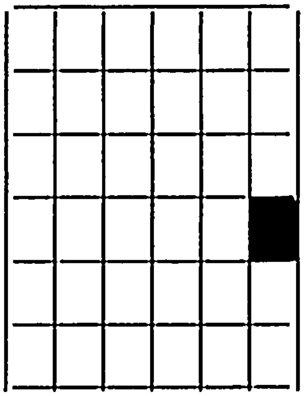
I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

24.0 602124 Recirc Pump 1B Motor Bearing Oil Level High/Low

Reflash: Yes

RECIRC PUMP 1B
MOTOR BRG OIL
LEVEL
HIGH/LOW

602124



602124

24.1 Computer Point / Computer Printout / Source

	Computer Point	Computer Printout	Source
a.	RCSLC02	RCS P1B MOT LOR BRG OIL	Oil 1" above normal (LS 32B)
b.	RCSLC04	RCS P1B MOT LOR BRG OIL	Oil 1" below normal (LS 33B)
c.	RCSLC07	RCS P1B MOT UPR BRG OIL	Oil 1" above normal (LS 35B)
d.	RCSLC08	RCS P1B MOT UPR BRG OIL	Oil 1" below normal (LS 34B)

24.2 Automatic Response

None

24.3 Corrective Action

NOTE: The motor bearing temperatures can be monitored via computer printout RCSTA 02, 04, 06, 14 for trending.

a. Monitor bearing temperatures (P614).

b. Low level should be interpreted as a loss of lubricating oil, and high level as the presence of cooling water in the oil reservoir. Either condition can result in bearing failure.

I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

c. If the temperature trend on the bearing indicating high/low level shows increasing temperature, shut down RCS-P1B in accordance with N2-OP-29 Section G.2.0 before the temperature reaches 194°F continuous. TCN-3

d. Refer to N2-OP-29 Section H.7.0 Single Loop Operation.

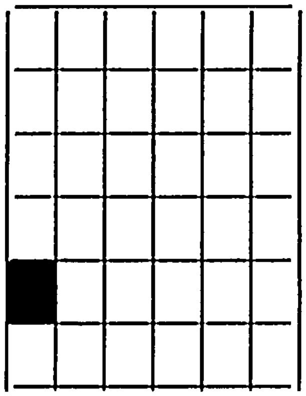
e. Correct cause as plant conditions allow.

25.0 602125 - Recirc Pump 1A Motor Generator Set Protective Relay Trip

Reflash: No

RECIRC PUMP 1A
MG SET
PROT RELAY
TRIP

602125



602125

25.1

Computer Point	Computer Printout	Source
RCSUC09	RCS LFMG 1A GEN PROT RLY	TRIP Motor and generator protective relays (K110A) *

25.2 Automatic Response

a. LFMG motor breaker trip, 2NNS-SWG011-9 (BRKR 1A) opens.

b. LFMG generator breaker trip, 2NPS-SWG004-1 (BRKR 2A) opens.

25.3 Corrective Action

a. Determine and correct cause for LFMG trip.

b. If recirc pump *P1A tripped, refer to N2-OP-29 Section H.2.0 Recirc Pump Trip and proceed as directed.

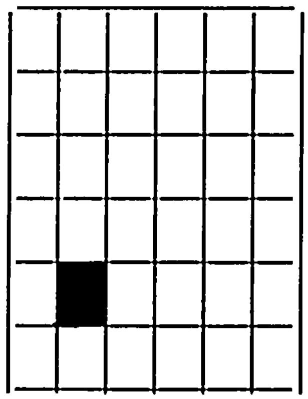
I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

26.0 602126 - Recirc Pump 1B Motor Generator Set Protective Relay Trip

Reflash: No

RECIRC PUMP 1B
MG SET
PROT RELAY
TRIP

602126



602126

26.1

Computer Point	Computer Printout	Source
RCSUC10	RCS LFMG 1B GEN PROT RLY	Trip Motor and Generator Protective relays (K110B) *

26.2 Automatic Response

a. LFMG motor breaker trip, 2NNS-SWG013-1 (BRKR 1B) opens.

b. LFMG generator breaker trip, 2NPS-SWG005-1 (BRKR 2B) opens.

26.3 Corrective Action

a. Determine and correct cause for LFMG trip.

b. If recirc pump *P1B tripped, refer to N2-OP-29 Section H.2.0 Recirc. Pump Trip and proceed as directed.

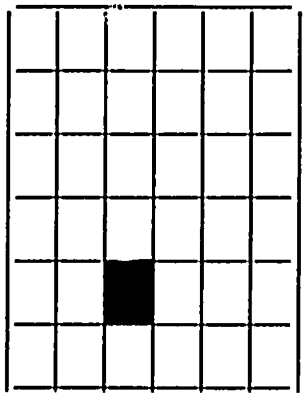
I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

27.0 602127 - Drywell High Pressure Switch A in Test Position

Reflash: No

DRYWELL
HIGH PRESSURE
SWITCH A
TEST POSITION

602127



602127

27.1

Computer Point	Computer Printout	Source
RCSBC01	DW HI PR SW A TEST POSN	Switch (S104A) in TEST position

27.2 Automatic Response

a. Flow control valve motion is effectively inhibited by a closed servo valve. Unlike a Motion Inhibit the subloops remain ready and operational with its motor running.

27.3 Corrective Action

a. Determine the need to have the test switch in the TEST position. When no longer required, restore to the NORMAL position.

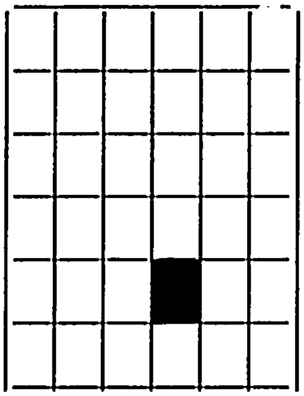
I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

28.0 602128 - Drywell High Pressure Switch B in Test Position

Reflash: No

DRYWELL
HIGH PRESSURE
SWITCH B
TEST POSITION

602128



602128

28.1

Computer Point	Computer Printout	Source
RCSBC02	DW HI PR SW B TEST POSN	Switch (S104B) in TEST position

28.2 Automatic Response

a. Flow control valve motion is effectively inhibited by a closed servo valve. Unlike a Motion Inhibit the subloops remain ready and operational with its motor running.

28.3 Corrective Action

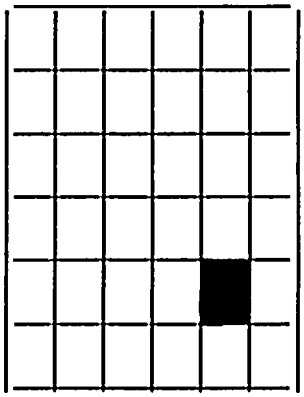
a. Determine the need to have the test switch in the TEST position. When no longer required, restore to the NORMAL position.

29.0 602129 - Recirc Pump 1A Motor Winding Cooler Leakage

Reflash: Yes

RECIRC PMP 1A
MOTOR WINDING
COOLER
LEAKAGE

602129



602129

29.1

	Computer Point	Computer Printout	Source
a.	RCSXC01	RCS P1A MOT WDG CLR A LK	LS-36A
b.	RCSXC03	RCS P1A MOT WDG CLR C LK	LS-36C

29.2 Automatic Response

None

29.3 Corrective Action

a. Switch actuation should be confirmed to be a leaking or ruptured air cooler by the following:

1. Increased DWFD leak rate.
2. Increased Mtr winding temperature on any of the phase windings.
   a. A phase - P614 recorder B35-R601 point #5 or computer point RCSTA07.
   b. B phase - P614 recorder B35-R601 point #6 or computer point RCSTA09.
   c. C phase - P614 recorder B35-R601 point #7 or computer point RCSTA11.
3. Low motor winding cooling flow as indicated by annunciator 602135 energized "RECIRC PUMP 1A MOTOR WINDING CLG WTR FLOW LOW" with computer point RCSFC07 in alarm "LOW". These indications would require a shutdown of RCS*P1A in accordance with N2-OP-29 Section G.2.0 Recirculation Pump Shutdown.

I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

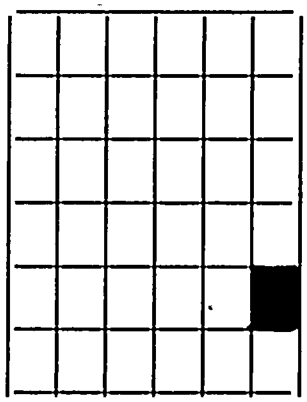
b. Refer to N2-OP-29 Section H.7.0 Single Loop Operation.

c. Correct cause as plant conditions allow. If leak is gross this should include isolating RBCLC to *P1A.

30.0 602130 - Recirc Pump 1B Motor Winding Cooler Leakage

Reflash: Yes

RECIRC PMP 1B MOTOR WINDING COOLER LEAKAGE 602130



602130

30.1

	Computer Point	Computer Printout	Source
a.	RCSXC02	RCS P1B MOT WDG CLR B LK	LS 36B
b.	RCSXC04	RCS P1B MOT WDG CLR D LK	LS 36D

30.2 Automatic Response

None

30.3 Corrective Action

a. Switch actuation should be confirmed to be a leaking or ruptured air cooler by the following:

1. Increased DWFD leak rate.
2. Increased Mtr winding temperature on any of the phase windings.
   a. A phase - P614 recorder B35-R601 point #17 or computer point RCSTA08.
   b. B phase - P614 recorder B35-R601 point #18 or computer point RCSTA10.
   c. C phase - P614 recorder B35-R601 point #19 or computer point RCSTA12.
3. Low motor winding cooling flow as indicated by annunciator 602136 energized "RECIRC PUMP 1B MOTOR WINDING CLG WTR FLOW LOW" with computer point RCSFC08 in alarm "LOW". These indications would require a shutdown of RCS*P1B in accordance with N2-OP-29 Section G.2.0 Recirculation Pump Shutdown.

b. Refer to N2-OP-29 Section H.7.0 Single Loop Operation.

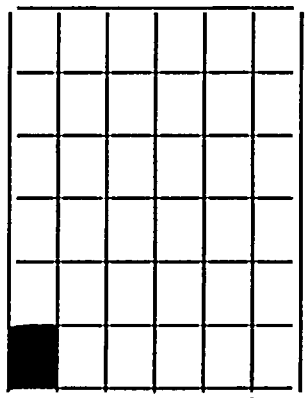
c. Correct cause as plant conditions allow. If leak is gross this should include isolating RBCLC to *P1B.

31.0 602131 - Recirc Pump 1A Motor Generator Set Interlock Bypassed

Reflash: Yes

RECIRC PMP 1A
MG SET
INTERLOCK
BYPASSED

602131



602131

31.1

Computer Point	Computer Printout	Source
a. RCSBC23	DELTA-TMP INTLK SW A POS	SW (S120A) in Bypass
b. RCSUC18	RCS LO FLO INLK SW A POS	SW (S119A) in Bypass
c. RCSUC19	RCS LO PWR INLK SW B POS	SW (S118A) in Bypass

31.2 Automatic Response

NONE

31.3 Corrective Action

a. Determine the need to have applicable switch in BYPASS. When no longer required, return switch to NORMAL

[illegible]

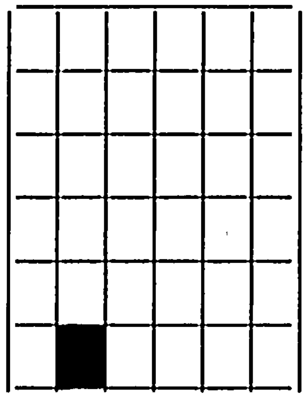
I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

32.0 602132 - Recirc Pump 1B Motor Generator Set Interlock Bypassed

Reflash: Yes

RECIRC PMP 1B
MG SET
INTERLOCK
BYPASSED

602132



602132

32.1	Computer Point	Computer Printout	Source
a.	RCSBC24	DELTA-TMP INTLK SW B POS	SW (S120B) in BYPASS
b.	RCSBC38	LO FLOW INTLK BYPASS SW	SW (S119B) in BYPASS
c.	RCSBC39	LO PWR INTLK BY-PASS SW ABNORMAL	SW (S118B) in Bypass

32.2 Automatic Response

a. NONE

32.3 Corrective Action

a. Determine the need to have applicable switch in BYPASS. When no longer required, return switch to NORMAL

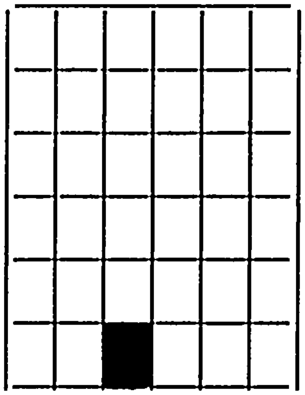
I. <u>PROCEDURES FOR CORRECTING ALARM CONDITIONS</u> (Cont)

33.0 <u>602133</u> - Drywell High Pressure System A Interlock

<u>Reflash: No</u>

DRYWELL
HIGH PRESSURE
SYSTEM A
INTERLOCK

602133



602133

33.1	<u>Computer Point</u>	<u>Computer Printout</u>	<u>Source</u>
	RCSBC03	DW HI PR SYS A INTERLOCK	DW Press above 1.68 psig (AMC-1) *

33.2 <u>Automatic Response</u>

a. Possible high DW press. Scram, containment isolations, and ECCS actuation.

b. Flow control valve A locks up as is.

c. Flow control shifts to manual.

d. HPU pump trip to Maintenance Mode.

