C1-F5

C5-B1

Effective Date: 4/21/10

CATEGORY II

ALARMS

- REACTOR RECIRC A TROUBLE C1-D4 REACTOR RECIRC B TROUBLE C1-D5 C1-D3
- REACTOR RECIRC PUMPS TRIP
- REACTOR RECIRC PUMP VIB HI C1-E4
- COMPUTER POINT IN ALARM
- LPRM UPSCALE C3-D5 LPRM DOWNSCALE C3-E5 OPRM TRIP ENABLE C3-F1 OPRM ALARM C3-F2 OPRM TRIP BYP/INOP/TRBL C3-F3
- OPRM TRIP

INDICATIONS

- Unexplained Change in:
 - Recirculation Pump Flow, Rx Water Level, Rx Power, Rx Recirc Pump Seal Performance.
- Trip of EITHER Recirc Pump as indicated by:
 - Recirc Pump RPT Breaker OPEN, Recirc Drive Motor Breaker OPEN, Recirc MG Field Breaker OPEN.
- The indicated Recirculation loop flow differs by more than
 - > 10% from the established pump speed-loop flow characteristics, 10% from the established total core flow value derived from Recirculation loop flow. The indicated diffuser-to-lower plenum differential pressure of any individual jet pump differs from the established patterns by more than 20%.
- Recirculation Pump Vibration Levels Rising
- APRM OR LPRM power oscillations
- An OPRM Channel indicates a trip or alarming condition
- Short Period alarms/ Positive and negative swings on the period meter
- Recirc Pump seal cavity temperature greater than 150 degrees F (A2998, A2999, A3008, A3009)
- Recirc Pump #2 seal cavity pressure less than 200 psig or greater than 800 psig. (A2590, A2592)

TERMINATED Date/Time:

	RETAINMENT OVERRIDE			
	CONDITION	ACTION		
Ι.	Affected Recirc Pump seal cavity temperature greater than 200 degrees F	I.a	REDUCE the affected Recirc pump speed to minimum, TRIP the affected Recirc pump and	
	Date/Time:		enter Condition A	

NOTES:

1. Figure 1 "POWER TO FLOW MAP (OPRM INOPERABLE)" is required to be utilized as part of an alternate method to detect and suppress thermal hydraulic instability oscillations to comply with T/S 3.3.11 action a.3 or b.1.

ADDITIONAL INFORMATION:

REFER to Attachment 4 for POWER TO FLOW MAP

Power Oscillations (Thermal Hydraulic Instabilities) are defined as any of the following:

- 10% peak to peak Power Oscillations on APRM Recorders
- Periodic Upscale <u>OR</u> Downscale LPRM Alarms (on the Full Core Display)
- Strong positive/negative swings on the Period Meters

IMMEDIATE OPERATOR ACTIONS

CONDITION	ACTION
No Recirc. Pumps running <u>AND</u> Reactor is Critical [CD-354F]	LOCK the Mode Switch in SHUTDOWN.
Date/Time:	
Indications of Power Oscillations (Thermal Hydraulic Instability)	LOCK the Mode Switch in SHUTDOWN. [CD354F]
Date/Time:	
** <u>NOTE 1</u> ** OPRM's INOPERABLE <u>AND</u> in REGION 1 of Figure 1	LOCK the Mode Switch in SHUTDOWN.
Date/Time:	

AUTOMATIC ACTIONS

IF	THEN
OPRM TRIP	Half or Full Scram

	RETAINMENT OVERRIDE			
CONDITION		ACTION		
I.	Affected Recirc Pump seal cavity temperature greater than 200 degrees F	l.a	REDUCE the affected Recirc pump speed to minimum, TRIP the affected Recirc pump and	
	Date/Time:		enter Condition A	

LIST OF CONDITIONS

A.	Single Reactor Recirc Pump Tripped	7
В.	Unplanned entry resulting in Reactor Power \geq 26.1% <u>AND</u> Core Flow \leq 68%	7
C.	Fluctuating Reactor Recirculation Pump Speed	.13
D.	Reactor Recirc Pump Seal Degradation is detected	.15
E.	Multiple seal failure of a Recirculation Pump	.15
F.	Recirc Pump Vibration Alarm	.17
G.	BOTH Recirculation Pumps TRIPPED AND Potential exists for Thermal Stratification	.19
H.	Recirculation Flow cannot be Restored <u>AND</u> There is potential for vessel Thermal Stratification <u>AND</u> HPCI, RCIC, and Feedwater are <u>not</u> needed for RPV level or pressure <u>apprend</u>	22
	Suspected let Pump Failure	.25
ı. T	Reactor is Sub-Critical	.25
0.	AND No Recirc. Pumps running	.25
K.	Any Recirc Pump Seal Cavity temperature >150F <u>OR</u> Indication of an adverse trend	.27

	RETAINMENT OVERRIDE			
	CONDITION	ACTION		
Ι.	Affected Recirc Pump seal cavity temperature greater than 200 degrees F	l.a	REDUCE the affected Recirc pump speed to minimum, TRIP the affected Recirc pump and	
	Date/Time:		enter Condition A	

CAUTIONS:

 With the operable loop drive flow near 23 Kgpm (≈48% Pump Speed), the flow through the idle loop is close to zero and will swap back and forth between forward and reverse flow. Operation in this region can cause excessive Jet Pump vibration and the potential for consequent stress fatigue of the riser brace welds to the vessel. Operation near this value should be minimized.

