

NC.DM-AP.ZZ-0002(Q)

FORM-1
ON-THE-SPOT-CHANGE (OTSC) FORM

PROCEDURE NO: HC.OP-50.BB-0002(Q) OTSC No. 50A
Order No. 60036505 TM#03-025

PROCEDURE TITLE: Reactor Recirculation System op. USE CATEGORY: II

DESCRIPTION OF CHANGE: Change Radial Alert Vibration Setpoint
Value for 'B' Pump FROM: 12.0 mils TO 11.0 mils

REASON FOR CHANGE: Removal of TM-03-025

LIST PAGES CHANGED: 11, 36, 37

Determine if the OTSC alters the intent of the procedure.
Refer to Attachment 1, Change of Intent Criteria. **IF ANY** of the statements in
Attachment 1 are true, **THEN** the OTSC changes the intent of the procedure...
STOP! - DO NOT use an OTSC!
NC & SH procedures: Salem AND HC Ops SM/CRS signatures required prior to use!

INITIATED: P.R. La Sala [Signature] 10-30-04
Initiator (Print AND Sign) Date
APPROVED: TIFFANY A. BABAN [Signature] 10/30/04
Supervisor (Print AND Sign) Date
APPROVED: [Signature] KENNETH P KLOSS 10/30/2004
(Hope Creek) Ops SM/CRS (Print AND Sign) Date
APPROVED: N/A
(Salem) Ops SM/CRS (Print AND Sign) Date

- SUPERVISOR/DESIGNEE:**
1. Initiate a Notification to the responsible procedure group to perform the post-implementation review of the OTSC upon final Ops SM/CRS approval. Notification No: 20209188
 2. Provide an approved copy of the OTSC Package (not the work package) to TDR by the end of shift.
 3. Provide an approved copy of the OTSC Package to the Sponsor/Procedure Writer by the end of shift.
 4. When applicable, provide an approved copy of the OTSC Package for the Control Room Console(s).
 5. Deliver the signed ORIGINAL OTSC Package for use with the procedure.
- N/A* Ensure a copy of the completed procedure including the OTSC Package is submitted with the Work Package, if the procedure was part of the work package.

COMPLETED BY: [Signature] 3659 10/30/04
Supervisor/Designee Extension Date

PSEG NUCLEAR L.L.C.

HOPE CREEK GENERATING STATION

HC.OP-SO.BB-0002(Q) - Rev. 50

REACTOR RECIRCULATION SYSTEM OPERATION

USE CATEGORY: II

Field Copy Exists

| | | | | | | | | | | | |
|----|--|-------|--------------------------|-------|-------------------------------------|-------|--------------------------|-------|---------|-------------------------------------|-------------------------------------|
| A. | Biennial Review performed | Yes | <input type="checkbox"/> | No | <input checked="" type="checkbox"/> | N/A | <input type="checkbox"/> | | | | |
| B. | Change Package(s) and Affected Document Number(s) incorporated into this revision. | | | | | | | | | | |
| | • CP No. | _____ | CP Rev. No. | _____ | AD No. | _____ | AD Rev. No. | _____ | or None | <input checked="" type="checkbox"/> | |
| C. | OTSC(s) incorporated into this revision: | | | | | | | | | | |
| | • OTSC No(s) | _____ | | | | | | | | or None | <input checked="" type="checkbox"/> |

REVISION SUMMARY

1. Based on the requests made under orders 70038946 and 80071310, prerequisite 2.1.14 has been re-worded to clarify that the MG Set Fluid Coupler Oil Level should be $\pm 1/4$ inch of the Maximum level mark prior to starting the MG Set, and that the level will lower as MG Speed is raised.
2. Based on the requests made under orders 70038946 and 80071310, new Precaution 3.1.31 has been added to this revision to clarify where the oil level should be maintained in the MG Set Fluid Coupler, for different conditions of operation.
3. Added PN1-B31-S001-0120 to the reference section of the procedure. This change is editorial in nature, based on the guidance found in NC.NA-AP.ZZ-0001(Q).

IMPLEMENTATION REQUIREMENTS

Effective date 10/5/04
9/2/04 *Blm*

The MG Set Fluid Coupler Sight Glasses have been properly marked, IAW operation 0030 of order 70038946.

APPROVED: _____

D. Boyle For
Manager Hope Creek Operations

8-31-04
Date

REACTOR RECIRCULATION SYSTEM OPERATION

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REACTOR RECIRCULATION SYSTEM OPERATION

1.0 PURPOSE

This procedure outlines the steps necessary for the startup, operation and shutdown of the Reactor Recirculation System.

2.0 PREREQUISITES

2.1 Reactor Recirculation System Startup

- 2.1.1 Reactor Recirculation System valves and breakers are aligned IAW applicable SAP/WCM operational mode. _____
- 2.1.2 Nuclear Boiler System is in service to align Reactor Recirculation Systems instrumentation. _____
- 2.1.3 Reactor Auxiliaries Cooling Water System (RACS) is in service to supply cooling water to Reactor Recirc Pump Motor Oil Coolers. _____
- 2.1.4 Safety Auxiliaries Cooling Water System (SACS) is in service to supply cooling to MG Set hydraulic oil cooler. _____
- 2.1.5 Chilled Water System or RACS is in service to supply cooling water to Reactor Recirc Pump Motor Winding Coolers. _____
- 2.1.6 Motor Generator Ventilation System is in service to ventilate MG Set area with ventilation dampers lined up IAW applicable SAP/WCM operational mode. _____
- 2.1.7 Control Rod Drive Hydraulic System is in service to supply seal purge water to Reactor Recirc Pumps. _____
- 2.1.8 Drywell Equipment Drain Sump is in operation to receive Reactor Recirc Pump seal cavity flow. _____
- 2.1.9 PCIS System has been reset. _____

2.1.10 The following controllers are in MANUAL at their MINIMUM setpoints: _____

A. SIC-R621A PUMP A SPD CONT _____

B. SIC-R621B PUMP B SPD CONT _____

C. SIC-R620 MASTER SPD CONT _____

2.1.11 PRIOR to starting a Recirculation Pump, and WHEN entry into the Drywell is possible, the upper and lower oil level gauge caps on the Recirculation Pump Motor should be removed and the reservoirs ensured to be filled to the reference level on the oil gauges. _____

2.1.12 Reactor Recirc Motor Generator bearing reservoir levels indicate approximately at the center of the oil level sight glasses. _____

2.1.13 Reactor Recirc Pump Motor bearing reservoir oil levels are within the height of the ring dam located in the level indicator. [REFER TO Exhibit 1 and/or HC.OP-LP.BB-0001(Q)]. _____

2.1.14 Fluid couplers oil levels are within $\pm 1/4$ " of the Maximum Mark on the fluid coupler sight glass. (Oil Level will lower as MG Set Speed is raised). _____

2.1.15 Radiation Protection should be notified PRIOR to any venting/drainage of this system when not using a hard piped drain. _____