33.3 <u>Corrective Action</u>

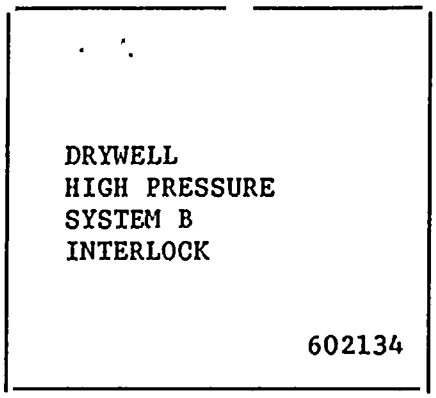
a. Investigate and correct cause as required.

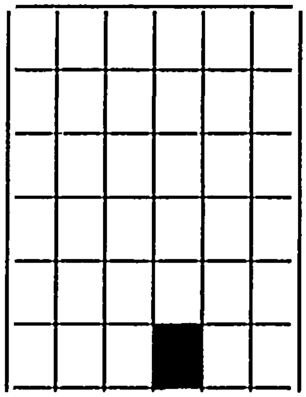
b. When corrected, start the HPU and reset motion inhibit by depressing the FCV Motion Inhibit reset pushbutton on P602.

I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

34.0 602134 - Drywell High Pressure System B Interlock

Reflash: No




602134

34.1

Computer Point	Computer Printout	Source
RCSBC04	DW HI PR SYS B INTERLOCK	DW Press above 1.68 psig (BMC-1)

34.2 Automatic Response

a. Possible high DW press. Scram, containment isolations, and ECCS actuation.

b. Flow control valve B locks up as is.

c. Flow control shifts to manual.

d. HPU pump trip to Maintenance Mode.

34.3 Corrective Action

a. Investigate and correct cause as required.

b. When corrected, start the HPU and reset motion inhibit by depressing the FCV Motion Inhibit reset pushbutton on P602.

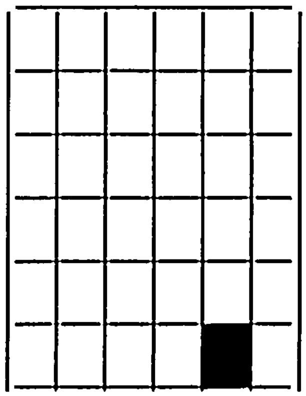
I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

35.0 602135 - Recirc Pump 1A Motor Winding Cooling Water Flow Low

Reflash: No

RECIRC PMP 1A
MOTOR WINDING
CLG WTR FLOW
LOW

602135



602135

35.1	Computer Point	Computer Printout	Source
	RCSFC07	RCS P1A MOT CLG WTR FLO	2CCP-FS34A (279 gpm) *

35.2 Automatic Response

None

35.3 Corrective Action

a. Check cooling water flow from *P1A (computer point CCPFA01).

b. Verify proper CCP lineup to *P1A, *MOV93A, 17A, 94A, 16A, 15A, 22A open.

c. Monitor Motor winding temperatures (P614), shutdown *P1A if temperature exceeds 248°F continuous or 266°F intermittent.

d. Refer to N2-OP-29 Section H.4.0 Loss of Cooling Water to the Recirc Pumps.

e. If required to shutdown *P1A refer to N2-OP-29 Section G.2.0 Reactor Recirculation Pump Shutdown.

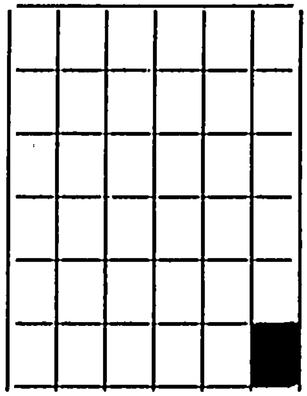
f. Determine and correct cause as required.

36.0 602136 - Recirc Pump 1B Motor Winding Cooling Water Flow Low

Reflash: No

RECIRC PMP 1B
MOTOR WINDING
CLG WTR FLOW
LOW

602136



602136

36.1 Computer Point

	Computer Point	Computer Printout	Source
a.	RCSFC08	RCS P1B MOT CLG WTR FLO	2CCP-FS34B (279 gpm)

36.2 Automatic Response

None

36.3 Corrective Action

a. Check cooling water flow from *P1B (computer point CCPFA02).

b. Verify proper CCP lineup to *P1B, *MOV93B, 17B, 16B, 94B, 15B, 22B open.

c. Monitor Motor winding temperatures (P614), shutdown *P1B if temperature exceeds 248°F continuous or 266°F intermittent.

d. Refer to N2-OP-29 Section H.4.0 Loss of Cooling Water to the Recirc Pumps.

e. If required to shutdown *P1A refer to N2-OP-29 Section G.2.0 Reactor Recirculation Pump Shutdown.

f. Determine and correct cause as required.

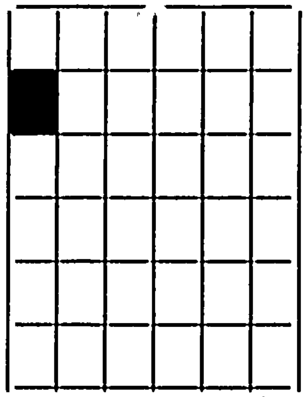
I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

37.0 602207 - Recirc Pump 1A Low Speed Automatic Transfer Not Available

Reflash: Yes

RECIRC PMP 1A
LOW SPEED
AUTO TRANSFER
NOT AVAILABLE

602207



602207

37.1	Computer Point	Computer Printout	Source
a.	RCSBC19	RCS LFMG 1A MOT BRKR 1A	Brk in PTL (S114A)
b.	RCSBC30	RCS P1A SUCT/DISCH VLVS NO FLOP	RCS*MOV10A or RCS*MOV18A not open (K112A)
c.	RCSBC31	LFMG1A GEN BKR 2A LOCKOUT	Brk in PTL (S115A)
d.	RCSBC32	RCS PMP 1A PERMIS INTLKS	BRKR1A PTL or MG set lockout, BRKR2A or BRKR1A not racked in (K111A)
e.	RCSBC33	RCS P1A BRKR 5A CONT PWR	Brk in PTL (K103A)

37.2 Automatic Response

a. NONE.

37.3 Corrective Action

a. Check *P1A discharge valve 2RCS*MOV18A full open.

b. Check *P1A Suction valve 2RCS*MOV10A full open.

c. Verify *P1A circuit breaker lineup.

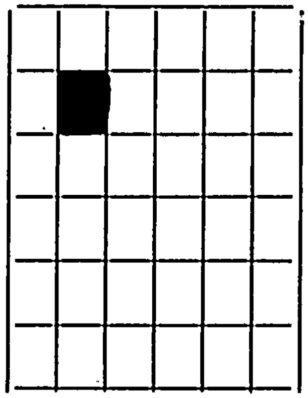
d. Place control switches for *P1A in Normal After Stop on P602.

38.0 602208 - Recirc Pump 1B Low Speed Automatic Transfer Not Available

Reflash: Yes

RECIRC PMP 1B
LOW SPEED
AUTO TRANSFER
NOT AVAILABLE

602208



602208

38.1 Computer Point / Computer Printout / Source

	Computer Point	Computer Printout	Source
a.	RCSBC20	RCS LFMG 1B MOT BRKR1B	Brk in PTL (S114B)
b.	RCSBC34	RCS P1B SUCT/DISCH VLVS NO FLOP	RCS*MOV10B or RCS*MOV18B not open (K112B)
c.	RCSBC35	LFMG1B GEN BKR 2B LOCKOUT	Brk in PTL (S115B)
d.	RCSBC36	RCS PMP 1B PERMIS INTLKS	BRKR1A PTL or MG set lockout, BRKR2B or BRKR1A not racked in (K111B)
e.	RCSBC37	RCS P1B BRKR5B CONT PWR	Brk in PTL (K103B)

38.2 Automatic Response

a. NONE.

38.3 Corrective Action

a. Check *P1B discharge valve 2RCS*MOV18B full open.

b. Check *P1B Suction valve 2RCS*MOV10B full open.

c. Verify *P1B circuit breaker lineup.

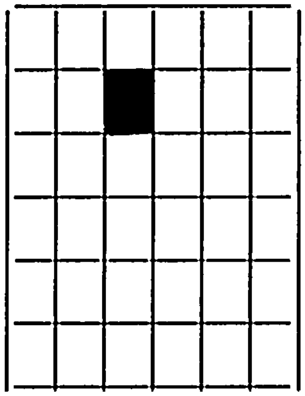
d. Place control switches for *P1B in Normal After Stop on P602.

39.0 602209 - Reactor Dome Press High/VES DRN LINE TEMP LOW

Reflash: Yes

REACTOR DOME
PRESS HIGH/
VES DRN LINE
TEMP LOW

602209



602209

39.1

	Computer Point	Computer Printout	Source
a.	RCSBC18	DOME PR HI/DR LN TMP LO	Dome press 312 psi (420°F) and Bottom drain 230°F (K662A, K667A)
b.	RCSTC11	DOME PR HI/DR LN TMP LO	Dome press 312 psi (420°) and Bottom drain 230°F (K662B, K667B)

*

39.2 Automatic Response

a. Recirc pump thermal interlock start inhibit will have already been received at 145° differential temperature using different temp/press switches.

39.3 Corrective Action

NOTE: This annunciator is not expected to be in alarm state with forced recirculation flow through the core.

a. Contact I&C to verify proper operation of temp/press circuit for annunciator.

b. If bottom head drain temp/RPV dome press (temp) difference is above 145°F with no recirculation flow;

1. Verify proper CRD flows.

2. Increase RWCU bottom head drain flow.

c. When RPV dome press (temp)/Bottom head drain temp difference is below 145°, reset Recirc pump thermal interlocks by pushing the PUMP SUCT DRAIN LINE- DOME ΔT INTERLOCK pushbutton on P602.

*8

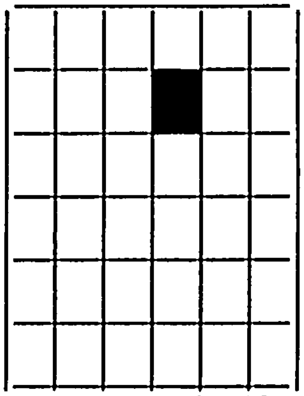
I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

40.0 602210 - Flow Control Valve A Partial Closure - Reactor Feed Pump Trip

Reflash: No

FCV A
PART CLOSURE
RFP
TRIP

602210



602210

40.1

Computer Point	Computer Printout	Source
RCSBC40	RCS FCV A PART CL/RFP TR	RPV water level at level 4 and less than 2 feed pump running (K616A-1) *

40.2 Automatic Response

Recirc flow control valve runback to about 20% valve position.

40.3 Corrective Action

a. Verify runback reduces power to within the capacity of 1 RFP and reactor water level is maintained.

b. Refer to N2-OP-101D, Sudden Decrease of Core Flow for possible immediate action requirements.

c. Restore feedwater per N2-OP-3

d. Verify or place Loop Controller in manual by depressing MAN pushbutton.

e. Zero the limiter error meter using the Loop Controller M/A station INCREASE/DECREASE positioner.

f. Verify the servo error is nulled and Loop Controller M/A station output is at about 35%.

I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

g. Reset the Runback by depressing the FW PUMP TRIP INTERLOCK reset pushbutton on P602.

h. Restore recirc flow control to the desired mode per Section E.5.0 and E.6.0 of this procedure.