NOTES:

- 2. Core Flow > 40% during single loop operation prevents excessive cool down of the idle loop.
- IfWTFLAG = 1 or 2, <u>AND</u> the operable loop drive flow ≤ 23 Kgpm (≈48% Pump Speed), the PPC WT (Core Flow) will not be accurate. In this case, add the Jet Pump Loop Flows to determine WT. If WTFLAG = 3, WT is calculated from the core plate DP and is accurate.

If WTFLAG = 4, WT is calculated from the recirculation drive flows and is accurate.

ADDITIONAL INFORMATION:

Procedures:

- HC.OP-DL.ZZ-0026(Q), Surveillance Log.
- HC.OP-IO.ZZ-0006(Q), POWER CHANGES DURING OPERATION.
- HC.SE-PR.ZZ-0003(Q), Thermal Cycle Monitoring.

Valves:

• 1-HV-F031A(B), Recirculation Pump Discharge Valve.

Indications:

- 1BBFR-R613-B21, Jet Pump Flow Recorder
- 1BBFI-R611A(B)-B21, Jet Pump Loop A(B) Flow

SUBSEQUENT OPERATOR ACTIONS

CONDITION	ACTION			
A. Single Reactor Recirc Pump Tripped.	A.1	INSERT Control Rods to clear APRM Upscale Alarms.		
[T/S 3.4.1.1]	A.2	CONTINUE actions in this condition while monitoring for Power Oscillations.		
[T/S 4.4.1.2]	A.3	ENSURE that the Recirc MG Drive Motor Breaker has TRIPPED for the tripped Pump.		
Date/Time:	A.4	CLOSE HV-F031A(B) for approximately 5 minutes, <u>THEN</u> RE-OPEN HV-F031A(B). <u>UNLESS</u> isolated IAW condition E "Seal Failure" [CD-976B]		
		\star <u>caution 1</u> \star		
	A.5	<u>IF</u> Single Loop Operation WITH flow ≥ 23 Kgpm. (≈ 48% Pump Speed)		
		DETERMINE Actual Core Flow by Using Indication for Core Flow from the Jet Pump Flow Recorder. (FR-R613-B21)		
		** <u>NOTE 13</u> **		
	A.6	<u>IF</u> Single Loop Operation WITH flow < 23 Kgpm. (≈ 48% Pump Speed)		
		DETERMINE Actual Core Flow by <u>ADDING</u> the Idle Loop Jet Pump Flow <u>AND</u> the Operating Loop Jet Pump Flow. (FI-R611A-B21 and FI-R611B-B21)		
	A.7	IMPLEMENT DL.ZZ-0026 Att. 3v AND IO-6 Requirements for Single Loop operations.		
		** <u>NOTE 2</u> **		
	A.8	<u>IF</u> core flow cannot be raised to > 40%, <u>THEN</u> DIRECT System Engineering to evaluate Single Loop operation IAW SE-PR.ZZ-0003. [950919568]		

	RETAINMENT OVERRIDE			
CONDITION		ACTION		
Ι.	Affected Recirc Pump seal cavity temperature greater than 200 degrees F	I.a	REDUCE the affected Recirc pump speed to minimum, TPIP the affected Recirc pump and	
	Date/Time:		enter Condition A	

CAUTIONS:

2. DO NOT intentionally enter the REGION 1 while changing power. Passing through this region or lowering flow once in REGION 1 is acceptable if the <u>intent</u> is to TAKE the Mode Switch to shutdown. [PR 971229163]

NOTES:

- 3. 68% core flow is the nominal value to enable the alarm. To ensure the OPRM enables during all conditions, e.g. SLO, the value has been set at 68% core flow. It is possible to receive the Trip Enable Alarm at a higher value, and may require up to 73% core flow to clear the alarm.
- 4. The OPRM ALARM overhead alarm (C3-F2) and associated CRIDS alarms will clear automatically when the condition clears. The OPRM Alarm LED on Local Panel 10C608 is a "lock in" indication and requires physically resetting when the condition clears.
- 14. IF in single loop operation, Steps A.5 and A.6 should be referred to for determination of actual core flow.

ADDITIONAL INFORMATION:

Indications:

- CRIDS PAGE 248
- OPRM Alarm, Red LED @ Panel 10C608

Figure 2 - POWER TO FLOW MAP (OPRM OPERABLE)



Power Oscillations (Thermal Hydraulic Instabilities) are defined as any of the following:

- 10% peak to peak Power Oscillations on APRM Recorders
- Periodic Upscale <u>OR</u> Downscale LPRM Alarms (on the Full Core Display)
- Strong positive/negative swings on the Period Meters

Hope Creek

CONDITION	ACTION		
B. Unplanned entry resulting in Reactor	B.1	MONITOR for Power Oscillations. (Thermal Hydraulic Instabilities)	
Power $\ge 26.1\%$ AND Core Flow $\le 68\%$		** <u>NOTE 3</u> **	
(nominal).	B.2	VERIFY OPRM TRIP ENABLE (C3-F1) alarm.	
Date/Time:		** <u>NOTE 14</u> **	
Ocurtioned on Dama 44		X CAUTION 2	
Continued on Page 11	B.3	<u>IF</u> OPRM's are OPERABLE, <u>THEN</u> PERFORM the following:	
		 A. <u>IF</u> in REGION 1 of Figure 2 <u>THEN</u> EXIT REGION 1 IAW Enhanced Stability Guidance. (RE.ZZ-0001) 	
		B. <u>IF</u> OPRM ALARM (C3-F2) is received <u>THEN</u> PERFORM the following:	
		 SUSPEND Control Rod withdrawal <u>AND</u> Recirculation Pump speed reduction. 	
		 <u>IF</u> applicable, CONTINUE operation <u>WITH</u> Enhanced Stability Guidance. (RE.ZZ-0001) 	
		C. <u>IF</u> OPRM ALARM (C3-F2) will NOT remain Clear, <u>OR</u> MORE THAN one OPRM Channel has an "OPRM Alarm" (REFER to CRIDS Page 248) <u>THEN CONTINUE</u> Rod insertion IAW Enhanced Stability Guidance <u>UNTIL</u> the alarm is clear. (RE.ZZ-0001)	
		** <u>NOTE 4</u> **	
		D. <u>WHEN</u> OPRM ALARM (C3-F2) is CLEAR, PRESS the OPRM LED reset at Panel 10C608.	
		Continued on Page 11	