2.1.16 RHR is in Shutdown Cooling
AND a flow path through RWCU Bottom head drain valve BG-HV-F101 returning to SDC via BG-HV-F102
AND a flow path through either BG-HV-F100
OR BG-HV-F106 is available. _____

OR

Reactor Water Cleanup (RWCU) is in service to provide bottom head drain flow. _____

2.2 Reactor Recirculation Two Loop Operation

2.2.1 Reactor Recirculation Loop A and B are in service. _____

2.2.2 Reactor Recirculation Pumps A and B are operating within the Tech Spec required band for the current flow. _____

2.3 Reactor Recirculation Single Loop Operation

2.3.1 Reactor Recirculation Loop A and B are in service. _____

2.3.2 Reactor Recirculation Pumps A and B are operating within the Tech Spec required band for the current flow. _____

2.3.3 Reactor Engineering is prepared to meet the requirements of Technical Specification 3.4.1.1. _____

2.3.4 Instrumentation and Controls has been notified. _____

2.4 Resetting Reactor Recirculation Pump Runback

Initiating condition has cleared. _____

2.5 Scoop Tube Positioner Lockup Operation

Reactor Recirculation Loop A and/or B are in service. _____

2.6 Reactor Recirculation System Shutdown

Reactor Recirculation System is in service. _____

2.7 Reactor Recirculation Pump Quick Restart

2.7.1 Reactor Recirculation System valves and breakers are aligned IAW applicable SAP/WCM operational mode. _____

2.7.2 Nuclear Boiler System is in service to align Reactor Recirculation Systems instrumentation. _____

2.7.3 Reactor Auxiliaries Cooling Water System (RACS) is in service to supply cooling water to Reactor Recirc Pump Motor Oil Coolers. _____

2.7.4 Safety Auxiliaries Cooling Water System (SACS) is in service to supply cooling to MG Set hydraulic oil cooler. _____

2.7.5 Chilled Water System or RACS is in service to supply cooling water to Reactor Recirc Pump Motor Winding Coolers. _____

2.7.6 Motor Generator Ventilation System is in service to ventilate MG Set area with ventilation dampers lined up IAW applicable SAP/WCM operational mode. _____

- 2.7.7 Control Rod Drive Hydraulic System is in service to supply seal purge water to Reactor Recirc Pumps. _____
- 2.7.8 Drywell Equipment Drain Sump is in operation to receive Reactor Recirc Pump seal cavity flow. _____
- 2.7.9 PCIS System has been reset. _____
- 2.7.10 The following controllers are in MANUAL at their MINIMUM setpoints: _____
 - A. IF A Reactor Recirculation Pump has tripped, SIC-R621A PUMP A SPD CONT _____
 - B. IF B Reactor Recirculation Pump has tripped, SIC-R621B PUMP B SPD CONT _____
 - C. SIC-R620 MASTER SPD CONT _____
- 2.7.11 Recirculation System Motor Generator A(B) Lube Oil System is in operation IAW Section 5.1.8. _____
- 2.7.12 The plant is in Operational Condition 3 or 4. _____
- 2.7.13 Reactor Water Cleanup (RWCU) is in service to provide bottom head drain flow. _____
- 2.8 Oil Mist Eliminator Operation
None. _____

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Precautions

- 3.1.1 Limitations of Technical Specification 3.4.1.1 prior to Shutdown of an operating Recirculation Loop during Operational Conditions 1 AND 2 shall be observed. Reactor Engineering AND Instrumentation and Controls must be notified. _____
- 3.1.2 To avoid over-pressurizing the pump casing, the Seal Purge Water for the Reactor Recirc Pump Seals shall be secured PRIOR to isolating a Reactor, Recirc Pump. [CD-781A, CD-455H] _____
- 3.1.3 Closure of both Reactor Recirc Pump Suction Valves simultaneously will result in a loss of Reactor Water Cleanup System suction. _____
- 3.1.4 The Limitations of Technical Specification 3.4.1.4 shall be observed PRIOR to starting an idle Recirculation Pump. _____
- 3.1.5 BB-HV-F031A(B) PUMP A(B) DISCH VALVE should be closed for > 5 minutes only for shutdown cooling or pump maintenance. [CD-976B] _____
- 3.1.6 WHEN locally adjusting Scoop Tube position, the licensed operator performing the adjustment must remain in constant communication with the NCO in the Main Control Room while locally adjusting Scoop Tube position WITH the Reactor Recirc Pump in operation. _____
- 3.1.7 The Scoop Tube Positioner should NOT be manually positioned unless the Scoop Tube Positioner power switch is OFF. _____
- 3.1.8 When coming out of Scoop Tube Lockup, the potential exists for the Recirc Pump to "Run Away", and the Operator should be prepared to take appropriate action. _____

3.1.9 The Reactor Recirc Pumps have vibration resonances in the following speed ranges, as seen on SIC-R621A(B) PUMP A(B) SPD CONT. Monitor Reactor Recirc Pump vibrations while operating in these ranges, and minimize operation at speeds causing elevated vibration levels. [CD-250G]

| 1AP201 RPM | 1AG122 %SPEED | 1BP201 RPM | 1BG122 %SPEED |
|------------|---------------|------------|---------------|
| 720-800 | 43-48 | 700-760 | 42-46 |
| 1040-1090 | 62-65 | 1150-1200 | 69-72 |
| | | 1444-1484 | 86-88 |

3.1.10 The following Recirculation MG Set/Pump Oscillations were identified during the Power Ascension program. These oscillations are a result of inherent instabilities in the Recirc Speed Control System and cannot be tuned out. Operations at these speeds may result in speed oscillations of 4 - 10%. Operation at these speeds should be minimized. [CD-250G]

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

3.1.11 Operation above 1510 RPM should be avoided. Operation with Reactor Recirc Pump speeds above 1510 RPM has resulted in elevated Reactor Recirc piping and Reactor Building vibrations due to frequency resonance between these components (RPM as read at SMART Panel B, Rack B, Channel KPH2 for 1AP201 and Channel KPH3 for 1BP201). [951005196]

3.1.12 This system contains potentially radioactive contaminated fluid.

3.1.13 With NO Recirculation pumps in service in Operating Condition 1, the Reactor shall be manually scrammed.

3.1.14 WHEN isolating a Recirculation Pump due to multiple seal failure, the suction valve must be closed prior to the discharge valve, due to the high differential pressure that will be created across a partially-closed suction valve. The discharge valve is designed to operate under high differential pressure whereas the suction valve is not.