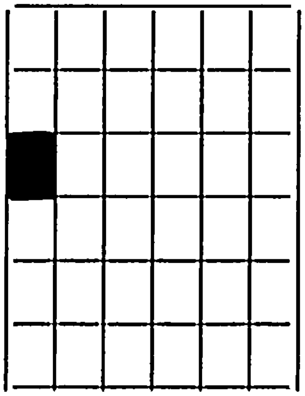
I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

41.0 602213 - Recirc Pump 1A Motor Automatic Transfer Not Complete

Reflash: No

RECIRC PMP 1A
MOTOR
AUTO TRANSFER
NOT COMPLETE

602213



602213

41.1

Computer Point	Computer Printout	Source
RCSBC21	RCS PMP 1A AUTO XFR STAT	Failure to transfer either due to control power failure or not completed within 40 seconds. (K120A)

41.2 Automatic Response

a. 2RCS*P1A trip (BRKR5A or BRKR1A lockout).

41.3 Corrective Action

a. Verify control power available (2BYS-PNLA107 ckt#7).

b. Determine and correct cause for incomplete transfer.

c. Take control switch BRKR5A to PTL to reset interlock.

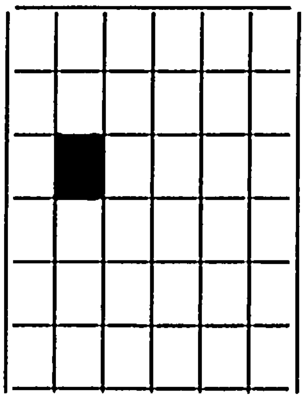
d. Refer to N2-OP-29 Section H.2.0 Recirculation Pump Trip and take actions as directed.

42.0 602214 - Recirc Pump 1B Motor Automatic Transfer Not Complete

Reflash: No

RECIRC PMP 1B
MOTOR
AUTO TRANSFER
NOT COMPLETE

602214



602214

42.1

Computer Point	Computer Printout	Source
a. RCSBC22	RCS PMP 1B AUTO XFR STAT	Failure to transfer either due to loss of control power or not completed within 40 seconds. (K120B)

*

42.2 Automatic Response

2RCS*P1B trips (BRKR5B or BRKR1B lockout).

42.3 Corrective Action

a. Verify control power available (2BYS-PNLB107 ckt#5).

b. Determine and correct cause for incomplete transfer.

c. Take control switch BRKR5B to PTL to reset interlock.

d. Refer to N2-OP-29 Section H.2.0 Recirculation Pump Trip and take actions as directed.

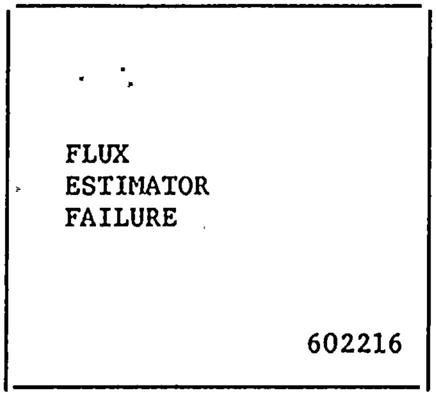
[illegible]

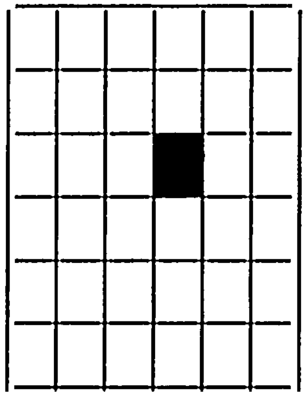
[illegible]

I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

43.0 602216 - Flux Estimator Failure

Reflash: No





602216

43.1	Computer Point	Computer Printout	Source
	RCSBC41	RCS FLUX ESTIMATOR	Continuous auto selection of APRM signal or excessive switching between APRM and flux estimator

43.2 Automatic Response

a. Flux Estimator Failure white light if APRM signal is continually provided to Flux controller.

b. Flux Estimator NEEDS MAINTENANCE white light if flux controller is switching between APRM and flux estimator signal.

43.3 Corrective Action

a. Place flux controller in the manual mode of operation. Stabilize any flow and power oscillations.

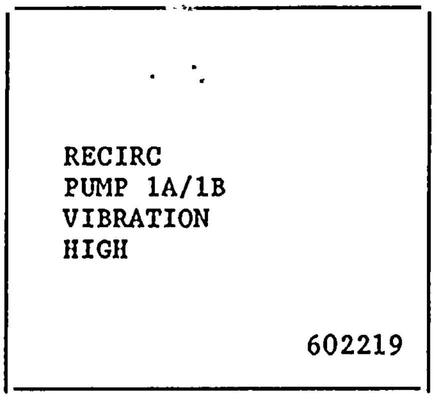
b. Determine and correct cause for failure or excessive switching.

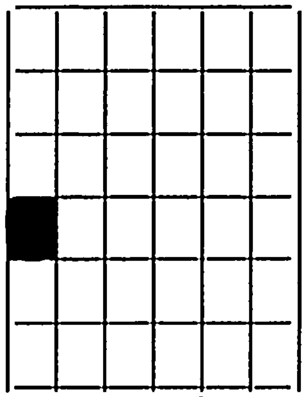
c. When corrected, reset by depressing the FLUX ESTIMATOR ALARM RESET on P602.

I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

44.0 602219 Recirc Pump 1A/1B Vibration High TCN-62

Reflash: Yes





602219

44.1

	Computer Point	Computer Printout	Source	
a.	RCSNC03	RCRC PMP1A VIBRATION HIGH	2RCS-NBS86A >13.5 mils or 2RCS-NBS88A >3 mils	TCN-62
b.	RCSNC04	RCRC PMP1B VIBRATION HIGH	2RCS-NBS86B >13.5 mils or 2RCS-NBS88B >3 mils	TCN-62

44.2 Automatic Response

None

44.3 Corrective Action

a. Monitor motor and pump shaft vibration (2RCS-PNL100 el. 240 R.B.), bearing and winding temperatures (P614). If recorded information is desired, instruct I&C to install a recorder on the vibration instrument loop.

b. Reset vibration alarm(s) by depressing RECIRC PMP 1A (1B) VIB reset at 2RCS-PNL100. If vibration alarm(s) cannot be reset, perform Section E.3.10.a and using frequency per Note CC in N2-OSP-LOG-S@ALL or S001. TCN-62

c. If Motor frame vibration exceeds 5 mils, or pump shaft vibration exceeds 15 mils or Bearing temperatures exceed 194°F, or annunciator 602123 (602124) *P1A(P1B) Bearing Oil Level H/L alarms, then; TCN-65

1. Shutdown the affected pump per N2-OP-29 Section G.2.0 Recirc Pump Shutdown.

2. Refer to N2-OP-29 Section H.7.0 Single Loop Operation.

d. Identify and correct cause as plant conditions allow.

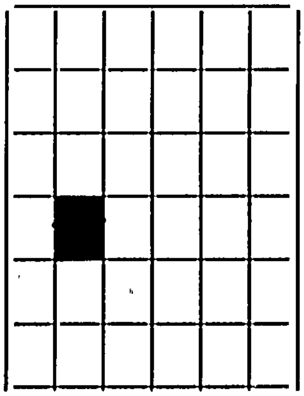
I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

45.0 602220 - Recirc Pump 1A/1B Motor Temperature High

Reflash: Yes

RECIRC
PUMP 1A/1B
MOTOR TEMP
HIGH

602220



602220

45.1	Computer Point	Computer Printout	Source
a.	RCSTC03	RCS P1A/B MOT BRG TEMP	Thrust Brg and Guide Brg Temp above 194°F (2RCS-TE 21A,22A,23A,27A) (2RCS-TE 21B,22B,23B,27B)
b.	RCSTC07	RCS P1A/B STATOR WDG TMP	Stator Phase Temp above 240°(2RCS-TE 24A,25A,26A) (2RCS-TE 24B, 25B, 26B)
c.	RCSTC08	RCS P1A/B SL CAVITY TEMP	Seal Cavity Temp above 160° (2RCS-TE 28A, 29A) (2RCS-TE 28B, 29B)
d.	RCSTC09	RCS P1A/B STTR WTR TEMP	Stator Water Temp high (2CCP-TE 26A) (2CCP-TE 26B)
e.	RCSTC10	RCS P1A/B SL/BRG WTR TMP	Bgr & Seal Water Temp high (2CCP TE 95A, 32A) (2CCP TE 95B, 32B)

*

45.2 Automatic Response

. None

I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

45.3 Corrective Action

a. Monitor temperatures on P614 temperature recorder (R601).

b. Verify the motor bearing oil level high/low, seal cooling water and motor winding cooling water low flow alarms are not annunciated.

c. If seal cavity temperature is greater than 185°F and upper seal cavity pressure is not within 100 to 920 psig, shut down the pump per G.2.0 of this procedure.

d. If seal cavity temperature exceeds 200°F, manual trip the pump per G.2.0 of this procedure.

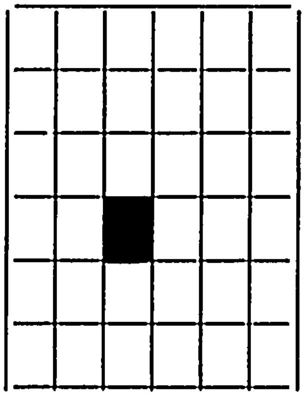
I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

46.0 602221 - Recirc Pump Cooler Isolation Valves 2CCP*MOV16A/B, 17A/B Motor Overload

Reflash: Yes

RBCL
CNTMT/RCS
PUMP COOLERS
MOT OVERLOAD

602221



602221

46.1

	Computer Point	Computer Printout	Source
a.	CCPTC41	D1 RCS P1A CLRS MOV MOT	Motor Overload (49X)
b.	CCPTC42	D2 RCS P1B CLRS MOV MOT	Motor Overload (49X)

46.2 Automatic Response

None

46.3 Corrective Action

a. Check local breaker for power available to the MOVs.

2CCP*MOV16A	2EHS*MCC303B Cub 5A
2CCP*MOV16B	2EHS*MCC303B Cub 5A
2CCP*MOV17A	2EHS*MCC103B Cub 5A
2CCP*MOV17B	2EHS*MCC103B Cub 5A

I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

b. Verify flow still available to recirc pumps.

Computer Points (CCPFA01, CCPFA02)

c. Refer to TS 3.6.3 for actions required for inoperable containment isolation valves.

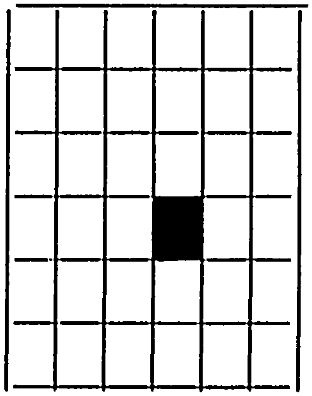
d. Determine and correct cause.

47.0 602222 - Flow Control Valve B Partial Closure - Reactor Feed Pump Trip

Reflash: No

FCV B
PART CLOSURE/
RFP
TRIP

602222



602222

47.1	Computer Point	Computer Printout	Source
	RCSBC42	RCS FCV B PART CL/RFP TR	RPV Water Level at Level 4 and less than 2 feedpump running (K616 B-1)

47.2 Automatic Response

Recirc flow control valve runback to about 20% valve position.

47.3 Corrective Action

a. Verify runback reduces power to within the capacity of 1 RFP and reactor water level is maintained.

b. Refer to N2-OP-101D, Sudden Decrease of Core Flow for possible immediate action requirements.

c. Restore feedwater per N2-OP-3.

d. Verify or place Loop Controller in manual by depressing man pushbutton.

e. Zero the Limiter error meter using the Loop Controller M/A Station Increase/Decrease positioner.

f. Verify servo error is nulled and Loop Controller M/A station output is at about 35%.

g. Reset the Runback by depressing the FW PUMP TRIP INTERLOCK reset pushbutton on P602.

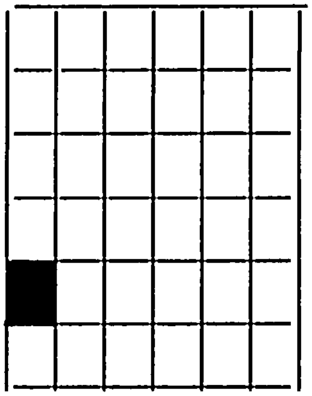
h. Restore recirc flow control to the desired mode per Section E.5.0 and E.6.0 of this procedure.