	RETAINMENT OVERRIDE			
	CONDITION	ACTION		
Ι.	Affected Recirc Pump seal cavity temperature greater than 200 degrees F	I.a	REDUCE the affected Recirc pump speed to minimum, TRIP the affected Recirc pump and	
	Date/Time:		enter Condition A	

CAUTIONS:

3. DO NOT intentionally enter the REGION 1 or 2 while changing power. Passing through these regions or lowering flow once in REGION 2 is acceptable if the <u>intent</u> is to TAKE the Mode Switch to shutdown. [PR 971229163]

NOTES:

5. Figure 1 "POWER TO FLOW MAP (OPRM INOPERABLE)" is required to be utilized as part of an alternate method to detect and suppress thermal hydraulic instability oscillations to comply with T/S 3.3.11 action a.3 or b.1.

ADDITIONAL INFORMATION:



Figure 1 - POWER TO FLOW MAP (OPRM INOPERABLE)

Power Oscillations (Thermal Hydraulic Instabilities) are defined as any of the following:

- 10% peak to peak Power Oscillations on APRM Recorders
- Periodic Upscale <u>OR</u> Downscale LPRM Alarms (on the Full Core Display)
- Strong positive/negative swings on the Period Meters

Hope Creek

SUBSEQUENT OPERATOR ACTIONS (continued)

CONDITION		ACTION
B. Unplanned entry		Continued from Page 9
resulting in Reactor Power ≥ 26 1%		** <u>NOTE_5</u> **
\underline{AND} Core Flow $\leq 68\%$		★ <u>CAUTION 3</u> ★
(nominal).	B.4 <u>IF</u> OPF	M's are INOPERABLE,
	<u>AND</u> in THEN	REGION 2 of Figure 1, EXIT REGION 2 IAW Enhanced Stability
Date/Time:	Guidar	ce. (RE.ZZ-0001)
Continued from Page 9		

	RETAINMENT OVERRIDE			
	CONDITION	ACTION		
١.	Affected Recirc Pump seal cavity temperature greater than 200 degrees F	l.a	REDUCE the affected Recirc pump speed to minimum, TPIP the affected Recirc pump and	
	Date/Time:		enter Condition A	

CAUTIONS:

4. Recirculation MG Set/Pump Speed Fluctuations have been identified during Power Ascension. Operations at these speeds may result in speed Fluctuations of 4 - 10%. Operation at these speeds should be minimized and may not warrant actions IAW with this procedure

1AP201 RPM	1AG122 %SPEED	1BP201 RPM	1BG122 %SPEED
538	32%	470	28%
890	53%	890	53%

ADDITIONAL INFORMATION:

Procedures:

• HC.OP-SO.BB-0002(Q), REACTOR RECIRCULATION SYSTEM OPERATION

REFER to Attachment 4 for POWER TO FLOW MAP

Power oscillations (Thermal Hydraulic Instabilities) are defined as any of the following:

- 10% peak to peak Power Oscillations on APRM Recorders
- Periodic Upscale <u>OR</u> Downscale LPRM Alarms (on the Full Core Display)
- Strong positive/negative swings on the Period Meters

SUBSEQUENT OPERATOR ACTIONS

CONDITION		ACTION
C. Fluctuating Reactor		★ <u>CAUTION 4</u> ★
Recirculation Fump Speed.	C.1	PLACE the affected Reactor Recirc Pump in MANUAL AND ADJUST to STABILIZE pump speed.
Date/Time:	C.2	IF Recirc Pump speed fluctuations continue, PERFORM the following:
		A. PRESS SCOOP TUBE TRIP A(B) Pushbutton.
		 ENSURE SCOOP TUBE LOCKUP light comes on for the desired Motor/Generator.
		C. REFER to SO.BB-0002(Q) for continued operation with a Scoop Tube Lock Up.

	RETAINMENT OVERRIDE			
	CONDITION	ACTION		
Ι.	Affected Recirc Pump seal cavity temperature greater than 200 degrees F	l.a	REDUCE the affected Recirc pump speed to minimum, TRIP the affected Recirc pump and	
	Date/Time:		enter Condition A	

NOTES:

6. A Recirc Pump can be confirmed to be stopped by referencing A(B) Flow FI-R617(R613) and D/P PDI-R612A(B) indications.

ADDITIONAL INFORMATION:

Procedures:

- HC.OP-DL.ZZ-0026(Q), Surveillance Log.
- HC.OP-IO.ZZ-0006(Q), POWER CHANGES DURING OPERATION.
- HC.SE-PR.ZZ-0003(Q), Thermal Cycle Monitoring.