3.1.15 Core stability is a direct function of Recirculation System flowrate. Operation should be IAW Attachment 1; Power to Flow Map. [CD-354F]

- 3.1.16 The 1A1P120 and 1B1P120, OR the 1A2P120 and 1B2P120 MG Set Lube Oil Pumps should NOT be run together as they have power supplies on the same 480V Bus (10B140 or 10B130). IF run together, a single 480V Bus trip may result in both Recirc Pumps tripping. _____

- 3.1.17 IF a pump reaches the electrical stop, the scoop tube drive will stop and the disc brake will engage. IF an increase demand for speed is still present, the speed demand indicator will slowly go to full scale and a scoop tube lockup will occur. The Scoop Tube Reset Push button must be pressed to disengage the brake. _____

- 3.1.18 IF RPT Brkr A,(B,C,D)N205 for a Recirc Pump trips, the Drive Motor breaker will not trip (DCP 4HE-0222). The Recirc MG Set should be secured IAW HC.OP-SO.BB-0002(Q). _____

- 3.1.19 A loss of Recirc. MG Set Ventilation will not result in an automatic trip of the MG Set Drive Motor breakers. _____

- 3.1.20 WHEN the RHR System is operating in the Shutdown Cooling Mode, Recirc Loop suction and discharge valve manipulations that result in a Shutdown Cooling Loop bypass flowpath being established shall be avoided (example: recirc suction and discharge valves being open simultaneously on the loop seeing Shutdown Cooling return flow) _____

- 3.1.21 Following Recirculation Pump seal maintenance, seal vents should remain open until seal purge is established and seals are flushed and vented. This prevents small particles from entering the pump cavity and seals due to flooding without seal purge established. [CD-455H] _____

- 3.1.22 The Reactor Recirc Pump Seal cavities must be thoroughly vented prior to pump operation to reduce seal wear. [CD-781A] _____

- 3.1.23 BB-HV-F023A(B) PUMP A(B) SUCT VALVE should only be closed for pump maintenance or leak isolation. _____

- 3.1.24 PRIOR to commencing Single Recirculation Loop Operations, Reactor Engineering and Instrumentation and Controls must be notified. _____

- 3.1.25 IF a Recirc MG Set fails to start, the Recirc Pump discharge Valve (F031) may not be fully closed. Shutdown cooling could be compromised IF the valve is left partially open. [PR 960105118] _____

- 3.1.26 With the operable loop drive flow near 23 Kgpm (approximately 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 can cause excessive jet pump vibration and the potential for consequent stress fatigue of the riser brace welds to the vessel. Operation in this area should be minimized. [80033270] _____
- 3.1.27 1-BF-V155(772) and 1-BF-156(773) Recirc Pmps Seal Purge Supply Hdr Vent Vlvs should remain open any time the downstream isolation valves are closed. [70029861] _____
- 3.1.28 Approximately 45 minutes may be required to stabilize motor-generator lube oil temperatures during post-maintenance equipment starts. Control Room temperature recorders B31-TRR625 and CRIDS points A2911 and A2912 provide pertinent parameter information and should be monitored for this duration. Local observation should also be in place. [70031515] _____
- 3.1.29 PRIOR to placing OIL MIST ELIMINATOR 1A-V-136 in service ensure proper oil collection apparatus is attached to collect oil. _____
- 3.1.30 Due to concerns with Oil Vapors being released to the atmosphere of the M-G room, the "A" Reactor Recirc Pump M-G Oil Mist Eliminator (H1BB -1A-V-136) should only be placed in-service when the "A" Reactor Recirculation Pump is being maintained at a steady speed ("Stable Power Operation"), and should not be used while "Maneuvering Power". Minor adjustments in Reactor Recirc Pump Speed, to maintain "Stable Power Operation", should be considered as "Stable Power Operation".[70036590] _____
- 3.1.31 With the MG Set out of service, the Fluid Coupler Oil Level should be at the Maximum level mark, $\pm 1/4$ inch. While operating, the Fluid Coupler Oil Level should be maintained between the Maximum and Minimum levels per the gauge glass. The oil level will raise as pump speed is lowered. When adding Oil at 100% power, only add oil to the Minimum level mark + 1/2 inch, - zero inch. _____

3.2 Limitations

3.2.1 IF valve or electrical lineup cannot be completed as required, the SM/CRS will determine whether the deviations are such that the system should not be placed in service or standby, as required. _____

3.2.2 The Limitations of Technical Specification 3.4.1.3 concerning Recirculation Pump speeds shall be observed. _____

3.2.3 The maximum heatup AND cooldown limitations of Technical Specification 3.4.6.1 shall be observed. A heatup or cooldown rate of 100°F per hour shall NOT be exceeded WHEN heating up a Reactor Recirculation Pump. _____

3.2.4 The following lube oil temperature limitations should be observed during Startup and Operation of the Reactor Recirculation Motor Generator sets, for lube oil to drive circuits and bearings: _____

| | |
|-----------|---------------|
| Normal | 110 to 130 °F |
| Allowable | 80 to 140 °F |

3.2.5 The Reactor Recirc Pump should NOT be operated for > 10 minutes without cooling water. _____

3.2.6 All pump operations should be performed IAW HC.OP-AP.ZZ-0109(Q); Equipment Operational Control. _____

3.2.7 Following a Recirc Runback, Chemistry Department shall be notified to ensure compliance with Tech Spec 3/4.4.5, Specific Activity, AND Radiation Protection shall be notified to ensure compliance with Tech Spec 3/4.11.2, Gaseous Effluents. _____

3.2.8 IF operation is to continue with one Recirculation Loop Shutdown, the Limitations of Technical Specification 3.4.1.1 and surveillance requirement of T/S 4.4.1.2.b shall be observed. [T/S 4.4.1.2.b] _____

3.2.9 The Limitations of Technical Specification 3.4.1.4 shall be observed WHEN restarting an idle Recirculation Loop. _____

3.2.10 WHEN operating in Single Recirculation Loop, THERMAL POWER shall be maintained $\leq 70\%$ of rated, Recirculation Pump speed shall be maintained $\leq 90\%$ of rated pump speed (90% of rated pump speed is 79% indicated), AND the recirculation flow control shall remain in local manual mode. _____

IT IS THE RESPONSIBILITY OF THE USER TO VERIFY REVISION, STATUS
 PRINTED 2004.10.30.1 Use Only

HC.OP-SO.BB-0002(Q)

- 3.2.11 Recirculation Pumps shall NOT be started.
WHEN operating above the 80% rod line, IAW Technical Specification Figure 3.4.1.1-1. [CD-354F]
- 3.2.12 IF in Hot Standby Operation without Recirc Flow - Maximizing Bottom Head Drain Flow, RWCU System outlet temperature must be maintained $\leq 434^{\circ}\text{F}$ to prevent thermal shock of the feedwater nozzles. [CD-389E]
- 3.2.13 During the transition from Shutdown Cooling operations to establishment of normal Reactor Recirculation System operations, the RHR System may be left in Shutdown Cooling, only IF BP202 is the RHR Pump in service AND AP201 is the Reactor Recirculation Pump to be started.
- 3.2.14 During the transition from normal Reactor Recirculation System operations to establishment of Shutdown Cooling, only the AP201 Reactor Recirculation Pump may be left in operation until the BP202 RHR Pump is operating satisfactorily, AND THEN only until the required B RHR Loop flow of 10,000 gpm is achieved.
- 3.2.15 Reactor Recirc Pump starting and operation should be minimized WHEN Reactor Vessel pressure is < 300 psig. Due to Recirc Pump seal concerns, the operation of a Recirculation Pump under this low pressure condition should be limited to 1 week. Engineering should be consulted prior to exceeding this limit. [CD-781A, PR 961227150]
- 3.2.16 Neither Recirculation Pump should be operated above the following Danger Vibration Setpoints.