48.0 602225 - Recirc Pump 1A Automatic Trip - Low Speed Transfer

Reflash: Yes

RECIRC PMP 1A
AUTO TRIP
LOW SPEED
TRANSFER

602225



602225

48.1

	Computer Point	Computer Printout	Source
a.	RCSUC07	RCS A FW LO FLO INTLK	Feed flow less than 30% (K128A)
b.	RCSUC15	RCS RX LO LVL INTLK A	RPV level less than 159.3" (K129A)
c.	RCSUC16	ST DOM/PP SUC TMP INLK A	Differential temperature less than 10.7°F (K130A)
d.	RCSUC17	RCS P1A TR LFMG START	RRCS High pressure initiation or EOC-RPT (K132A)

48.2 Automatic Response

a. Recirc pump downshift to slow speed.

b. Recirc flow control shift to manual.

I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

48.3 Corrective Action

NOTE: Information alarm, the alarm is actuated when reactor power is less than 24%. TCN-66

a. Refer to N2-OP-101D, Sudden Decrease of Core Flow for possible immediate action requirements.

b. Determine and correct cause for recirc pump high to low speed transfer.

c. Reset associated trip on P602.

d. Restore recirc flow control as required.

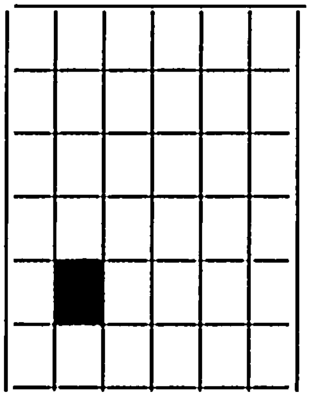
e. Refer to N2-OP-29 Section H.2.0 Recirculation Pump Trip if pump trips to zero speed.

49.0 602226 - Recirc Pump 1B Automatic Trip - Low Speed Transfer

Reflash: Yes

RECIRC PMP 1B
AUTO TRIP
LOW SPEED
TRANSFER

602226



602226

49.1		Computer Point	Computer Printout	Source
	a.	RCSUC08	RCS B FW LO FLO INTLK	Feed flow less than 30% (K128B)
	b.	RCSUC20	RCS RX LO LVL INTLK B	RPV level less than 159.3" (K129B)
	c.	RCSUC21	ST DOM/PP SUC TMP INLK B	Differential temperature less than 10.7°F (K130B)
	d.	RCSUC22	RCS P1B TR LFMG START	RRCS High pressure initiation or EOC-RPT (K132B)

49.2 Automatic Response

a. Recirc pump downshift to slow speed.

b. Recirc flow control shift to manual.

I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

49.3 Corrective Action

NOTE: Information alarm, the alarm is actuated when reactor power is less than 24%. TCN-66

a. Refer to N2-OP-101D, Sudden Decrease of Core Flow for possible immediate action requirements.

b. Determine and correct cause for recirc pump high to low speed transfer.

c. Reset associated trip on P602.

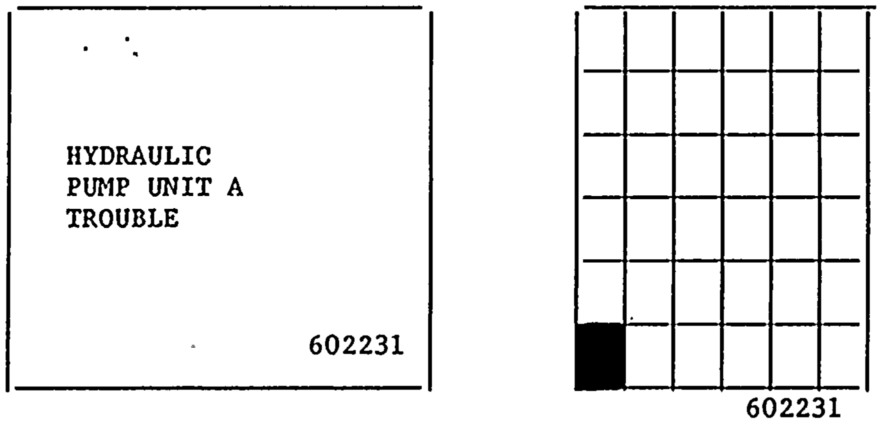
d. Restore recirc flow control as required.

e. Refer to N2-OP-29 Section H.2.0 Recirculation Pump Trip if pump trips to zero speed.

I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

50.0 602231 - Hydraulic Pump Unit A Trouble

Reflash: Yes



50.1	Computer Point	Computer Printout	Source
a.	RCSTC13	RCS HYDR OIL PMP 3A MOT	Motor Overload (49X)
b.	RCSTC14	RCS FAN 3A MOT	Motor Overload (49X)
c.	RCSTC15	RCS HYDR OIL PMP 4A MOT	Motor Overload (49X)
d.	RCSTC16	RCS FAN 4A MOT	Motor Overload (49X)

50.2 Automatic Response

a. 2RCS*P3A trip, 2RCS*P4A start.

b. 2RCS*F3A trip, 2RCS*F4A start.
or
c. 2RCS*P4A trip, 2RCS*P3A start.

d. 2RCS*F4A trip, 2RCS*F3A start.

I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

50.3 Corrective Action

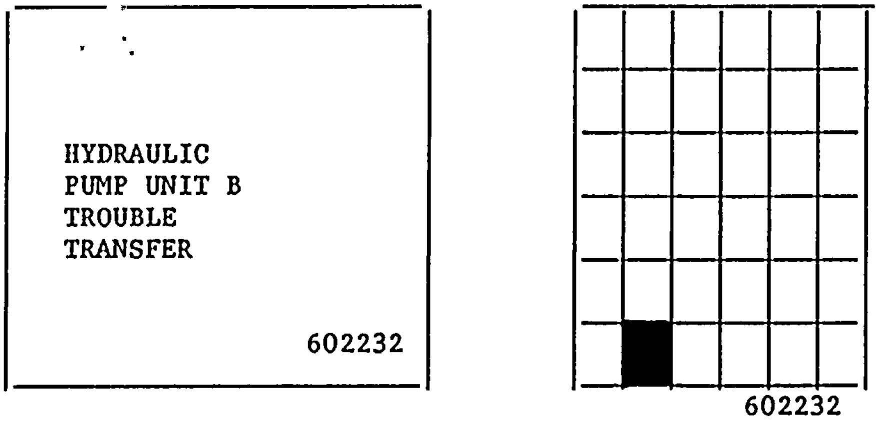
a. Verify running subloop operating properly.

b. Determine and correct cause of pump or fan motor overload.

c. Restore tripped component to READY status.

51.0 602232 - Hydraulic Pump Unit B Trouble

Reflash: Yes



51.1		Computer Point	Computer Printout	Source
	a.	RCSTC17	RCS HYDR OIL PMP 3B MOT	Motor Overload (49X)
	b.	RCSTC18	RCS FAN 3B MOT	Motor Overload (49X)
	c.	RCSTC19	RCS HYDR OIL PMP 4B MOT	Motor Overload (49X)
	d.	RCSTC20	RCS FAN 4B MOT	Motor Overload (49X)

51.2 Automatic Response

a. 2RCS*P3B trip, 2RCS*P4B starts.

b. 2RCS*F3B trip, 2RCS*F4B starts.

or

c. 2RCS*P4B trip, 2RCS*P3B starts.

d. 2RCS*F4B trip, 2RCS*F3B starts.

I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

51.3 Corrective Action

a. Verify running subloop operating properly.

b. Determine and correct cause of pump or fan motor overload.

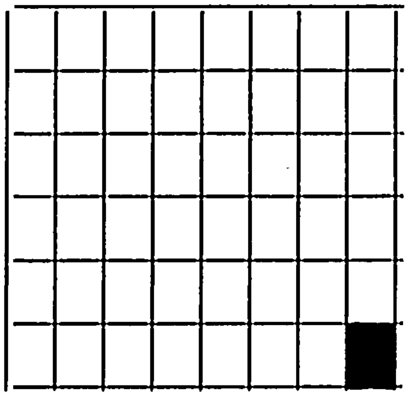
c. Restore tripped component to READY status.

52.0 603148 - Recirc Pumps Trip System A Inoperable

Reflash: No

RECIRC PUMPS
TRIP SYSTEM A
INOPERABLE

603148



603148

52.1

Computer Point	Computer Printout	Source
RPSBC36	RECIRC PMPS TRIP SYS A	Bypass PB

52.2 Automatic Response

a. EOC-RPT Bypassed when EOC RPT BYPASS pushbutton on P602 depressed and backlit.

52.3 Corrective Action

a. Determine the need to have EOC-RPT bypassed.

b. Refer to TS 3.3.4.2 END OF CYCLE RECIRCULATION PUMP TRIP SYSTEM and take action as required.

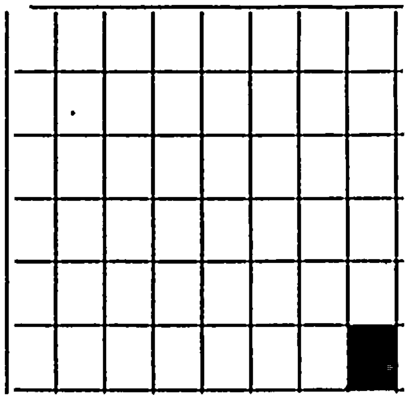
c. Restore to normal when no longer required to be bypassed, by pressing then releasing the RPT MANUALLY OUT OF SERVICE pushbutton. Verify the backlight goes out and annunciator clears.

53.0 603448 - Recirc Pumps Trip System B Inoperable

Reflash: No TCN-56

RECIRC PUMPS
TRIP SYSTEM B
INOPERABLE

603448



603448

53.1	Computer Point	Computer Printout	Source
	RPSBC37	D2 RX RCIR PMP TRIP INOP NO AVLB	Bypass PB

53.2 Automatic Response

a. EOC-RPT Bypassed when EOC RPT BYPASS pushbutton on P602 depressed and backlit.

53.3 Corrective Action

a. Determine the need to have EOC-RPT bypassed.

b. Refer to TS 3.3.4.2 END OF CYCLE RECIRCULATION PUMP TRIP SYSTEM and take action as required.

c. Restore to normal when no longer required to be bypassed, by pressing then releasing the RPT MANUALLY OUT OF SERVICE pushbutton. Verify the backlight goes out and annunciator clears.

I. PROCEDURES FOR CORRECTING ALARM CONDITIONS (Cont)

54.0 Inop Status Lights on P602

Refer to the following INOP windows for response:

NOTE: These Inop windows are actuated by 74 relays within the control power circuit. Fuses and panel location are given in parenthesis.