Valves:

- 1-HV-F023A(B), RECIRCULATION PUMP SUCTION VALVE.
- 1-BF-HV3800A(B), Recirc. Pump Seal Purge Valve.
- 1-BG-HV-F100, RWCU SUCT FROM RECIRC LOOP "A".
- 1-BG-HV- F106, RWCU SUCT from Recirc Loop "B".
- 1-HV-F031A(B), Recirculation Pump Discharge Valve.

References:

• Basis for Action D; DCRMS\Records Management\Doc. ID: 80098244

SUBSEQUENT OPERATOR ACTIONS (continued)

CONDITION		ACTION
D. Reactor Recirc Pump Seal Degradation is	D.1	MONITOR seal parameters every 2 hours, to DETERMINE the severity of degradation.
Date/Time:	D.2	<u>IF</u> Recirc Pump seal cavity temperature >180 F, REDUCE the affect Recirc pump speed as necessary to reduce seal cavity temperature to <180 F.
	D.3	IF NO.2 SEAL CAVITY PRESS (CRIDS or local) < 200 psig <u>OR</u> > 800 psig <u>OR</u> ANY of the following CRID's points are in alarm D2924/D2926/ D2925/ D2927 <u>THEN</u> NOTIFY the following:
		Site Vice President – Hope Creek
		Plant Manager - Hope Creek
		 Hope Creek Operations Manager
		Hope Creek System Engineering Manager
E. Multiple seal failure of a Recirculation Pump.	E.1	PRESS The Pump A(B) MOTOR BRKR TRIP PB.
Date/Time:	E.2	CONTINUE actions in this condition while monitoring for Power Oscillations IAW Condition B.
CD-813E, CD-164B, CD-219B]		**NOTE 6**
	E.3	<u>WHEN</u> the PUMP has stopped, PRESS the CLOSE PB on HV-F023A(B).
	E.4	CLOSE the following:
		• BF-HV3800A(B).
		• BG-HV-F100(F106).
	E.5	ENSURE HV-F023A(B) is CLOSED.
	E.6	CLOSE HV-F031A(B).
	E.7	ENTER AND COMPLETE condition "A"

	RETAINMENT OVERRIDE			
	CONDITION	ACTION		
١.	Affected Recirc Pump seal cavity temperature greater than 200 degrees F	l.a	REDUCE the affected Recirc pump speed to minimum, TRIP the affected Recirc pump and	
	Date/Time:		enter Condition A	

CAUTIONS:

- 5. DO NOT intentionally enter the Power Oscillation regions (region 1 or 2) while changing power. Passing through these regions or lowering flow once in these regions is acceptable if the <u>intent</u> is to TAKE the Mode Switch to shutdown. [PR 971229163]
- 6. After the affected pump speed reduction, flow mismatch requirements should be evaluated, and compliance with T/S 3.4.1.3 ENSURED.

NOTES:

- 7. If the affected Recirculation Pump is operating in a critical speed band with a speed change in progress and continuing the speed change clears the Table 2 alarm condition, no further action in this procedure is required.
- The following guidance applies to the Radial PMP, Radial MTR ALERT/DANGER alarm setpoints and digital points listed in Table 2 only. This guidance does not apply to Gap Voltage which also causes REACTOR RECIRC PUMP VIB HI C1-E4 to annunciate <u>OR</u> spurious vibration alarms/indications.

ADDITIONAL INFORMATION:

Procedures:

- HC.OP-SO.BB-0002(Q), Reactor Recirculation System Operation
- HC.ER-AP.BB-0001(Q), HOPE CREEK REACTOR RECIRCULATION PUMPS/MOTORS VIBRATION MONITORING
- HC.OP-IO.ZZ-0006(Q), Power Changes During Operation

Valves/Breakers/Controllers:

- SIC-R621A(B) PUMP A(B) Speed Controller
- Cabinet 1B-C374 TSI Vibration (Bentley Nevada 3500) System cabinet

Indications:

- REACTOR RECIRC PUMP VIB HI C1-E4
- CRIDS PAGE 85 REAC RECIRC PUMP A AND B

		ALERT	DANGER	
	Vibration Point	Limit	Limit	
	A2601 - Radial PMP	11.0 mils	16.0 mils	
A Recirc Fump	A2602 - Radial MTR	3.0 mils	4.5 mils	
P. Pooiro Dump	A2603 - Radial PMP	11.0 mils	16.0 mils	
	A2604 - Radial MTR	6.0 mils	8.0 mils	

Table 2

SUBSEQUENT OPERATOR ACTIONS (continued)

CONDITION		ACTION
F. Recirc Pump Vibration		** <u>NOTE 7</u> **
Alarm [T/S 3/4.4.1.1,3/4.4.1.3]	F.1	PRIOR to REDUCING Recirc Pump Speed, PERFORM the following:
		A. ENSURE the following controllers are in MANUAL:
		SIC-R621A PUMP A SPD CONT
		SIC-R621B PUMP B SPD CONT
	F.2	EVALUATE the following Recirc Pump parameters for degradation of the pump(s) in ALARM to validate the condition.
		Seal Parameters (Temperature, Pressure, Flow)
		Pump Parameters (Temperature, Vibration)
		Motor Parameters (Temperature, Vibration)
	F.3	REQUEST SM/CRS to contact the Engineering Duty Manager to obtain <u>AND</u> assess vibration data.
		** <u>NOTE 8</u> **
		🛠 <u>caution 5</u> 🛠
	F.4	MAINTAIN A(B) Recirc Pump Vibration points below the DANGER limit as follows: [REFER to Table 2]
		 INTERMITTENTLY PRESS SIC-R621A(B) PUMP A(B) SPD CONT DECREASE push button.
		 INSERT Control Rods as required by Reactor Engineering Instructions.
		★ <u>CAUTION 6</u> ★
	F.5	<u>IF</u> A(B) Recirc Pump Vibration points cannot be maintained below the DANGER limit [REFER to Table 2] <u>THEN</u> PERFORM the following to remove A(B) Recirc Pump from service:
		A. PRESS SIC-R621A(B) PUMP A(B) SPD CONT DECREASE push button <u>UNTIL</u> minimum speed is reached.
		B. PRESS PUMP A(B) MOTOR BRKR TRIP push button.
		C. ENTER and complete condition "A"