| | RADIAL | | AXIAL | |
|---------------|----------------------|-----------|----------|-----------|
| | ALERT | DANGER | ALERT | DANGER |
| Recirc Pump A | 11.0 mils | 21.0 mils | 7.0 mils | 11.0 mils |
| Recirc Pump B | 12.0 mils | 21.0 mils | 7.0 mils | 11.0 mils |

11.0 mils

- 3.2.17 Master Manual mode of Reactor Recirc may be used only when $\geq 45\%$ speed and $\leq 102\%$ Total Core Flow.
- 3.2.18 Seal Purge should be in service when the pump is not isolated.
IF it is necessary to remove seal purge from service for maintenance with the pump operating, the time out of service should be minimized. Engineering should determine the allowable time.
IF the pump is stopped with seal purge isolated, the pump should be isolated to prevent low point crud from entering the pump seals. [70029861]

50A

3.2.19 The Reactor Recirc Pump Seal must be cooled to <200 °F via seal purge prior to isolating the pump. [70029861]

3.3 Interlocks

3.3.1 The following conditions will cause a full Recirc Pump runback to 30% speed:

- Reactor water level < Level 3 (+12.5") _____
- Total feedwater flow < 20% for > 15 seconds _____
- Loss of 1 Circ Water Pump with 3 or less Circ Water Pumps running AND Condenser pressure > 5.8" HgA. _____
- Loss of 1 Primary Condensate Pump with total feedwater flow ≥ 75% and 2 or more feedpumps in service. _____
- BB-HV-F031A(B) PUMP A(B) DISCH VLV < 90% open. _____
- Loss of Stator Water Cooling after a 12 second time delay as sensed by: _____
 1. Generator Stator Cooling Inlet Pressure low-low (13 psig) OR _____
 2. Generator Stator Cooling Outlet Temperature high (82°C) OR _____
 3. Main Generator Stator Current to Stator flow 15% mismatch: _____

| STATOR AMPS | REQUIRED FLOW | ALARM (FLOW) | RUNBACK (FLOW) |
|---------------|---------------|--------------|----------------|
| 30,022 (100%) | 661 gpm | 595 gpm | 562 gpm |
| 27,020 (90%) | 535 gpm | 482 gpm | 455 gpm |
| 24,018 (80%) | 423 gpm | 381 gpm | 360 gpm |
| 21,015 (60%) | 324 gpm | 292 gpm | 275 gpm |
| 18,013 (50%) | 238 gpm | 214 gpm | 202 gpm |
| 15,011 (50%) | 165 gpm | 149 gpm | 140 gpm |
| 12,009 (40%) | 106 gpm | 95 gpm | 90 gpm |

NOTE: The Main Turbine will trip on loss of stator water cooling if Main Generator Stator Current is NOT less than 79.11% (23,752 amps) in 2 minutes or 23.49% (7,055 amps) in 3.5 minutes

- 3.3.2 The following conditions will cause an intermediate Recirc Pump runback to 45% speed:
- Loss of 1 Reactor Feed Pump
AND Reactor water level < level 4 (+30")
 - Loss of 1 Circ Water Pump with 4 Circ Water Pumps running
AND Condenser pressure > 4.5" HgA.
 - Loss of 1 Secondary Condensate Pump
WITH total feedwater flow \geq 85%
AND 2 or more feedpumps in service.
- 3.3.3 Any one of the following conditions will trip the MG Set Drive Motor Breaker:
- Generator Lockout Relay energized.
 - Drive Motor phase current unbalance.
 - Disch Vlv not off closed seat within 3 secs. of field breaker closure.
 - BB-HV-F023A(B) PUMP A(B) SUCT VLV < 90% open.
 - BB-HV-F031A(B) PUMP A(B) DISCH VLV < 90% open (after 85 second time delay on pump start).
 - MG set drive motor bus undervoltage.
 - MG set drive motor lube oil high temperature (210°F).
 - Low lube oil pressure \leq 30 psig (after 6 second time delay).
- 3.3.4 The following signals will energize the generator lockout relay and/or the generator auxiliary lockout relay, resulting in a Field Breaker trip AND a Drive Motor breaker trip:
- M/G set incomplete start sequence.
 - Generator neutral overvoltage.
 - Exciter Field overcurrent.
 - Generator vs Pump Motor high differential current.
 - Generator loss of Field (with Field Breaker closed).
 - Generator overcurrent (instantaneous and 10 second time delay).
 - 7.2KV Bus (10A110, 10A120) differential overcurrent.

3.3.5 The following conditions will cause the scoop tube positioner to lockup: [CD-230G]

- M/G drive motor bus undervoltage (10A110, 10A120).
- Speed control signal failure, high or low.
- Lube oil temperature high > 210°F.
- Lube oil pressure low < 30 psig after 6 sec time delay.
- Manual (Push button 10C651)
- Loss of control power to the positioner and/or loss of MG set lockout power, as listed below :

| MG | CONTROL POWER | LOCKOUT POWER |
|----|---------------|---------------|
| A | 10Y109 | AD318 |
| B | 10Y107 | BD318 |

3.4 Permissives

3.4.1 The following Permissives must be satisfied in order to start a Recirc MG Set Drive Motor:

- Generator Lockout Relay reset.
- Generator Auxiliary Relay reset.
- BB-HV-F023A(B) PUMP SUCT VLV 100% open.
- BB-HV-F031A(B) PUMP DISCH VLV 100% closed.
- MG Field Breaker open.
- Lube Oil pressure > 20 psig.
- RPT Breakers 1AN205 and 1CN205 (1BN205 and 1DN205) closed.
- Drive Motor Differential Lockout Relay reset.

3.4.2 The following permissives will start a Lube Oil Pump:

A. To manually start an AC Lube Oil Pump,
the following must be satisfied:

1. MAN mode selected
2. Alternate AC Lube Oil Pump in NOT in service.
3. START pressed

B. The standby AC Lube Oil Pump will Auto start
IF all of the following are satisfied:

1. AUTO mode selected
2. Low Lube Oil Pressure < 30 psig
3. Alternate AC Lube Oil Pump in NOT in service.

C. The DC Lube Oil Pump will auto start
IF the following are satisfied:

1. AUTO mode selected
2. Low Lube Oil Pressure < 30 psig with 6 sec. TD
3. Low low LO Pressure (< 20 OR 10 psig)

4.0 EQUIPMENT REQUIRED

- Hand-held pyrometer
- Hose and hose clamps or pipe fitting

5.0 PROCEDURE

NOTE 5.0

- A. All operations are from the 10C651 Section C unless otherwise noted.
- B. Local panel locations are as follows:

A(B)C158 Recirc MG Set A(B) Relay Panel, Turb Bldg. El. 137'.