	Window	Source (74 Relays)	Automatic Action
1.	LOOP A HYDR FLUID SUPPLY SOV 67A INOP	Loss of control ckt power (F4-2RCSA26, P859)	Valve fails closed
2.	LOOP A HYDR FLUID RETURN SOV 65A INOP	Loss of control ckt power (F2-2RCSA26, P859)	Valve fails closed
3.	LOOP A HYDR FLUID PILOT SOV 66A INOP	Loss of control ckt power (F3-2RCSA26, P859)	Valve fails closed
4.	LOOP A HYDR FLUID DRAIN SOV 68A INOP	Loss of control ckt power (F5-2RCSA26, P859)	Valve fails closed
5.	LOOP A HYDR FLUID SUPPLY SOV 81A INOP	Loss of control ckt power (F4-2RCSA30, P861)	Valve fails closed
6.	LOOP A HYDR FLUID RETURN SOV 79A INOP	Loss of control ckt power (F2-2RCSA30, P861)	Valve fails closed
7.	LOOP A HYDR FLUID PILOT SOV 80A INOP	Loss of control ckt power (F3-2RCSA30, P861)	Valve fails closed
8.	LOOP A HYDR FLUID DRAIN SOV 82A INOP	Loss of control ckt power (F5-2RCSA30, P861)	Valve fails closed
9.	LOOP B HYDR FLUID SUPPLY SOV 67B INOP	Loss of control ckt power (F4-2RCSB26, P859)	Valve fails closed
10.	LOOP B HYDR FLUID RETURN SOV 65B INOP	Loss of control ckt power (F2-2RCSB26, P859)	Valve fails closed

11.	LOOP B HYDR FLUID PILOT SOV 66B INOP	Loss of control power (F3-2RCSB26, P859)	Valve fails closed
12.	LOOP B HYDR FLUID DRAIN SOV 68B INOP	Loss of control power (F5-2RCSB26, P859)	Valve fails closed
13.	LOOP B HYDR FLUID SUPPLY SOV 81B INOP	Loss of control power (F4-2RCSB30, P861)	Valve fails closed
14.	LOOP B HYDR FLUID RETURN SOV 79B INOP	Loss of control power (F2-2RCSB30, P861)	Valve fails closed
15.	LOOP B HYDR FLUID PILOT SOV 80B INOP	Loss of control power (F3-2RCSB30, P861)	Valve fails closed
16.	LOOP B HYDR FLUID DRAIN SOV 82B INOP	Loss of control power (F5-2RCSB30, P861)	Valve fails closed
17.	RBCLW ISOL V MOV 15A INOP	Loss of control power (2EHS*MCC103A)	Valve fails as is
18.	RBCLW ISOL V MOV 17A INOP	Loss of control power (2EHS*MCC103A)	Valve fails as is
19.	CCP ISOL V MOV 94A INOP	Loss of control power (2EHS*MCC303B)	Valve fails as is
20.	RBCLW ISOL MOV 16A INOP	Loss of control power (2EHS*MCC303B)	Valve fails as is
21.	RBCLW ISOL V MOV 15B INOP	Loss of control power (2EHS*MCC103A)	Valve fails as is
22.	RBCLW ISOL V. MOV 17B INOP	Loss of control power (2EHS*MCC103B)	Valve fails as is
23.	CCP ISOL V MOV 94B INOP	Loss of control power (2EHS*MCC303B)	Valve fails as is
24.	RBCLW ISOL MOV 16B INOP	Loss of control power (2EHS*MCC303B)	Valve fails as is

54.1 Corrective Action

a. If individual lights energize check control power listed under each source heading.

b. If windows 1 through 4 energize:

1. Check 2VBS*PNL101A ckt 11 closed.

c. If windows 1 through 4 energize:

1. Check 2VBS*PNL101A ckt 11 closed.

2. Check fuse F1-2RCSA26 (P859) installed.

d. If windows 5 through 8 energize:

1. Check 2VBS*PNL301B ckt 12 closed.

2. Check fuse F1-2RCSA30 (P861) installed.

e. If windows 9 through 12 energize:

1. Check 2VBS*PNL101A ckt 13 closed.

2. Check fuse F1-2RCSB26 (P859) installed.

f. If windows 13 through 16 energize:

1. Check 2VBS*PNL301B ckt 13 closed.

2. Check fuse F1-2RCSB30 (P861) installed.

g. If any of windows 17 through 24 energize:

1. Verify proper RBCLC flow to *P1A and *P1B.

2. Check MOV power supply at MCC.

3. Refer to T.S. 3.6.3 PRIMARY CONTAINMENT ISOLATION VALVES and take actions as required.

TABLE 1: SYSTEM VALVE LINEUP SHEET

PROCEDURE NUMBER N2-OP-29	PROCEDURE TITLE REACTOR RECIRCULATION SYSTEM					
VALVE NUMBER	**DESCRIPTION**	**REQUIRED POSITION**	**ACTUAL POSITION**	**INITIALS AND DATE**	**INDEP. VERIF. INIT./DATE**	**REMARKS**
	Control Room Operated Valves					
2RCS*MOV10A	"A" Loop Recirculation Suction Stop Valve	0				
2RCS*MOV18A	Recirc Pump A Discharge Stop Valve	0				
2RCS*SOV67B	OTBD HYDR FLUID OPEN ISOL SOL (HPU B)	0				
2RCS*SOV68B	OTBD FLUID DRAIN ISOL SOL (HPU B)	0				
2RCS*SOV79B	INBD HYDR FLUID CLOSE ISOL SOL (HPU B)	0				
2RCS*SOV80B	INBD HYDR FLUID PILOT ISOL (HPU B)	0				
2RCS*SOV81B	INBD HYDR FLUID OPEN ISOL SOL (HPU B)	0				
2RCS*SOV82B	INBD HYDR FLUID DRAIN ISOL SOL (HPU B)	0				
2RCS*MOV10B	LOOP B RECIRCULATION SUCTION STOP VALVE	0				

POSITION CODES:
O = Open
C = Closed
V = Throttled
L = Locked
T = Tagged (Danger)
CC = Closed and Capped
I = Installed
NG = Not Gagged
A = Auto
MP = Mid Position
V = Variable
AS = As Selected

TABLE 1: SYSTEM VALVE LINEUP SHEET

PROCEDURE NUMBER: N2-OP-29
PROCEDURE TITLE: REACTOR RECIRCULATION SYSTEM

VALVE NUMBER	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
	Control Room Operated Valves					
2RCS*MOV18B	RECIRC PUMP B DISCHARGE STOP VALVE	O				
2RCS*SOV65A	OTBD HYD FLUID CLOSE SOL (HPU A)	O				
2RCS*SOV66A	OTBD HYD FLUID PILOT SOL (HPU B)	O				
2RCS*SOV67A	OTBD HYDR FLUID OPEN SOL (HPU B)	O				
2RCS*SOV68A	OTBD FLUID DRAIN SOL (HPU A)	O				
2RCS*SOV79A	INBD HYDR FLUID CLOSE SOL (HPU A)	O				
2RCS*SOV80A	INBD HYDR FLUID PILOT SOL (HPU A)	O				
2RCS*SOV81A	INBD HYDR FLUID OPEN SOL (HPU B)	O				
2RCS*SOV82A	INBD HYDR FLUID DRAIN SOL (HPU A)	O				

POSITION CODES:

O = Open	L = Locked	I = Installed	MP = Mid Position
C = Closed	T = Tagged (Danger)	NG = Not Gagged	V = Variable
V = Throttled	CC = Closed and Capped	A = Auto	AS = As Selected

TABLE 1: SYSTEM VALVE LINEUP SHEET

PROCEDURE NUMBER	PROCEDURE TITLE					
N2-OP-29	REACTOR RECIRCULATION SYSTEM					
VALVE NUMBER	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
	Control Room Operated Valves					
2RCS*SOV66B	OTBD HYD FLUID PILOT SOL (HPU B)	O				
2RCS*SOV65B	OTBD HYD FLUID CLOSE SOL (HPU B)	O				
	Hydraulic Power Unit A (RB 261 North)					
2RCS-V2001C (A-2-11A)	Press gage isolation valve	O				
2RCS-V2002C (A-2-11B)	Press switch isolation valve	O				
2RCS-V2003C (A-2-13)	Bypass needle valve	C				
2RCS-V2004C (A-2-14)	Sample Valve	C				
2RCS-V2005C (A-2-18A)	Open Line Isolation Valve	N				
2RCS-V2006C (A-2-18B)	Close Line Isolation Valve	N				

POSITION CODES:
O = Open
C = Closed
V = Throttled
L = Locked
T = Tagged (Danger)
CC = Closed and Capped
I = Installed
NG = Not Gagged
A = Auto
MP = Mid Position
V = Variable
AS = As Selected

TABLE 1: SYSTEM VALVE LINEUP SHEET

PROCEDURE NUMBER	PROCEDURE TITLE				
N2-OP-29	REACTOR RECIRCULATION SYSTEM				

VALVE NUMBER	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
	Hydraulic Power Unit A (RB 261 North)					
2RCS-V2007C (A-2-19)	Pilot Line Isolation Valve	N				
2RCS-V2008C (A-2-24)	Suction line Isolation Valve	N				
2RCS-V2009C (A-2-30)	Press Gage Hydraulic Snubber	I				TCN-71
2RCS-V2010C (A-2-67A)	Return filter - Drain	C				
2RCS-V2011C (A-2-67B)	Return filter isolation Valve	O				
2RCS-V2012C (A-C-28)	Reservoir Drain Valve	C				
2RCS-V110A	Close line drain Isol. (HPU A)	CC				
2RCS-V106A	Close line upstream drain Isol (HPU A)	C				

POSITION CODES:

O = Open
C = Closed
V = Throttled
L = Locked
T = Tagged (Danger)
CC = Closed and Capped
I = Installed
NG = Not Gagged
A = Auto
MP = Mid Position
V = Variable
AS = As Selected

PROCEDURE NUMBER	PROCEDURE TITLE					
N2-OP-29	REACTOR RECIRCULATION SYSTEM					
VALVE NUMBER	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
	Hydraulic Power Unit A (RB 261 North)					
2RCS-V2001A (A-2-11A)	Press Gage Isolation	O				
2RCS-V2002A (A-1-11B)	Press switch isolation	O				
2RCS-V2003A (A-1-13)	Bypass needle valve	C				
2RCS-V2004A (A-1-14)	Sample Valve	C				
2RCS-V2005A (A-1-18A)	Open Line Isolation Valve	N				
2RCS-V2006A (A-1-18B)	Close Line Isolation Valve	N				
2RCS-V2007A (A-1-19)	Pilot Line Isolation Valve	N				
2RCS-V2008A (A-1-24)	Suction Line Isolation Valve	N				

POSITION CODES:

O = Open	L = Locked	I = Installed	MP = Mid Position
C = Closed	T = Tagged (Danger)	NG = Not Gagged	V = Variable
V = Throttled	CC = Closed and Capped	A = Auto	AS = As Selected

PROCEDURE NUMBER N2-OP-29 | PROCEDURE TITLE REACTOR RECIRCULATION SYSTEM

VALVE NUMBER	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
	Hydraulic Power Unit A (RB 261 North)					
2RCS-V2009A (A-1-30)	Press gage Hydraulic Snubber	I				TCN-71
2RCS-V2010A (A-1-67A)	Return Filter - Drain	C				
2RCS-V2011A (A-1-67B)	Return Filter Isolation Valve	O				
	Hydraulic Power Unit B (RB 261 South)					
2RCS-V2001B (B-1-11A)	Press gage isolation	O				
2RCS-V2002B (B-1-11B)	Press switch isolation	O				
2RCS-V2003B (B-1-13)	Bypass needle valve	C				
2RCS-V2004B (B-1-14)	Sample Valve	C				

POSITION CODES:

O = Open	L = Locked	I = Installed	MP = Mid Position
C = Closed	T = Tagged (Danger)	NG = Not Gagged	V = Variable
V = Throttled	CC = Closed and Capped	A = Auto	AS = As Selected

PROCEDURE NUMBER
N2-OP-29

PROCEDURE TITLE
REACTOR RECIRCULATION SYSTEM

VALVE NUMBER	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
	Hydraulic Power Unit B (RB 261 South)					
2RCS-V2005B (B-1-18A)	Open Line Isolation Valve	N				
2RCS-V2006B (B-1-18B)	Close Line Isolation Valve	N				
2RCS-V2007B (B-1-19)	Pilot Line Isolation Valve	N				
2RCS-V2008B (B-1-24)	Suction Line Isolation Valve	N				
2RCS-V2009B (B-1-30)	Press gage Hydraulic Snubber	I				TCN-71
2RCS-V2010B (B-1-67A)	Return filter - Drain	C				
2RCS*V2011B (B-1-67B)	Return filter isolation Valve	O				
2RCS-V2001D (B-1-11A)	Press gage isolation	O				

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A = Auto
MP = Mid Position
V = Variable
AS = As Selected

PROCEDURE NUMBER	PROCEDURE TITLE					
N2-OP-29	REACTOR RECIRCULATION SYSTEM					
VALVE NUMBER	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
	Hydraulic Power Unit B (RB 261 South)					
2RCS-V2002D (B-1-11D)	Press switch isolation	O				
2RCS-V2003D (B-1-13)	Bypass needle valve	C				
2RCS-V2004D (B-1-14)	Sample Valve	C				
2RCS-V2005D (B-1-18A)	Open Line Isolation Valve	N				
2RCS-V2006D (B-1-18B)	Close Line Isolation Valve	N				
2RCS-V2007D (B-1-19)	Pilot Line Isolation Valve	N				
2RCS-V2008D (B-1-24)	Suction Line Isolation Valve	N				
2RCS-V2009D (B-1-30)	Press gage Hydraulic Snubber	I				TCN-71

POSITION CODES:
O = Open
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L = Locked
T = Tagged (Danger)
CC = Closed and Capped
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TABLE 1: SYSTEM VALVE LINEUP SHEET