	RETAINMENT OVERRIDE			
	CONDITION	ACTION		
Ι.	Affected Recirc Pump seal cavity temperature greater than 200 degrees F	l.a	REDUCE the affected Recirc pump speed to minimum, TRIP the affected Recirc pump and	
	Date/Time:		enter Condition A	

NOTES:

9. The following steps are utilized to place one Reactor Recirculation Pump in service to prevent thermal stratification from occurring.

ADDITIONAL INFORMATION:

Procedures:

- HC.OP-IO.ZZ-0006(Q), Power Changes During Operation
- HC.OP-SO.BG-0001(Q), Reactor Water Cleanup System Operation
- HC.OP-SO.SA-0001(Q), REDUNDANT REACTIVITY CONTROL SYSTEM OPERATION

Valves/Breakers/Controllers:

- SIC-R621A(B) PUMP A(B) Speed Controller
- BB-HV-F023A(B) A(B) Recirc Pump Suction Valve
- BG-HV-F100(F106) A(B) RWCU Suction Valve
- SIC-R621A(B) PUMP A(B) Speed Controller
- SIC-R620 Master Speed Controller
- 1-HV-F031A(B), Recirculation Pump Discharge Valve
- Recirc Pump Trip System A(B) Disable Keylock at 10C609(10C611)
- EOC Recirc Pump Trip AP201 Pump Motor Breakers 1AN205 AND 1CN205
- EOC Recirc Pump Trip BP201 Pump Motor Breakers 1BN205 AND 1DN205

Indications:

- REACTOR RECIRC A(B) TROUBLE C1-D4 (D5)
- A2856, RWCU SYS OUTLET FLOW TO FDW
- 1BBTI-8291A(B) MG SET HYD Oil CLR A(B) Inlet Temperature

TABLE 1

RACS is in service to supply cooling water to Reactor Recirc Pump Motor Oil Coolers.

SACS is in service to supply cooling to MG Set hydraulic oil cooler.

Chilled Water System

OR RACS is in service to supply cooling water to Reactor Recirc Pump Motor Winding Coolers

Motor Generator Ventilation System is in service.

CRD Hydraulic System is in service to supply seal purge water to Reactor Recirc Pumps.

Recirculation System Motor Generator A(B) Lube Oil System is in operation.

SUBSEQUENT OPERATOR ACTIONS (continued)

CONDITION	ACTION			
G. BOTH Recirculation	** <u>NOTE 9</u> **			
Pumps TRIPPED <u>AND</u> Potential exists for	G.1 ENSURE BOTH Reactor Recirculation Pump A <u>AND</u> B Motor Breakers TRIPPED.			
Thermal Stratification	G.2 ENSURE systems in-service as described in Table 1.			
Date/Time:	G.3 ENSURE RWCU is in service. (REFER to Attachment 3 for placing RWCU in service.)			
Continued on Page 21	G.4 VERIFY BB-HV-F023A(B) <u>AND</u> BG-HV-F100(F106) are OPEN.			
	G.5 VERIFY that PUMP A(B) LOCKOUT BUS POWER AVAILABLE light is illuminated.			
	G.6 VERIFY Reactor Recirc A(B) Trouble Alarm CLEAR.			
	G.7 ENSURE the following controllers are in MANUAL <u>AND</u> at their MINIMUM setpoints:			
	 SIC-R621A(B) PUMP A SPD CONT 			
	 SIC-R620 MASTER SPD CONT 			
	Continued on Page 21			

	RETAINMENT OVERRIDE			
	CONDITION	ACTION		
Ι.	Affected Recirc Pump seal cavity temperature greater than 200 degrees F	l.a	REDUCE the affected Recirc pump speed to minimum, TRIP the affected Recirc pump and	
	Date/Time:		enter Condition A	

NOTES:

10. Normal Recirculation Set MG Lube Oil Temperature Band is 110 to 130°F, however 80-140°F is allowable for start up.

ADDITIONAL INFORMATION:

Procedures:

- HC.OP-IO.ZZ-0006(Q), Power Changes During Operation
- HC.OP-SO.BG-0001(Q), Reactor Water Cleanup System Operation
- HC.OP-SO.SA-0001(Q), REDUNDANT REACTIVITY CONTROL SYSTEM OPERATION

Valves/Breakers/Controllers:

- 1-HV-F031A(B), Recirculation Pump Discharge Valve
- Recirc Pump Trip System A(B) Disable Keylock at 10C609(10C611)
- EOC Recirc Pump Trip AP201 Pump Motor Breakers 1AN205 AND 1CN205
- EOC Recirc Pump Trip BP201 Pump Motor Breakers 1BN205 AND 1DN205

Indications:

- REACTOR RECIRC A(B) TROUBLE C1-D4 (D5)
- D2915 (D2916) Recirc MG A(B) Drive Lube Oil Pressure
- 1BBTI-8291A(B) MG SET HYD Oil CLR A(B) Inlet Temperature

TABLE 1

RACS is in service to supply cooling water to Reactor Recirc Pump Motor Oil Coolers.