CAUTION 5.0

- A. The Reactor Recirc Pumps have vibration resonances in the following speed ranges, and as seen on SIC-R621A(B) PUMP A(B) SPD CONT. Reactor Recirc Pump vibrations should be monitored while operating in these ranges, and operation at speeds causing elevated vibration levels should be minimized. [CD-250G].

| 1AP201 RPM | 1AG122 %SPEED | 1BP201 RPM | 1BG122 %SPEED |
|------------|---------------|------------|---------------|
| 720-800 | 43-48 | 700-760 | 42-46 |
| 1040-1090 | 62-65 | 1150-1200 | 69-72 |
| | | 1444-1484 | 86-88 |

- B. The following Recirc MG Set/Pump oscillations were identified during the power ascension program. These oscillations are a result of inherent instabilities in the Recirc Speed Control System and cannot be tuned out. Operations at these speeds may result in speed oscillations of 4 - 10%. Operation at these speeds should be minimized.

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

- C. Operation above 1510 RPM should be avoided. Operation with Reactor Recirc Pump speeds above 1510 RPM has resulted in elevated Reactor Recirc piping and Reactor Building vibrations due to frequency resonance between these components (RPM as read at SMART Panel B, Rack B, Channel KPH2 for 1AP201 and Channel KPH3 for 1BP201). [951005196]
- D. Operation with one recirculation loop shutdown is permitted provided the Limitations of Tech Spec 3.4.1.1 are adhered to. Reactor Engineering AND Instrumentation and Controls must be notified prior to commencing single loop operation.

5.1 Reactor Recirculation System Startup

5.1.1 ENSURE all prerequisites have been satisfied IAW Section 2.1. _____

5.1.2 ENSURE Reactor level is greater than +30 inches to ensure
adequate NPSH is available. _____

NOTE 5.1.3

Venting of the Reactor Recirculation Pump Seal Purge Supply Header IAW Step 5.1.3
requires three EOs and close communication with the Control Room.

CAUTION 5.1.3

- A. The CRD System is pressurized to 1600 psig. Caution should be used
when venting the Seal Purge Supply line.
- B. Reactor Pressure Vessel Level should be monitored while performing the
following step.

5.1.3 IF the Reactor Recirc pump was isolated,
OR Reactor Recirculation Seal Purge requires venting following isolation
THEN PERFORM the following: [CD-455H] _____

A. ENSURE the following valves are closed: _____

- 1-BF-V805(V804) CRD Drive Water Filter to
Recirc Loop A(B) (CRD Master Control Area A) _____
- 1-BF-V100 (101) Rx Recirc Pump A(B) CRD Seal ISLN. _____
- 1-BB-V050(V052)
AND 1-BB-V051(V053) Seal Vent. _____

Continued on next page

5.1.3 (Continued)

NOTE 5.1.3.B

Venting the Reactor Recirculation Pump 'Common' Seal Purge Supply Header is ONLY required for the 1st pump being placed in service.

- B. VENT the Reactor Recirculation Pump 'Common' Seal Purge Supply Header as follows:
 - 1. UNCAP AND INSTALL a hose at 1-BF-V796 Recirc Pmp Seal Purge Hdr Vnt (CRD Master Control Area A) AND ROUTE to nearest floor/equipment drain.
 - 2. OPEN 1-BF-V795 Recirc Pmp Seal Purge Hdr Isln.
 - 3. USING 1-BF-V796 VENT UNTIL a solid, steady stream issues from vent hose THEN CLOSE 1-BF-V796.
 - 4. CLOSE 1-BF-V795.
 - 5. REMOVE hose AND CAP 1-BF-V796.

- C. VENT the A(B) Reactor Recirculation Pump Seal Purge Supply Header as follows:
 - 1. ENSURE 1-BB-V042(V046) Seal Purge Manual Isolation is OPEN.
 - 2. UNCAP AND INSTALL a hose at 1-BB-V647 (V649) AND 1-BB-V645 (V652) Inst Ln PDT-N015A(B) Vnt Vlv (Drywell Area C(K), AZ 045-080 (190) AND ROUTE to the Equipment Drain Sump.
 - 3. ENSURE BF-HV-3800A(B) Pump A(B) Seal Purge Wtr Vlv is CLOSED.
 - 4. VERIFY 1-ED-V023(V024) Rx Recirc Pmp A(B) Racs Sup Isln (90 Deg, 10' From Outer Wall) AND 1-ED-V025(V026) Rx Recirc Pmp A(B) RACS Rtn Isln (90 Deg, 10' From Outer Wall) are OPEN.

Continued on next page

5.1.3.C (Continued)

5. **ENSURE** 1-BB-V284
AND 1-BB-V285(1-BB-V286 and 1-BB-V287)
 # 2 Seal Cavity Vents are CLOSED. _____

6. **PREPARE** the A(B) Reactor Recirculation Pump
 Seal Purge Supply Header highpoint vent as follows: _____
 - a. **UNCAP AND INSTALL** a hose at 1-BF-V156(V773),
 Recirc Pmps Seal Purge Supply Hdr Vent Vlv
 (Torus Access, Rm. 4223 (4321 Pipechase))
AND ROUTE to nearest floor/equipment drain. _____

 - b. **OPEN** 1-BF-V155(V772), Recirc Pmps Seal Purge
 Supply Hdr Vent Vlv. _____

 - c. **OPEN** 1-BF-V156(V773), Recirc Pmps Seal Prg
 Hdr Vent. _____

7. **CHECK OPEN** 1-BB-V179(V175)
AND 1-BB-V176(V172) #2 Seal Drains.
 [70029861] _____

8. **OPEN** 1-BF-V100 (101) Rx Recirc Pump A(B) CRD
 Seal ISLN is OPEN. _____

NOTE 5.1.3.C.9

- A. Establishing a higher-than-normal purge flow in the following step is acceptable since purge flow will be re-adjusted to a normal value in Step 5.1.5.

- B. IF it is desired to reduce flow from the vent, 1- BF-V805(V804) may be throttled. [70029861]

9. **SLOWLY OPEN** 1-BF-V805(V804)
AND ADJUST to obtain \approx 4 to 6 gpm flow,
 as indicated on FI-R020A(B) Rx Recirc Pump A(B) Seal
 Purge Flow (Local). _____

Continued on next page

5.1.3.C (Continued)

10. **OPEN** the following valves: _____
- 1-BB-V647(V649) Inst Ln PDT-N015A(B) Vnt Vlv _____
 - 1-BB-V648(V650) Inst Ln PDT-N015A(B) Vnt Vlv _____
 - 1-BB-V645 (V652) Inst Ln PDT-N015A(B) Vnt Vlv _____
 - 1-BB-V646 (V651) Inst Ln PDT-N015A(B) Vnt Vlv _____

CAUTION 5.1.3.C.11

Establishing Seal Purge to an Isolated Recirc Pump without an adequate vent path may result in over-pressurizing the pump casing.

11. **WITH** operators in place to monitor flows at Seal Purge Supply Header High Point and Pump Vents
OPEN BF-HV-3800A(B) Pump A(B) Seal Purge Wtr Valve. _____
12. **CLOSE** 1-BF-V156(V773), Recirc Pmps Seal Prg Hdr Vent. _____

NOTE 5.1.3.C.13

The following step may be completed while continuing in this section.