PROCEDURE NUMBER: N2-OP-29

PROCEDURE TITLE: REACTOR RECIRCULATION SYSTEM

VALVE NUMBER	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
	Hydraulic Power Unit B (RB 261 South)					
2RCS*V2010D (B-1-67A)	Return filter - Drain	C				
2RCS-V2011D (B-1-67B)	Return filter isolation	O				
2RCS-V2013 (B-C-28)	Reservoir Drain Valve	C				
	Hydraulic Power Unit					
2RCS-V105A	PILOT LINE (HPU A) DRAIN ISOL.	C				
2RCS-V109A	PILOT LINE (HPU A) DRAIN ISOL.	CC				
2RCS-V104A	OPEN LINE (HPU A) DRAIN ISOL.	C				
2RCS-V108A	OPEN LINE (HPU A) DRAIN ISOL.	CC				

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CC = Closed and Capped
I = Installed
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A = Auto
MP = Mid Position
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TABLE 1: SYSTEM VALVE LINEUP SHEET

PROCEDURE NUMBER	PROCEDURE TITLE
N2-OP-29	REACTOR RECIRCULATION SYSTEM

VALVE NUMBER	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
	Hydraulic Power Unit					
2RCS-V123A	DRAIN LINE (HPU A) DRAIN ISOL.	C				
2RCS-107A	DRAIN LINE (HPU A) DRAIN ISOL.	CC				
2RCS-V121A	PILOT LINE (HPU A) VENT ISOL.	C				
2RCS-V111A	PILOT LINE (HPU A) VENT ISOL.	CC				
2RCS-V122A	DRAIN LINE (HPU A) VENT ISOL.	C				
2RCS-V112A	DRAIN LINE (HPU A) VENT ISOL.	CC				
2RCS-V19A	RCS*HVY17A BODY DRAIN (HPU A) VENT ISOL.	C				
2RCS*V120	SAMPLE LINE MANUAL ISOLATION	O				
2RCS-V36A	2RCS*PT 84A ISOL	O				

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TABLE 1: SYSTEM VALVE LINEUP SHEET

PROCEDURE NUMBER N2-OP-29

PROCEDURE TITLE REACTOR RECIRCULATION SYSTEM

VALVE NUMBER	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
	Hydraulic Power Unit					
2RCS*V37A	2RCS*FT 7A and 9A ISOL	O				
2RCS*V39A	2RCS*FT 7A and 9A VENT ISOL	C				
2RCS*V38A	2RCS*FT 7A and 9A ISOL	O				
2RCS*V40A	2RCS*FT 7A and 9A VENT ISOL	CC				
2RCS*V41A	2RCS*FT 8A, 6A and 83A VENT ISOL	C				
2RCS*V42A	2RCS*FT 8A, 6A and 83A ISOL	CC				
2RCS*V43A	2RCS*FT 8A, 6A and 83A ISOL	O				
2RCS*V85A	2RCS*FT8A, *FT6A, and *FT 83A ISOLATION	O				
2RCS*V18A	LOOP A FCV BODY DRAIN ISOL	C				
2RCS*V150A	RCS*HYV 17A DRAIN ISOL	C				

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PROCEDURE NUMBER	PROCEDURE TITLE					
N2-OP-29	REACTOR RECIRCULATION SYSTEM					
VALVE NUMBER	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
	Hydraulic Power Unit					
2RCS*V151A	RCS*HVY 17A DRAIN ISOL	CC				
2RCS*V140A	DISCHARGE STOP VALVE BONNET VENT ISOLATION	C				
2RCS*V141A	DISCHARGE STOP VALVE BONNET VENT ISOLATION	CC				
2RCS*V142A	DISCHARGE STOP VALVE BODY DRAIN ISOLATION	C				
2RCS*V143A	DISCHARGE STOP VALVE BODY DRAIN ISOLATION	C				
2RCS-V145	RECIRC SYSTEM MANUAL SAMPLE ISOLATION	C				TCN-68
2RCS*V114	SAMPLING LINE TEST CONN. ISOL.	C				
2RCS*V115	SAMPLING LINE TEST CONN. ISOL.	CC				
2RCS-V89	SAMPLING LINE TEST CONN. ISOL.	C				

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TABLE 1: SYSTEM VALVE LINEUP SHEET

PROCEDURE NUMBER N2-OP-29

PROCEDURE TITLE REACTOR RECIRCULATION SYSTEM

VALVE NUMBER	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
	Hydraulic Power Unit					
2RCS-V88	SAMPLING LINE TEST CONN. ISOL.	CC				
2RCS*SOV104	RECIRC SYSTEM SAMPLE ISOLATION	O				
2RCS*SOV105	RECIRC SYSTEM SAMPLE ISOLATION	O				
2RCS*V53A	SEAL FAILURE LEAKOFF LINE ISOLATION	O				
2RCS-V93A	SEAL FAILURE LEAKOFF LINE HIGH POINT VENT UPSTREAM ISOLATION	C				*
2RCS-V94A	SEAL FAILURE LEAKOFF LINE HIGH POINT VENT ISOLATION	CC				
2RCS-SOV90A	NORMAL SEAL LEAKOFF LINE ISOLATION	O				
2RCS-V52A	NORMAL SEAL LEAKOFF LINE VENT ISOLATION	O				

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PROCEDURE NUMBER	PROCEDURE TITLE					
N2-OP-29	REACTOR RECIRCULATION SYSTEM					
VALVE NUMBER	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
	Hydraulic Power Unit					
2RCS-V92A	NORMAL SEAL LEAKOFF LINE MANUAL ISOLATION	CC				
2RCS-V91A	NORMAL SEAL LEAKOFF LINE ISOLATION	O				
2RCS*V74A	2RCS*V60A TEST CONNECTION	CC				
2RCS*V61A	SEAL PURGE INBOARD MANUAL ISOLATION	O				
2RCS*V102A	2RCS*PT44A and PI43A HIGH VENT ISOLATION	C				
2RCS*V103A	2RCS*PT44A and PI43A VENT ISOLATION	CC				
2RCS*V55A	(No. 1 SEAL CAVITY PRESSURE) 2RCS*PT44A and PI43A ISOLATION	O				

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TABLE 1: SYSTEM VALVE LINEUP SHEET

PROCEDURE NUMBER
N2-OP-29

PROCEDURE TITLE
REACTOR RECIRCULATION SYSTEM

VALVE NUMBER	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
	Hydraulic Power Unit					
2RCS*V54A	(No. 2 SEAL CAVITY PRESSURE) 2RCS*V42A and PI41A ISOLATION	O				
2RCS*V100A	2RCS*PT42A and PI41A VENT ISOLATION	C				
2RCS*V101A	2RCS*PT42A and PI41A HIGH POINT VENT ISOLATION	CC				
2RCS-RV46A	SEAL PURGE LINE RELIEF VALVE	NG				
2RCS-V58A	2RCS-FCV2A ISOLATION	O				
2RCS-V73A	2RCS*V59A TEST CONNECTION	C				
2RCS*V76A	2RCS*V59A TEST CONNECTION	CC				
2RCS*V72A	2RCS*V90A TEST CONNECTION	C				

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PROCEDURE NUMBER	PROCEDURE TITLE					
N2-OP-29	REACTOR RECIRCULATION SYSTEM					
VALVE NUMBER	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
	Hydraulic Power Unit					
2RCS*V75A	2RCS*V90A TEST CONNECTION	CC				
2RCS-V83A	2RCS*V60A TEST CONNECTION	C				
2RCS*V84A	2RCS*V60A TEST CONNECTION	CC				
2RCS*V71A	2RCS*V60A TEST CONNECTION	C				
2RCS*V77A	SEAL PURGE VENT VALVE	C				
2RCS*V78A	SEAL PURGE VENT VALVE	CC				
2RCS*V59A	SEAL PURGE CHECK	I				
2RCS*V90A	SEAL PURGE CHECK	I				
2RCS*V60A	SEAL PURGE CHECK	I				
2RCS*V131A	RCS*MOV10A BONNET VENT	C				
2RCS*V130A	RCS*MOV10A BONNET VENT	CC				

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TABLE 1: SYSTEM VALVE LINEUP SHEET

PROCEDURE NUMBER	PROCEDURE TITLE					
N2-OP-29	REACTOR RECIRCULATION SYSTEM					
VALVE NUMBER	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
	Hydraulic Power Unit					
2RCS*V12A	RCS*MOV10A BODY DRAIN	C				
2RCS*V13A	RCS*MOV10A BODY DRAIN	C				
2RCS*V26A	RCS*PDT 15A ISOLATION	O				
2RCS*V27A	RCS*PDT 15A ISOLATION	O				
2RCS*HVY 17A	'A' LOOP RECIRCULATION FLOW CONTROL VALVE	V				
2RCS-V56A	PI103A ISOLATION	O				
2RCS-V57A	SEAL PURGE LINE ISOL-ATION FROM RDS	O				
2RCS*FCV2A	SEAL PURGE FLOW CONTROL VALVE	V (3-5 gpm)				
2RCS*V106B	CLOSE LINE DRAIN (HPU B)	C				
2RCS-V110B	CLOSE LINE DRAIN (HPU B)	CC				
2RCS-V105B	PILOT LINE DRAIN (HPU B)	C				

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TABLE 1: SYSTEM VALVE LINEUP SHEET

PROCEDURE NUMBER	PROCEDURE TITLE
N2-OP-29	REACTOR RECIRCULATION SYSTEM

VALVE NUMBER	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
	Hydraulic Power Unit					
2RCS-V109B	PILOT LINE DRAIN (HPU B)	CC				
2RCS-V104B	OPEN LINE DRAIN (HPU B)	C				
2RCS-V108B	OPEN LINE DRAIN (HPU B)	CC				
2RCS-123B	DRAIN LINE DRAIN (HPU B)	C				
2RCS-V107B	DRAIN LINE DRAIN (HPU B)	CC				
2RCS-V121B	PILOT LINE VENT (HPU B)	C				
2RCS-V111B	PILOT LINE VENT (HPU B)	CC				
2RCS-V122B	DRAIN LINE VENT (HPU B)	C				

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TABLE 1: SYSTEM VALVE LINEUP SHEET

PROCEDURE NUMBER	PROCEDURE TITLE
N2-OP-29	REACTOR RECIRCULATION SYSTEM

VALVE NUMBER	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
	Hydraulic Power Unit					
2RCS-V112B	DRAIN LINE VENT (HPU B)	CC				
2RCS*V36B	2RCS*PT34B ISOLATION	O				
2RCS*V37B	2RCS*FT9B and *FT 7B ISOLATION	O				
2RCS*V38B	2RCS*FT9B and *FT 7B ISOLATION	O				
2RCS*V40B	2RCS*FT9B and *FT 7B VENT	CC				
2RCS*V39B	RCS*FT 9B and *FT 7B VENT	CC				
2RCS*V42B	RCS*FT6B, *FT 8B, and *FT 83B VENT	C				
2RCS*V41B	RCS*FT6B, *FT8B, and *FT83B VENT	CC				
2RCS*V43B	RCS*FT6B, *FT8B, and *FT83B ISOLATION	O				

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TABLE 1: SYSTEM VALVE LINEUP SHEET

PROCEDURE NUMBER: N2-OP-29

PROCEDURE TITLE: REACTOR RECIRCULATION SYSTEM

VALVE NUMBER	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
	Hydraulic Power Unit					
2RCS*V85B	RCS*FT6B, *FT8B, and *FT83B ISOLATION	O				
2RCS*V131B	RCS*MOV10B BONNET VENT	C				
2RCS*V130B	RCS*MOV10B BONNET VENT	CC				
2RCS*V12B	2RCS*MOV12B BODY DRAIN	C				
2RCS*V13B	RCS*MOV10B BODY DRAIN	C				
2RCS*V26B	RCS*PDT15B ISOLATION	O				
2RCS*V27B	RCS*PDT15B ISOLATION	O				
2RCS*HYV 17B	LOOP 'B' RECIRCULATION FLOW CONTROL VALVE	V				
2RCS*V19B	RCS*HYV17B BODY DRAIN	C				
2RCS*V18B	RCS*HYV17B BODY DRAIN	C				
2RCS*V91B	NORMAL SEAL LEAK OFF LINE VENT	C				

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TABLE 1: SYSTEM VALVE LINEUP SHEET