SACS is in service to supply cooling to MG Set hydraulic oil cooler.

Chilled Water System

<u>OR</u> RACS is in service to supply cooling water to Reactor Recirc Pump Motor Winding Coolers

Motor Generator Ventilation System is in service.

CRD Hydraulic System is in service to supply seal purge water to Reactor Recirc Pumps.

Recirculation System Motor Generator A(B) Lube Oil System is in operation.

SUBSEQUENT OPERATOR ACTIONS (continued)

CONDITION	ACTION		
G. BOTH Recirculation		Continued from Page 19	
AND	G.8	ENSURE the following:	
Potential exists for		A. D2915 (D2916) not in alarm.	
		** <u>NOTE 10</u> **	
Continued from Page 19		B. MG Set Lube Oil Temperature 80-140°F.	
		C. High Vibration Trip RESET.	
		D. Scoop Tube Lock Up RESET.	
	G.9	<u>IF</u> required, <u>THEN</u> RESET RRCS. (SA)	
	G.10	ENSURE the following switches are in BYP:	
		 C71A-S12A, RECIRC PUMP TRIP BYPASS DISABLE SYSTEM "A" 	
		 C71A-S12B, RECIRC PUMP TRIP BYPASS DISABLE SYSTEM "B" 	
	G.11	ENSURE EOC RPT Breakers are CLOSED.	
		Continued on Page 23	

	RETAINMENT OVERRIDE				
	CONDITION	ACTION			
Ι.	Affected Recirc Pump seal cavity temperature greater than 200 degrees F	I.a	REDUCE the affected Recirc pump speed to minimum, TRIP the affected Recirc pump and		
	Date/Time:		TRIP the affected Recirc pump and enter Condition A		

CAUTIONS:

- 8. Reactor Coolant System pressure and temperature limits of Tech Spec. 3.4.6.1 should be observed.
- 9. Step H.1 supplements the level and thermal stratification direction of HC.OP-AB.ZZ-0000 (Q) REACTOR SCRAM.

NOTES:

11. The next step will start the respective Motor Generator Set and Recirculation Pump. The following should be observed to occur after starting:

- A. Recirc Pump A(B) drive motor ammeter will increase to approximately 3000 amps <u>AND</u> THEN decrease to approximately 200 amps.
- B. Approximately 6 seconds after the MG set is started, the generator field breaker will close.
- C. The Recirc Pump speed will increase to approximately 50% of rated generator speed.
- D. The Recirc Pump speed will decrease AND settle at approximately 20% of rated speed.

ADDITIONAL INFORMATION:

Procedures:

• HC.OP-SO.BB-0002(Q), REACTOR RECIRCULATION SYSTEM OPERATION

Valves/Breakers/Controllers:

• 1-HV-F031A(B), RECIRCULATION PUMP DISCHARGE VALVE

Indications:

• 1BBTI-8291A(B) MG SET HYD Oil CLR A(B) Inlet Temperature

SUBSEQUENT OPERATOR ACTIONS (continued)

CONDITION	ACTION		
G. BOTH Recirculation Pumps TRIPPED <u>AND</u> Potential exists for Thermal Stratification	G.12	Continued from Page 21 ENSURE Differential Temperature requirements are met by completing Attachment 2. [T/S 4.4.1.4]	
	G.13	CLOSE HV-F031A(B) for the pump to be started.	
Continued from Page 21	G.14	<u>IF</u> Differential Temperature Requirements CANNOT be met, <u>THEN</u> EXIT this condition and restart a Recirculation Pump IAW the SOP. (BB)	
		** <u>NOTE 11</u> **	
	G.15	<u>WITHIN</u> 15 minutes of completing Attachment 2 PERFORM the following: [T/S 3.4.1.4]	
		A. PRESS REACTOR RECIRCULATION PUMP A(B) MOTOR BRKR CLOSE PB.	
		 B. VERIFY BB-HV-F031A(B) opens according to jog sequence. (approximately 80 seconds for full travel) 	
	G.16	MONITOR MG Set Lube Oil Temperatures.	
	G.17	ENSURE RWCU system operating correctly per HC.OP-SO.BG-0001(Q)	
H. Recirculation Flow cannot be Restored		\star <u>Caution 8</u> \star	
AND There is notential for		\star <u>caution 9</u> \star	
vessel Thermal Stratification <u>AND</u> HPCI, RCIC, and Feedwater are <u>not</u> needed for RPV level or pressure control.	H.1	<u>SLOWLY</u> RAISE RPV level to 80" to induce natural circulation. [CD-693A]	
Date/Time:			

	RETAINMENT OVERRIDE			
CONDITION		ACTION		
Ι.	Affected Recirc Pump seal cavity temperature greater than 200 degrees F	l.a	REDUCE the affected Recirc pump speed to minimum, TRIP the affected Recirc pump and	
	Date/Time:		enter Condition A	

ADDITIONAL INFORMATION:

Procedures:

- HC.OP-ST.BB-0001(Q), Recirculation Jet Pump Operability Daily.
- HC.OP-ST.BB-0007(Q), Recirculation Jet Pump Operability Single Loop Daily.
- HC.RE-IO.ZZ-0001(Q), Core Operations Guidelines
- HC.OP-IO.ZZ-0004(Q), Shutdown From Rated Power To Cold Shutdown.