13. **COMPLETE** the following: _____
- a. **CLOSE** 1-BF-V155(V772) Recirc Pmps Seal Prg Hdr Vent. _____
 - b. **REMOVE** hose
AND CAP 1-BF-V156(V773), Recirc Pmps Seal Prg Hdr Vent. _____

Continued on next page

5.1.3.C (Continued)

NOTE 5.1.3.C.14

Maintaining a higher-than-normal purge flow in the following step is acceptable since purge flow will be re-adjusted to a normal value in Step 5.1.5.

14. WHILE operator monitors venting at 1-BB-V647(V649)
AND 1-BB-V645 (V652) Inst Ln PDT-N015A(B) Vnt Vlv,
RE-ADJUST 1-BF-V805(V804) to obtain
≈ 4 to 6 gpm flow as indicated on FI-R020A(B).

NOTE 5.1.3.C.15

There is no maximum time limit restriction for flushing the seals in the following steps. Since the pump suction valve is not open, overheating of the seals should not occur.

15. MAINTAIN flush for a minimum of 5 minutes,
after a solid, steady stream issues from vent hose.

NOTE 5.1.3.C.16

Direct communication with the Control Room is required during the performance of the following step.

CAUTION 5.1.3.C.16

When the RHR System is operating in the Shutdown Cooling Mode, Recirc Loop suction and discharge valve manipulations that result in a Shutdown Cooling Loop bypass flowpath being established shall be avoided (example: Recirc suction and discharge valves being open simultaneously on the loop seeing Shutdown Cooling return flow).

16. WHILE operator monitors seal venting at
1-BB-V647(V649) AND 1-BB-V645 (V652) Inst Ln
PDT-N015A(B) Vnt Vlv
OPEN Suction Valve BB-HV-F023A(B).

Continued on next page

5.1.3.C (Continued)

17. WHEN BB-HV-F023A(B) is fully OPEN,
AND AFTER ensuring a solid, steady stream of water is
issuing from vent hose at 1-BB-V647(V649),
THEN IMMEDIATELY CLOSE 1-BB-V647(V649)
AND 1-BB-V645 (V652).

NOTE 5.1.3.C.18

The following step may be completed while continuing in this section.

18. **COMPLETE** the following:
- a. **CLOSE** 1-BB-V648(V650)
AND 1-BB-V646 (V651) Inst Ln PDT-N015A(B)
Vnt Vlv.
 - b. **REMOVE** hose
AND CAP 1-BB-V647(V649)
AND 1-BB-V645 (V652) Inst Ln PDT-N015A(B)
Vnt Vlv.

CAUTION 5.1.3.C.19

For hot recirculation pump Seal Cavity venting (i.e., filled with Reactor Coolant System >212° F) DO NOT leave vents open for > 5 minutes to prevent seal damage from overheating.

Reactor Pressure Vessel level should be monitored while performing this following step.

19. **PRIOR** to starting the associated Recirc Pump
VENT Recirc Pump A(B) Seal Cavity as follows:
- a. **SLOWLY OPEN** 1-BB-V051 (1-BB-V053)
AND 1-BB-V050 (1-BB-V052), A(B) Recirc Pump
Seal Cavity No. 1 vents.
 - b. **CLOSE** 1-BF-V805(1-BF-V804).

Continued on next page

5.1.3.C (Continued)

- c. AFTER A(B) Recirc Pump, No. 1 Seal Cavity vent has been open for a minimum of five (5) minutes THEN OPEN AND ADJUST 1-BF-V805(1-BF-V804), as necessary, to obtain a 4 to 6 gpm purge flow, as indicated on FI-R020A(B). _____
- d. CLOSE 1-BB-V051 (1-BB-V053) and 1-BB-V050 (1-BB-V052), A(B) Recirc Pump Seal Cavity No. 1 vents. _____
- e. INSTALL a hose at 1-BB-V285 (V287) A(B) Recirc Pump No. 2 Cavity Vent Outboard Valve AND ROUTE to the Equipment Drain Sump. _____
- f. Slowly OPEN 1-BB-V284 AND 1-BB-V285 (1-BB-V286 and 1-BB-V287) Recirc Pump No. 2 Cavity Vent Vlvs. _____
- g. After all the air is removed, CLOSE 1-BB-V284 and 1-BB-V285 (1-BB-V286 and 1-BB-V287) Recirc Pump No. 2 Cavity Vent Vlvs. _____
- h. REMOVE hose attached at 1-BB-V285 (1-BB-V287) A(B) Recirc Pump No. 2 Cavity Vent Outboard Valve AND INSTALL cap. _____
- i. DOCUMENT completion of Recirc Seal Venting in Control Room Log(s). _____

5.1.4 ENSURE BB-HV-F023A(B) Suction Valve AND BG-HV-F100(F106) RWCU Suction Valve are OPEN. _____

NOTE 5.1.5

Approximately 30 minutes should be allowed to elapse between the completion of Step 5.1.5 and the start of the pump, to allow the #2 Seal Cavity to self-vent through the seal stage flow line.

5.1.5 ADJUST 1-BF-V805 (1-BF-V804) CRD Drive Water to Rx Recirc Pump A(B) Seal Purge throttle valve as necessary UNTIL FI-R020A(B) Rx Recirc Pump A(B) Seal Purge Flow indicates 1.5 to 2.5 gpm (Local). [CD-405H] _____

- 5.1.6 ENSURE the following: _____
- RECIRC PUMP A(B) SEAL COOLING FLOW LOW -
Computer Point D2424(D2425) alarm is CLEAR. _____
 - RECIRC PUMP MTR A(B) OIL LEVEL HI/LO - Computer Point
D2922(D2923) alarm is CLEAR. _____
- 5.1.7 VERIFY no flow from the PSV-F025A(B) discharge piping.
IF flow is identified from the discharge piping,
THEN CONTACT engineering to calculate the required increase
in seal purge flow. [70029861] _____
- 5.1.8 PREPARE the Reactor Recirc Pump for start as follows: _____
- A. VERIFY that PUMP A(B) LOCKOUT BUS POWER
AVAILABLE light is illuminated. _____
 - B. TURN handle on LF-173A(B) Rx Recirc Motor Generator blade
type lube oil filter through several rotations to clear any blockage
(Local). _____
 - C. PLACE the A(B) Oil Mist Eliminator in-service
IAW section 5.8. _____
 - D. TEST DC oil pump auto start function
WITH NO AC oil pumps in service, as follows
(Local Panel A(B)C158): _____
 - 1. PLACE AUX LUBE OIL PUMP A(B)P113 Control Switch
in AUTO. _____
 - 2. VERIFY START is ON. _____
 - 3. PLACE AUX LUBE OIL PUMP A(B)P113 Control Switch
in OFF. _____

Continued on next page

5.1.8. (Continued)

CAUTION 5.1.8.E

The 1A1P120 AND 1B1P120, OR the 1A2P120 AND 1B2P120 oil pumps should not be run together, as they are powered off the same 480V Bus (10B130 and 10B140). A single 480 volt Bus trip may result in both MG Sets tripping.