PROCEDURE NUMBER	PROCEDURE TITLE					
N2-OP-29	REACTOR RECIRCULATION SYSTEM					
VALVE NUMBER	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
	Hydraulic Power Unit					
2RCS*140B	RCS*MOV18B BONNET VENT	C				
2RCS*V141B	2RCS*MOV18B BODY VENT	CC				
2RCS*V22B	2RCS*MOV18B BODY DRAIN	C				
2RCS-V98B	NORMAL SEAL LEAKOFF LINE ISOLATION	O				
2RCS*V150B	RCS*HYV17B VENT ISOL	C				
2RCS*V151B	RCS*HYV17B VENT ISOL	CC				
2RCS*V23B	RCS*MOV18B BODY DRAIN	C				
2RCS*V56B	RCS-PI103B ISOLATION	O				
2RCS-V57B	SEAL PURGE LINE MANUAL ISOLATION FROM RDS	O				
2RCS-FCV2B	SEAL PURGE FLOW CONTROL VALVE	V (3-5 gpm)				
2RCS-RV46B	SEAL PURGE LINE RELIEF VALVE	NG				

POSITION CODES:

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PROCEDURE NUMBER	PROCEDURE TITLE					
N2-OP-29	REACTOR RECIRCULATION SYSTEM					
VALVE NUMBER	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
	Hydraulic Power Unit					
2RCS-V58B	RCS-FCV2B ISOLATION	O				
2RCS*V73B	RCS*V59B TEST CONNECTION	C				
2RCS-V76B	RCS*V59B TEST CONNECTION	CC				
2RCS*V72B	RCS*V90B TEST CONNECTION	C				
2RCS*V75B	RCS*V90B TEST CONNECTION	CC				
2RCS*V59B	SEAL PURGE CHECK	I				
2RCS*V90B	SEAL PURGE CHECK	I				
2RCS*V60B	SEAL PURGE CHECK	I				
2RCS*V77B	SEAL PURGE SUPPLY VENT	C				
2RCS*V78B	SEAL PURGE SUPPLY VENT	CC				
2RCS*V83B	RCS*V60B TEST CONNECTION	C				

POSITION CODES: O = Open, C = Closed, V = Throttled, L = Locked, T = Tagged (Danger), CC = Closed and Capped, I = Installed, NG = Not Gagged, A = Auto, MP = Mid Position, V = Variable, AS = As Selected

TABLE 1: SYSTEM VALVE LINEUP SHEET

PROCEDURE NUMBER
N2-OP-29

PROCEDURE TITLE
REACTOR RECIRCULATION SYSTEM

VALVE NUMBER	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
	Hydraulic Power Unit					
2RCS*V84B	RCS*V60B TEST CONNECTION	CC				
2RCS*V71B	RCS*V60B TEST CONNECTION	C				
2RCS*V74B	RCS*V60B TEST CONNECTION	CC				
2RCS-V61B	RCS*V60B ISOLATION VALVE	O				
2RCS*V102B	RCS*PT44B and PI43B HIGH POINT VENT	C				
2RCS*V103B	RCS*PT44B and PI43B HIGH POINT VENT ISOLATION	CC				
2RCS*V55B	RCS-PT44B and PI43B ISOLATION VALVE	O				
2RCS*V54B	RCS-PT42B and PI41B ISOLATION VALVE	O				
2RCS*V100B	RCS-PT42B and PI41B VENT ISOLATION	C				
2RCS*V101B	RCS-PT42B and PI41B VENT ISOLATION	CC				

POSITION CODES:

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TABLE 1: SYSTEM VALVE LINEUP SHEET

VALVE LINEUP SHEET

PROCEDURE NUMBER	PROCEDURE TITLE
N2-OP-29	REACTOR RECIRCULATION SYSTEM

VALVE NUMBER	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
	Hydraulic Power Unit					
2RCS*V53B	SEAL FAILURE LEAKOFF LINE ISOLATION VALVE	O				
2RCS-V93B	SEAL FAILURE LEAKOFF LINE VENT ISOLATION	C				
2RCS*V94B	SEAL FAILURE LEAKOFF LINE VENT ISOLATION	CC				
2RCS-SOV 90B	NORMAL SEAL LEAKOFF LINE ISOLATION	O				
2RCS-V52B	NORMAL SEAL LEAKOFF LINE ISOLATION	O				
2RCS-V92B	NORMAL SEAL LEAKOFF LINE VENT ISOLATION	C				
2RCS-V160A	PT84A VENT VALVE	C				
2RCS-V161A	PT84A VENT VALVE	CC				
2RCS*V160B	PT84B Test Conn	C				
2RCS*V161B	PT84B Test Conn	CC				

POSITION CODES:

O = Open	L = Locked	I = Installed	MP = Mid Position
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PROCEDURE NUMBER	PROCEDURE TITLE
N2-OP-29	REACTOR RECIRCULATION SYSTEM

VALVE NUMBER	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
	Hydraulic Power Unit					
2RCS*EFV44A	PT84A Excess Flow V/V	I				
2RCS*EFV44B	PT84B Excess Flow V/V	I				
2RCS*EFV45A	FT9A Excess Flow V/V	I				
2RCS*EFV45B	FT9B Excess Flow V/V	I				
2RCS*EFV46A	FT7A Excess Flow V/V	I				
2RCS*EFV46B	FT7B Excess Flow V/V	I				
2RCS*EFV47A	FT8A Excess Flow V/V	I				
2RCS*EFV47B	FT8B Excess Flow V/V	I				
2RCS*EFV48A	FT6A Excess Flow V/V	I				
2RCS*EFV48B	FT6B Excess Flow V/V	I				
2RCS*EFV52A	PDT15A Excess Flow V/V	I				
2RCS*EFV52B	PDT15B Excess Flow V/V	I				
2RCS*EFV53A	PDT15A Excess Flow V/V	I				

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TABLE 1: SYSTEM VALVE LINEUP SHEET

PROCEDURE NUMBER: N2-OP-29

PROCEDURE TITLE: REACTOR RECIRCULATION SYSTEM

VALVE NUMBER	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
	Hydraulic Power Unit					
2RCS*EFV53B	PDT15B Excess Flow V/V	I				
2RCS*EFV62A	PT44A/PI43A Excess Flow Valve	I				
2RCS*EFV62B	PT44B/PI43B Excess Flow Valve	I				
2RCS*EFV63A	PT42A/PT41A Excess Flow Valve	I				
2RCS*EFV63B	PT42B/PI41B Excess Flow Valve	I				

POSITION CODES:

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TABLE II A: SYSTEM ELECTRICAL LINEUP SHEET

PROCEDURE NUMBER	PROCEDURE TITLE
N2-OP-29	REACTOR RECIRCULATION SYSTEM POWER SUPPLY

COMPONENT NUMBER	COMPONENT DESCRIPTION	BUS NUMBER	CUBICLE BREAKER	LOCATION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT/DATE	REMARKS
2RCS-FN3A	HPU A FAN MOTOR (Subloop A-1)	2NHS-MCC014A	2D	RB 215	ON				
2RCS-FN3B	HPU B FAN MOTOR (Subloop B-1)	2NHS-MCC014B	11D	RB 215	ON				
2RCS-FN4A	HPU A FAN MOTOR (Subloop A-2)	2NHS-MCC014B	10D	RB 215	ON				
2RCS-FN4B	HPU B FAN MOTOR (Subloop B-2)	2NHS-MCC014A	3D	RB 215	ON				
2RCS-P3A	HPU A DRIVE MOTOR (Subloop A-1)	2NHS-MCC014A	2E	RB 215	ON				
2RCS-P3B	HPU B DRIVE MOTOR (Subloop B-1)	2NHS-MCC014B	11E	RB 215	ON				
2RCS-P4A	HPU A DRIVE MOTOR (Subloop A-2)	2NHS-MCC014B	10E	RB 215	ON				
2RCS-P4B	HPU B DRIVE MOTOR (Subloop B-2)	2NHS-MCC014A	3E	RB 215	ON				
2RCS-FNH 3A	HPU A FAN 3A Mtr Heater	2SCA-PNL200	32	RB 240N	ON				

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N2-OP-29	REACTOR RECIRCULATION SYSTEM POWER SUPPLY

COMPONENT NUMBER	COMPONENT DESCRIPTION	BUS NUMBER	CUBICLE BREAKER	LOCATION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT/DATE	REMARKS
2EPS*SWG001	Breaker Heater	2EJA*PNL100A	8	CB261 E	ON				
2RCS-MG1A	EXCITER FIELD POWER MG1A	2RCS-PNL1A	CB1	NORM SWGR 293	ON				
2RCS-MG1B	EXCITER FIELD POWER MG1B	2RCS-PNL1B	CB1	NORM SWGR 293	ON				
2EPS*SWG002	Breaker Heater	2EJA*PNL300B	7	S. Aux Bay RB 240	ON				
2EPS*SWG003	Breaker Heater	2EJA*PNL100A	9	N. Aux Bay RB 240	ON				
2EPS*SWG004	Breaker Heater	2EJA*PNL300B	8	CB 261W	ON				
2RCS-FNH 4A	HPU A FAN 4A Mtr Heater	2SCA-PNL200	34	RB 240N	ON				
2RCS-H3A	HPU A HEATER	2SCA-PNL200	28	RB 240N	ON				16405
2RCS-H4A	HPU A HEATER	2SCA-PNL200	33	RB 240N	ON				
2RCS-FNH 3B	HPU B FAN 3B Mtr Heater	2SCA-PNL201	33	RB 289SW	ON				

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PROCEDURE NUMBER	PROCEDURE TITLE
N2-OP-29	REACTOR RECIRCULATION SYSTEM POWER SUPPLY

COMPONENT NUMBER	COMPONENT DESCRIPTION	BUS NUMBER	CUBICLE BREAKER	LOCATION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT/DATF	REMARKS
2RCS-FNH4B	HPU B FAN 4B Mtr Heater	2SCA-PNL201	35	RB 289SW	OPEN				
2RCS-H3B	HPU B HEATER	2SCA-PNL201	32	RB 289SW	OPEN				
3RCS-H4B	HPU B HEATER	2SCA-PNL201	34	RB 289SW	ON				
2RCS*SOV 65B, 66B 67B and 68B	INBD HPU B SOLENOID VALVES	2VBS*PNL101A	13	CB 288W	ON				
2RCS*SOV 65A, 66A, 67A and 68A	INBD HPU A SOLENOID VALVES	2VBS*PNL101A	11	CB 288W	ON				
2CEC*PNL 634A RACK 1	RECIRC FLOW CONTROL PANEL	2VBS-PNLA101	19	CB 306W	ON				
2CEC*PNL 634C RACK 3	RECIRC FLOW CONTROL PANEL	2VBS-PNLA101	20	CB 306W	ON				

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TABLE II A: SYSTEM ELECTRICAL LINEUP SHEET

PROCEDURE NUMBER
N2-OP-29

PROCEDURE TITLE
REACTOR RECIRCULATION SYSTEM
POWER SUPPLY

COMPONENT NUMBER	COMPONENT DESCRIPTION	BUS NUMBER	CUBICLE BREAKER	LOCATION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT/DATE	REMARKS
2CEC*PNL 634C RACK 3	RECIRC FLOW CONTROL PANEL	2VBS-PNLB101	5	CB 306W	ON				
2CEC*PNL 634C RACK 2	RECIRC FLOW CONTROL CONTROL PANEL	2VBS-PNLB101	6	CB 306W	ON				
2RCS*SOV 79A, 80A, 81A, 82A	INBD HPUA SOLENOID VALVES	2VBS*PNL301B	12	CB 288E	ON				
2RCS*SOV 79B, 68B, 81B, 82B	OUTBD HPUB SOLENOID VALVES	2VBS*PNL301B	13	CB 288E	ON				
2RCS*SOV 65A, 66A 67A, 68A	INOP STATUS LIGHT	2SCM*PNL101A	17	CB 288W	ON				
2RCS*SOV 65B, 66B 67B, 68B	INOP STATUS LIGHT	2SCM*PNL101A	18	CB 288W	ON				
2RCS-H1A	2RCS P1A MOTOR HEATER	2NHS-MCC014A	4AL/4D	RB 215	ON				

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TABLE II A: SYSTEM ELECTRICAL LINEUP SHEET