SUBSEQUENT OPERATOR ACTIONS (continued)

	CONDITION		ACTION
I.	Suspected Jet Pump Failure.	I.1	COMPLETE (one) of the following:
	[T/S 3.4.1.2]		• ST.BB-0001.
			• ST.BB-0007.
	Date/Time:	I.2	ANY Jet Pump INOPERABLE <u>AND</u> in Operational Condition 1 or 2 <u>THEN</u> COMMENCE a unit Shutdown IAW IO.ZZ-0004. [T/S 3.4.1.2]
J.	Reactor is Sub-Critical <u>AND</u> No Recirc. Pumps running	J.1	INSERT all Control Rods to 00 IAW the Shutdown Sequence. (RE.ZZ-0001) (IO.ZZ-0004)
	[CD354F]		
	Date/Time:		

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	RETAINMENT OVERRIDE			
CONDITION		ACTION		
Ι.	Affected Recirc Pump seal cavity temperature greater than 200 degrees F	I.a	REDUCE the affected Recirc pump speed to minimum, TRIP the affected Recirc pump and	
	Date/Time:		enter Condition A	

CAUTIONS:

10. **ENSURE** compliance with LCO 3.4.1.3 at all times.

NOTES:

12. It is recommended that operator action to reduce speed or shut down the pump be taken if seal temperatures exceed the stated limits and sustain these levels. Temperature spiking that results in momentary entry into the ALERT or ALARM thresholds should be evaluated by Engineering to determine if operator action is necessary. It is not the intent of this guidance to unnecessarily cycle the plant or the Operations staff.

ADDITIONAL INFORMATION

Indications:

- A2998 A Recirc Pump Seal Cavity 2 Temperature (CRIDS Alarm set point = 180F)
- A2999 A Recirc Pump Seal Cavity 1 Temperature (CRIDS Alarm set point = 180F)
- A3008 B Recirc Pump Seal Cavity 2 Temperature (CRIDS Alarm set point = 180F)
- A3009 B Recirc Pump Seal Cavity 1 Temperature (CRIDS Alarm set point = 180F)

SUBSEQUENT OPERATOR ACTIONS (continued)

CONDITION	ACTION			
K. Any Recirc Pump Seal Cavity temperature >150F <u>OR</u> Indication of an adverse trend	K.1	<u>IF</u> any Any Recirc Pump Seal Cavity temperature >150F <u>OR</u> Indication of an adverse trend:		
		 TRACK seal pressures/temperatures and drywell floor and equipment inputs. 		
Date/Time:		VERIFY adequate Seal Purge Flow.		
		VERIFY adequate Seal Cooling.		
	K.2	<u>IF</u> any Recirc Pump seal cavity temperature exceeds 170°F, <u>THEN</u> BRIEF the control room for a potential down power.		
		** <u>NOTE 12</u> **		
		★ <u>CAUTION 10</u> ★		
	K.3	<u>IF</u> any Recirc Pump Seal Cavity temperature >180F, <u>THEN</u> LOWER Recirc pump speed to maintain seal temperature < 180F.		
	K.4	<u>IF</u> the speed reduction does not restore and maintain Recirc pump seal temperature below 180F, <u>THEN</u> REMOVE the Recirc Pump from service.		
		A. PRESS SIC-R621A(B) PUMP A(B) SPD CONT DECREASE push button <u>UNTIL</u> minimum speed is reached.		
		B. PRESS PUMP A(B) MOTOR BRKR TRIP push button.		
		C. ENTER and complete condition "A"		

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1.0 COMPLETION AND REVIEW

- 1.1 **EXPLAIN** the entry Condition into the abnormal in the Comments Section.
- 1.2 **ANNOTATE** in the comments section all systems affected by the implementation of this procedure <u>AND</u> restoration actions (i.e. restoration line ups) completed/required.
- 1.3 **ATTACH** photocopies of any Hard Cards utilized as part of this procedure implementation to Attachment 1.
- 1.4 **ENSURE** the Exit time for any applicable conditions and this abnormal are annotated in the comment section <u>AND</u> the Control Room Logs.
- 1.5 **FORWARD** completed Portions of this procedure <u>AND</u> Sections 1 and 2 of Attachment 1 to SM/CRS for approval and Record Retention.

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ATTACHMENT 1 (Page 1 of 2) COMPLETION AND REVIEW

1.0 COMMENTS:

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ATTACHMENT 1 (Page 2 of 2) COMPLETION AND REVIEW

2.0 SIGNATURES:

PRINT NAME	SIGNATURE	INITIALS	DATE/TIME

Completion of this attachment is annotated in the Control Room Logs:

Printed Name

SIGNATURE

Date/Time

3.0 SM/CRS FINAL REVIEW AND APPROVAL:

This procedure and Attachment 1 have been reviewed for completeness and accuracy. Entry/Exit conditions and all deficiencies, including corrective actions, are clearly recorded in the COMMENTS Section above.