- E. START one of A1P120 (B1P120)
OR A2P120 (B2P120) PUMP A(B) Auxiliaries Lube Oil Pump
for Motor Generator to be started. _____
- F. PRESS AUTO push button of other pump A1P120 (B1P120)
OR A2P120 (B2P120) PUMP A(B) Auxiliaries Lube Oil Pump. _____
- G. PLACE AUX LUBE OIL PUMP A(B)P113 Control Switch
in AUTO (Local Panel A(B)C158). _____
- H. VERIFY the following MG Set parameters: _____
 - 1. Computer Point D2915 (D2916) RECIRC MG A(B)
DRV LUBO PRESS is NOT in alarm. _____
 - 2. Computer Point D2913 (D2914) RECIRC MG A(B)
LUBE OIL TEMP is NOT in alarm. _____
- I. VERIFY the following: _____
 - 1. PUMP A(B) - MOT-GEN-FIELD BRKR TRIPPED is ON. _____
 - 2. All protective
AND Generator Lockout relays are reset
(Local Panel A(B)C158). _____
 - 3. REACTOR RECIRC "A"("B") TROUBLE annunciator
C1-D4 (C1-D5) is CLEAR. _____
 - 4. PUMP B - RSP TK OVR is OFF. _____

Continued on next page

5.1.8 (Continued)

- J. ENSURE RECIRC PUMP TRIP A(B)P201 PUMP MTR BRKR 1AN205 AND 1CN205 (1BN205 AND 1DN205) are CLOSED.
- K. PRESS the following push buttons for REACTOR RECIRCULATION PUMP A AND PUMP B.
 - 1. HIGH VIBRATION TRIP RESET.
 - 2. SCOOP TUBE TRIP RESET (SCOOP TUBE LOCK UP light goes OFF).

5.1.9 START the first idle Reactor Recirc Pump as follows:

NOTE 5.1.9.A

The limitations of Technical Specification 3.4.1.4 shall be observed prior to starting an idle Reactor Recirculation Pump.

- A. Within 15 minutes prior to starting pump, **VERIFY** temperature differential between Reactor coolant within idle loop AND coolant in pressure vessel is $\leq 50^{\circ}\text{F}$ as indicated by: [T/S 4.4.1.4]
 - Dome temperature calculated from REACTOR PRESSURE IAW HC.OP-DL.ZZ-0026(Q).
 - RECIRC PUMP SUCTION LOOP A(B) TEMP IAW HC.OP-DL.ZZ-0026(Q).
- B. LOG the above temperatures in HC.OP-DL.ZZ-0026(Q), Attachment 3v.

Continued on next page

5.1.9 (Continued)

NOTE 5.1.9.C

To obtain a true bottom head drain temperature reading on Computer point A2942 one of the following conditions must be met.

- The RWCJ System must be in service with BG-HV-F101 SUCT FROM RPV BOT DRN open.
- RHR must be in Shutdown Cooling with BG-HV-F100 SUCT FROM A RECIRC LP OR BG-HV-F106 SUCT FROM B RECIRC LP open AND BG-HV-F102 RECIRC LP SUCT HDR open AND BG-HV-F101 SUCT FROM RPV BOT DRN open to obtain a true bottom head drain temperature

- C. Within 15 minutes prior to starting pump, **VERIFY** temperature differential between Reactor coolant within dome AND bottom head drain is $\leq 145^{\circ}\text{F}$ as indicated by: [T/S 4.4.1.4] _____
- Computer Point A2942-REAC BOT HD DRN TEMP _____
 - Dome temperature calculated from REACTOR PRESSURE IAW HC.OP-DL.ZZ-0026(Q). _____
- D. **LOG** the above temperatures in HC.OP-DL.ZZ-0026(Q), Attachment 3v. _____

NOTE 5.1.9.E

IF the BP202 RHR Pump is operating in Shutdown Cooling AND the AP201 Reactor Recirc Pump is to be placed in service, THEN performance of Step 5.1.9.E is NOT required.

- E. **REMOVE** the RHR System operating in the Shutdown Cooling mode from service. _____

Continued on next page

5.1.9 (Continued)

CAUTION 5.1.9.F

WHEN the RHR System is operating in the Shutdown Cooling Mode, Recirc Loop suction and discharge valve manipulations that result in a Shutdown Cooling Loop bypass flowpath being established shall be avoided (example: recirc suction and discharge valves being open simultaneously on the loop seeing Shutdown Cooling return flow).

- F. **THROTTLE OPEN** BB-HV-F031A(B) PUMP A(B) DISCH VALVE as necessary to increase loop temperatures (push button must be pressed and held to effect valve opening.) _____
- G. **AFTER** loop temperature requirements are satisfied, **IF** BB-HV-F031A(B) PUMP A(B) DISCH VALVE is open, **THEN CLOSE** BB-HV-F031A(B) PUMP A(B) DISCH VALVE. _____
- H. **IF** the BB-HV-F031A(B) PUMP A(B) DISCH VALVE has **NOT** been opened to satisfy the loop temperature requirements, **THEN CYCLE** BB-HV-F031A(B) PUMP A(B) DISCH VALVE as necessary to verify that the valve is not bound, ensuring valve is left in the closed position after cycling. _____
- I. **ENSURE** approximately 30 minutes have elapsed since completion of Step 5.1.5. This allows the #2 Seal Cavity to self-vent through the seal stage flow line. _____
- J. **ENSURE** the temperature requirements of T/S 3.4.1.4 are satisfied **PRIOR** to performing the following step (**REFERENCE** Steps 5.1.9.A through D). _____

Continued on next page

5.1.9 (Continued)

NOTE 5.1.9.K

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 AND 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.

CAUTION 5.1.9.K

During the transition from Shutdown Cooling operations to establishment of normal Reactor Recirculation System operations, the RHR System may be left in Shutdown Cooling, only if BP202 is the RHR Pump in service AND AP201 is the Reactor Recirculation Pump to be started.

- K. PRESS REACTOR RECIRCULATION PUMP A(B) MOTOR BRKR CLOSE push button. _____
- L. VERIFY BB-HV-F031A(B) REACTOR RECIRCULATION PUMP A(B) DISCH VALVE opens according to jog sequence (approximately 80 seconds for full travel). _____
- M. RAISE Reactor Recirculation Pump Speed to 25% - 30%, to prevent erratic speed indications. [70031631] _____

Continued on next page

5.1.9 (Continued)

CAUTION 5.1.9.N

Approximately 45 minutes may be required to stabilize motor-generator lube oil temperatures during post-maintenance equipment starts. Control Room temperature recorders B31-TRR625 and CRIDS points D2911 and D2912 provide pertinent parameter information and should be monitored for this duration. Local observation should also be in place. [70031515]

- N. ADJUST TACS flow to 1AE-126 (1BE-126) MG Set A(B) Hydraulic Oil Cooler to maintain lube oil temperature between 110°F and 130°F as indicated on TI-8290 A(B) MG Set A(B) Lube Oil Temp (Local). _____
- O. IF Shutdown Cooling was NOT terminated in Step 5.1.9.E, AND the AP201 Reactor Recirc Pump is operating satisfactorily, THEN TERMINATE Shutdown Cooling IAW HC.OP-SO.BC-0002(Q), Decay Heat Removal Operation. _____

5.1.10 START the second Reactor Recirc Pump as follows: _____

NOTE 5.1.10.A

The limitations of Technical Specification 3.4.1.4 shall be observed prior to starting an idle Reactor Recirculation Pump.