PROCEDURE NUMBER	PROCEDURE TITLE
N2-OP-29	REACTOR RECIRCULATION SYSTEM POWER SUPPLY

COMPONENT NUMBER	COMPONENT DESCRIPTION	BUS NUMBER	CUBICLE BREAKER	LOCATION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT/DATE	REMARKS
2RCS-H1B	2RCS P1B MOTOR HEATER	2NHS-MCC014B	9AL/9D	RB 215	ON				
2RCS-MOV18A	LOOP A DISCHARGE BLOCK VLV.	2NHS-MCC011	3B	RB 261	ON				
2RCS*MOV18B	LOOP B DISCHARGE BLOCK VLV.	2NHS-MCC012	4C	RB 261	ON				
2RCS*MOV10A	LOOP A SUCTION BLOCK VLV.	2NHS-MCC011	3C	RB 261	ON				
2RCS*MOV10B	LOOP B SUCTION BLOCK VLV.	2NHS-MCC012	4D	RB 261	ON				
2EPS*SWG002	BKR 4A TRIP AND CLOSING POWER	2DMS*MCCB1 (Control power to 2EPS*SWG002)	2AL	S. Aux Bay RB 240	ON				
2EPS*SWG004	BKR 4B TRIP AND CLOSING POWER	2DMS*MCCB1 (Control power to SWG004)	2AR	S. Aux Bay RB 240	ON				

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PROCEDURE NUMBER N2-OP-29

PROCEDURE TITLE REACTOR RECIRCULATION SYSTEM POWER SUPPLY

COMPONENT NUMBER	COMPONENT DESCRIPTION	BUS NUMBER	CUBICLE BREAKER	LOCATION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT/DATE	REMARKS
2EPS*SWG001	BKR 3A TRIP AND CLOSING POWER	2DMS*MCCA1 (Control power to SWG001)	6AL	N. Aux Bay RB 240	ON				
2RCS*SOV 79A, 80A, 81A, 82A	INOP STATUS LIGHT INOP STATUS LIGHT	2SCM*PNL304B 2BYS*PNL202A	13 5	CB 288E CB 288E	ON ON				
2RCS*SOV 79B, 80B 81B, 82B	INOP STATUS LIGHT INOP STATUS LIGHT	2SCM*PNL304B 2BYS*PNL202A	14 6	CB 288E CB 288E	ON ON				
2EPS*SWG003	BKR 3B TRIP AND CLOSING POWER	2DMS*MCCA1 (Control power to SWG003)	6AR	N. Aux Bay RB 240	ON				
2RCS-PNL1A	LIGHTS AND RCPT FOR 2RCS-PNL1A	2SCA-PNL400	2	Norm SWGR 261N	ON				
2RCS-PNL 1A	LFMG 1A VOLTAGE REGULATOR	2SCA-PNL400	5&7	Norm SWGR 261N	ON				
2RCS-PNL 1B	LIGHTS AND RCPTS FOR 2RCS PNL 1B	2SCA-PNL401	2	Norm SWGR 261W	ON				

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PROCEDURE NUMBER	PROCEDURE TITLE
N2-OP-29	REACTOR RECIRCULATION SYSTEM POWER SUPPLY

COMPONENT NUMBER	COMPONENT DESCRIPTION	BUS NUMBER	CUBICLE BREAKER	LOCATION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT/DATE	REMARKS
2RCS-PNL 1B	LFMG 1B VOLTAGE REGULATOR	2SCA-PNL401	1&3	Norm SWGR 261W	ON				
2RCS-MGH 1A	LFMG A MOTOR HEATER	2SCA-PNL405	4	Norm SWGR 261N	ON				
2RCS-MGH 1A	LFMG A EXCITER AND GEN HEATER	2SCA-PNL405	3	Norm SWGR 261N	ON				
2RCS-MGH 1B	LFMG B MOTOR HEATER	2SCA-PNL405	29	Norm SWGR 261N	ON				
2RCS-MGH 1B	LFMG B EXCITER AND GEN HEATER	2SCA-PNL405	27	Norm SWGR 261N	ON				
2RCS-PNL1A	2RCS PNL 1A HEATER	2SCA-PNL405	16	Norm SWGR 261N	ON				
2RCS-PNL1B	2RCS PNL 1B HEATER	2SCA-PNL405	22	Norm SWGR 261N	ON				
2RCS-PNL1A	2RCS PNL 1A CONTROL POWER	2BYS-PNLA107	7	Norm SWGR 237E	ON				
2RCS-PNL1B	2RCS PNL 1B CONTROL POWER	2BYS-PNLB107	5	Norm SWGR 261N	ON				

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PROCEDURE NUMBER	PROCEDURE TITLE
N2-OP-29	REACTOR RECIRCULATION SYSTEM POWER SUPPLY

COMPONENT NUMBER	COMPONENT DESCRIPTION	BUS NUMBER	CUBICLE BREAKER	LOCATION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT/DATE	REMARKS
----------	BKR 3A AND 4A CONTROL AND IND. PWR	2BYS-PNLA101	8	CB 306W	ON				
----------	BKR 3B AND 4B CONTROL AND IND PWR	2BYS-PNLB102	4	CB 306E	ON				
2NPS-SWG004 and SWG005	LFMG BKR 2A 2B CONTROL POWER	2BYS-SWG001A (Control power for SWG004 and SWG005)	15	Norm SWGR 237	ON				
2NPS-SWG001	BKR 5A CONTROL POWER	2BYS-SWG001B (Control power for SWG001)	8	Norm SWGR 237	ON				
2NNS-SWG011	LFMG BKR 1A TRIP AND CLOSING POWER	2BYS-SWG001A (Control power for SWG0011)	17	Norm SWGR 237	ON				
2NNS-SWG013	LFMG BKR 1B TRIP AND CLOSING POWER	2BYS-SWG001B (Control power for SWG013)	19	Norm SWGR 237	ON				

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PROCEDURE NUMBER	PROCEDURE TITLE
N2-OP-29	REACTOR RECIRCULATION SYSTEM POWER SUPPLY

COMPONENT NUMBER	COMPONENT DESCRIPTION	BUS NUMBER	CUBICLE BREAKER	LOCATION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT/DATE	REMARKS
B35-R650	RECIRC PUMP SUCTION TEMPERATURE RECORDER AND FLUX ESTIMATOR	2VBS-PNLB101	7	CB 306W	ON				
B35-R601	RECIRC PUMP A and B MOTOR TEMPERATURE RECORDER	2VBS-PNLB101	8	CB 306W	ON				
----------	RECIRC PUMP INSTRUMENTS POWER SUPPLY	2VBS-PNLB101	9	CB 306W	ON				
----------	RECIRC PUMP INSTRUMENTS POWER SUPPLY	2VBS-PNLB102	1	CB 306E	ON				
2NPS-SWG003	BKR 5B CONTROL POWER	2BYS-SWG001B (Control power for SWG003)	10	Norm SWGR 237	ON				
2RCS*SOV104	RCS SAMPLE LINE INSIDE IV POWER	Fuse B22HF13B	CEC-601F Strip K Fuse 1	CB 306	I				

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PROCEDURE NUMBER
N2-OP-29

PROCEDURE TITLE
REACTOR RECIRCULATION SYSTEM
POWER SUPPLY

COMPONENT NUMBER	COMPONENT DESCRIPTION	BUS NUMBER	CUBICLE BREAKER	LOCATION	REQUIRED POSITION	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT/DATE	REMARKS
2RCS*SOV104	RCS SAMPLE LINE INSIDE IV INDICATION POWER	Fuse B22HF92B	CEC-601F Strip K Fuse 7	CB 306	I				
2RCS*SOV105	RCS SAMPLE LINE OUTSIDE IV POWER	Fuse B22HV13A	CEC-601F Strip E Fuse 1	CB 306	I				
2RCS*SOV 105	RCS SAMPLE LINE OUTSIDE IV INDICATION POWER	Fuse B22HF92A	CEC-601F Strip E Fuse 7	CB 306	I				

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Component Work Order Maint Item 07-168-91

Display of Work Item Data
SEEK Strategy: W168492

HIT.................... 1
Work No................ W168492
Issued................. 910328
Depart................. 100
Status................. O
Lead or Supprt......... L
WCC Status............. 03
WCC Resp............... WC
Unit................... 2
Component No........... 2VBB-UPS3A
System No.............. VBB
BIP No................. 071B, 075
Safety Class........... NSR
ASME Component......... N
Title.................. NORMAL AC LOW VOLT DIST RPS UPS UNINTERRUPTABLE POWER SUPPLY (NORMAL POWER SUPPLY FOR PANEL 2VBS*PNLA106)
Work Item Description.. MAINTENANCE SUPPLY OUTPUT VOLTS AT 148 VAC. TROUBLESHOOT AND REPLACE REGULATOR CONTROL CARD AS REQUIRED
CHECK AND RECORD OUTPUT VOLTAGE PER EACH TRANSFORMER TAP
Location............... NTR, 237, AF, 010.00
Originator............. CRANDALL B
Approved by............ KINNEY D
Approval date.......... 910403
Received By............ LEMAY D
Rcvd By Dt............. 910404
Account Code........... 706.40--9551-321257--200-0110
QC Review.............. MCCLOSKEY D
QA Review Date......... 910405
Inspection Req'd....... N
Left Planning.......... 910405
IP Code................ 3
Merit Score............ 000
Work Cond. Code........ A
Work Type Code......... PL
Power Block Flag....... Y
Staged By.............. POOR J
Staged By Date......... 910809
Proj Crew.............. 2
Proj Dur............... 8
Lead/Supprt Dpt........ 100, 300

HIT.................... 2
Work No................ W168492
Issued................. 910328
Depart................. 300
Status................. O
Lead or Supprt......... S
WCC Status............. 01
Unit................... 2
Component No........... 2VBB-UPS3A
System No.............. VBB
BIP No................. 071B, 075

Display of Work Item Data
SEEK Strategy: W168492

Safety Class........... NSR
ASME Component......... N
Title.................. NORMAL AC LOW VOLT DIST RPS UPS UNINTERRUPTABLE POWER SUPPLY (NORMAL POWER SUPPLY FOR PANEL 2VBS*PNLA106)
Work Item Description... MAINTENANCE SUPPLY OUTPUT VOLTS AT 148 VAC. TROUBLESHOOT AND REPLACE REGULATOR CONTROL CARD AS REQUIRED CHECK AND RECORD OUTPUT VOLTAGE PER EACH TRANSFORMER TAP
Location............... NTR, 237, AF, 010.00
Originator............. GRANDALL B
Approved by............ KINNEY D
Approval date.......... 910403
Received By............ LEMAY D
Rcvd By Dt............. 910404
Account Code........... 706.40--9551-321257--200-0110
QC Review.............. MCCLOSKEY D
QA Review Date......... 910405
Inspection Req'd....... N
Left Planning.......... 910821
IP Code................ 3
Merit Score............ 000
Work Cond. Code........ A
Work Type Code......... PL
Power Block Flag....... Y
Supprt Acct............ 706.40--9521-321258--200-0110
Lead/Supprt Dpt........ 100, 300

07-169-91

Component Work Order - Maint Item 07-170-91

Display of Work Item Data
SEEK Strategy: W184851

HIT	1
Work No.	W184851
Issued	910525
Depart	300
Status	O
Lead or Supprt	L
Deficiency Tag Number	026520
WCC Status	05
Unit	2
Component No.	2MSS*PSV135
System No.	MSS
BIP No.	001, 021, 085
Safety Class	SR
EQ	Y
ASME Component	Y
Cleanness Class	B, D
Title	SAFETY/RELIEF VALVE
Work Item Description	RELIEF VALVE TAILPIECE TEMPERATURE INDICATION ON PANEL 2CEC*PNL614 IS ACTING ERRATICALLY WITH UNEXPLAINED INCRESES AND DECREASES. PLEASE TROUBLESHOOT AND REPAIR. SEE WR 194360
Location	PC, 296, 20, 330.00
NPRDS Failcode	D
Originator	LAWRENCE J
Approved by	MURRAY R
Approval date	910610
Received By	PEAVLER T
Rcvd By Dt	910610
Account Code	706.30--9521-321258--200-0110
QC Review	QUEEN S
QA Review Date	910610
Inspection Req'd	Y
Left Planning	910611
IP Code	3
Merit Score	000
Work Cond. Code	F
Remarks	SENT TO CONTROL ROOM 910816
Work Type Code	CM
Power Block Flag	Y
Staged By	NOSKO G
Staged By Date	910806
Proj Crew	3
Proj Dur	10
Sched. Start Date	910818
SSS Notify	910821
Lead/Supprt Dpt	300
OMG System Window	010
OMG Availability Code	22, DW, HO