Printed Name

SM/CRS

Date/Time

4.0 <u>RECORDS</u>

- 4.1 **RETAIN** the following IAW RM-AA-101, Records Management Program:
 - Procedure cover page
 - Affected Conditions and Hard Cards performed
 - Completion and Review section
 - Attachment 1

ATTACHMENT 2 REACTOR RECIRCULATION PUMP PRE-START TEMPERATURE DIFFERENTIAL CRITERIA DETERMINATION (Page 1 of 2)

1.0 <u>REACTOR VESSEL TO BOTTOM HEAD DRAIN LINE DIFFERENTIAL</u> <u>TEMPERATURE CRITERIA</u>

- 1.1 Rx Pressure Vessel Steam Space Coolant Saturation Temperature. (Rx Pressure and Steam Tables) (**Note 1**)
- 1.2 Bottom Head Drain Coolant Temperature. (**Note 2**) (Computer Point A2942)
- 1.3 ≤ 145°F between Rx Pressure Vessel Steam Space Coolant AND Bottom Head Drain Line Coolant (A – B).
 [T/S 4.4.1.4]
- 1.4 Time Readings taken:

2.0 <u>REACTOR VESSEL TO RECIRCULATION LOOP DIFFERENTIAL</u> <u>TEMPERATURE CRITERIA</u>

- 2.1 Temperature of the Rx Coolant within the idle loop to be started up. (Note 3)
- 2.2 Temperature of coolant in the Rx Pressure Vessel. (RX Pressure and Steam Tables) (**Note 1**)
- 2.3 ≤ 50°F between the Rx Coolant within the loop not in operation <u>AND</u> the Coolant in the Rx Pressure Vessel (A-B).
 [T/S 4.4.1.4]
- 2.4 Time Readings taken:
- **Note 1:** Steam Table as part of this attachment may be utilized to determine temperature rounding the numbers in a conservative fashion. For a more accurate conversion from pressure to temperature a more detailed set of steam tables should be utilized.
- **Note 2:** RWCU Flow required for accurate Bottom Head Drain Coolant Temperature indication.
- Note 3: Use TR-650-B31 Recirc Pump Suction Loop A(B) (if available) <u>OR</u> if above 400° F - CRIDS points A221 and A222 for A loop (A223 and A224 for B loop). <u>IF</u> below 400°F <u>AND</u> TR-650-B31 not available, <u>THEN</u> have I&C obtain temperatures using RTD ohm values (reference RTD ohm values to calibration data in TDR using HC.OP-GP.ZZ-0008(Q))

ATTACHMENT 2 REACTOR RECIRCULATION PUMP PRE-START TEMPERATURE DIFFERENTIAL CRITERIA DETERMINATION (Page 2 of 2)

TEMP °F	ABS PRESS (PSIA)	TEMP °F	ABS PRESS (PSIA)
200	11.526	388	215.220
212	14.696	396	236.193
220	17.186	404	258.725
228	20.015	412	282.894
236	23.216	420	308.780
244	26.826	428	336.463
252	30.883	436	366.03
260	35.427	444	397.56
268	40.500	452	431.14
276	46.147	460	466.87
284	52.414	468	504.83
292	59.350	476	545.11
300	67.005	484	587.81
308	75.433	492	633.03
316	84.688	500	680.86
324	94.826	508	731.40
332	105.907	516	784.76
340	117.992	524	841.04
348	131.142	532	900.34
356	145.424	540	962.79
364	160.903	548	1028.49
372	177.648	556	1097.55
380	195.729	564	1170.10

SATURATED STEAM TABLES

ATTACHMENT 3 PLACING RWCU IN SERVICE (Page 1 of 2)

<u>CAUTION</u>

RWCU pumps should be started immediately if possible to avoid thermal stresses to piping and associated components.

- 1. IF necessary, **RESET** NSSSS as follows:
 - 1.1 **ENSURE** conditions causing the Isolation have been corrected.
 - 1.2 **PRESS** the following PBs to reset NSSSS:
 - NUCLEAR STEAM SUPPLY SHUTOFF SYSTEM TRIP LOGIC A RESET.
 - NUCLEAR STEAM SUPPLY SHUTOFF SYSTEM TRIP LOGIC B RESET.
 - NUCLEAR STEAM SUPPLY SHUTOFF SYSTEM TRIP LOGIC C RESET.
 - NUCLEAR STEAM SUPPLY SHUTOFF SYSTEM TRIP LOGIC D RESET.
 - 1.3 **OPEN** HV-F001 and HV-F004, RWCU suction valves.

ATTACHMENT 3 PLACING RWCU IN SERVICE (Page 2 of 2)

- 2. **ENSURE** HV-F044, Filter Demin Bypass valve is CLOSED.
- 3. **ENSURE** HV-F104 HX Bypass valve is CLOSED.

<u>NOTE</u>

RWCU pumps trip on low flow <70 gpm and after a time delay of 15 minutes. This trip will only occur if the common pump suction flowpath is <70 gpm.

- 4. **START** A(B) P221, RWCU pump.
- 5. **THROTTLE** OPEN HV-F044, Filter Demin Bypass valve until computer point A2856, RWCU Outlet Flow indicates approximately 150 gpm.
- 6. **START** B(A) P221, RWCU pump.
- 7. **THROTTLE** OPEN HV-F044, Filter Demin Bypass valve until computer point A2856, RWCU Outlet Flow indicates approximately 300 gpm.



ATTACHMENT 4



- Biennial Review Performed: Yes
 No
 NA
 ✓
- Packages and Affected Document Numbers incorporated into this revision: CP No. _____ CP Rev. ____ AD No. ____ Rev No. ____ None ____

• The following OTSCs were incorporated into this revision: None

REVISION SUMMARY

- Added an initial indication of Recirc Pump #2 seal cavity pressure < 200 or > 800 psig.
- Added Action D.2 to reduce pump seal cavity temperature to < 180° F.
- Revises Action D.3 for Recirc Pump #2 seal cavity pressure < 200 or > 800 psig.
- Added a reference for the above actions.

This was reviewed in 70086680 and is editorial. (70086680-0763)

IMPLEMENTATION REQUIREMENTS

None