- A. Within 15 minutes prior to starting pump, ENSURE operating Loop flow is \leq (50% rated loop flow), as indicated on B31-FR-R614 RECIRC LOOP A / LOOP B FLOW. [T/S 4.4.1.4] _____
- B. LOG FLOW in HC.OP-DL.ZZ-0026(Q), Attachment 3v. _____
- C. Within 15 minutes prior to starting pump, ENSURE temperature differential between idle AND operating Reactor Recirculation Loops is \leq 50°F, IAW HC.OP-DL.ZZ-0026(Q). [T/S 4.4.1.4] _____
- D. LOG temperatures in HC.OP-DL.ZZ-0026(Q), Attachment 3v. _____

Continued on next page

5.1.10 (Continued)

NOTE 5.1.10.E

The RWCU System must be in service with BG-HV-F101 SUCT FROM RPV BOT DRN open to obtain a true bottom head drain temperature reading on Computer Point A2942.

- E. Within 15 minutes prior to starting pump, **ENSURE** temperature differential between Reactor coolant within dome **AND** bottom head drain is $\leq 145^{\circ}\text{F}$ as indicated by the following:
[T/S 4.4.1.4]
 - Computer Point A2942-REAC BOT HD DRN TEMP _____
 - Dome temperature calculated from REACTOR PRESSURE, IAW HC.OP-DL.ZZ-0026(Q). _____
- F. **LOG** temperatures in HC.OP-DL.ZZ-0026(Q), Attachment 3v. _____
- G. **THROTTLE OPEN** BB-HV-F031A(B) PUMP A(B) DISCH VALVE as necessary to increase loop temperatures (push button must be pressed and held to effect valve opening). _____
- H. **AFTER** loop temperature requirements are satisfied, **IF** BB-HV-F031A(B) PUMP A(B) DISCH VALVE is open, **THEN CLOSE** BB-HV-F031A(B) PUMP A(B) DISCH VALVE. _____
- I. **IF** the BB-HV-F031A(B) PUMP A(B) DISCH VALVE has **NOT** been opened to satisfy the loop temperature requirements, **THEN CYCLE** BB-HV-F031A(B) PUMP A(B) DISCH VALVE as necessary to verify that the valve is not bound, ensuring valve is left in the closed position after cycling. _____
- J. **ENSURE** approximately 30 minutes have elapsed since completion of Step 5.1.5. This allows the #2 Seal Cavity to self-vent through the seal stage flow line. _____
- K. **ENSURE** the temperature requirements of T/S 3.4.1.4 are satisfied **PRIOR** to performing the following step (REFERENCE Step 5.1.10.A through F). _____

Continued on next page

5.1.10 (Continued)

NOTE 5.1.10.L

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 AND 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.

L. **PRESS REACTOR RECIRCULATION PUMP A(B)
MOTOR BRKR CLOSE** push button. _____

M. **VERIFY BB-HV-F031A(B) REACTOR RECIRCULATION
PUMP A(B) DISCH VALVE** opens according to jog sequence
(approximately 80 seconds for full travel). _____

N. **RAISE** Reactor Recirculation Pump Speed to 25% - 30%,
to prevent erratic speed indications.
[70031631] _____

CAUTION 5.1.10.O

Approximately 45 minutes may be required to stabilize motor-generator lube oil temperatures during post-maintenance equipment starts. Control Room temperature recorders B31-TRR625 and CRIDS points A2911 and A2912 provide pertinent parameter information and should be monitored for this duration. Local observation should also be in place.

O. **ADJUST TACS** flow to 1AE-126 (1BE-126) MG Set A(B)
Hydraulic Oil Cooler to maintain lube oil temperature between
110°F and 130°F as indicated on TI-8290 A(B) MG Set A(B) Lube
Oil Temp (Local). _____

5.2 Reactor Recirculation System Two Loop Operation

5.2.1 ENSURE all prerequisites have been satisfied IAW Section 2.2. _____

5.2.2 PERFORM Manual Recirc Flow Control as follows: _____

NOTE 5.2.2.A

Recirc Pump speed can NOT be increased above its minimum set point until Feedwater flow is > 20% of its rated value.

A. MONITOR the following when changing Recirc Pump speed: _____

• XR-R603A,B,C,D - C51 (NEUTRON MONITORING)
APRM _____

• B31-FR-R614 RECIRC LOOP A(B) FLOW _____

• FR-R611A(B) RECIRC LOOP A(B) JET PUMP FLOW _____

• PDR-R613/FR-R613 CORE PLATE DIFF PRESS/JET
PUMP FLOW _____

B. RAISE OR LOWER Reactor Recirc Pump speed by
intermittently pressing INCREASE OR DECREASE push button
on SIC-R621A(B) PUMP A(B) SPD CONT. _____

5.2.3 ADJUST TACS flow to 1AE-126 (1BE-126) MG Set A(B) Hydraulic
Oil Cooler to maintain lube oil temperature between 110°F and 130°F as
indicated on TI-8290 A(B) MG Set A(B) Lube Oil Temp (Local). _____

NOTE 5.2.4

- A. Reactor Recirc Master Manual mode may be used ONLY when $\geq 45\%$ speed and $\leq 102\%$ Total Core Flow.
- B. For Master Manual operation, Steps 5.2.4 through 5.2.6 are performed.

5.2.4 IF Master Manual operation is desired,
WHEN Recirc Pump speed is $> 45\%$,
THEN PERFORM MASTER MANUAL Recirc Flow Control
as follows:

- A. ENSURE SIC-R620 MASTER SPD CONT MAN push button is ON.
- B. ENSURE both Recirc Pump A AND B speeds are matched (approximately).
- C. PRESS OUTPUT A SELECT push button on SIC-R620 MASTER SPD CONT.
- D. PRESS SIC-R620 MAST CONT INCREASE OR DECREASE push button as necessary to null RECIR MASTR DEMAND on the SIC-R620 A/B DEMND OUTPT (approximately).
- E. PRESS SIC-R621A PUMP A SPD CONT AUTO push button.
- F. PRESS OUTPUT B SELECT push button on SIC-R620 MASTER SPD CONT.

Continued on next page

5.2.4.G (Continued)

NOTE 5.2.4.G

The following step will change speed on the B Recirc Pump. IF there is a speed mismatch of > 5%, A Recirc Pump speed should be adjusted, using the Master Controller to halve the difference.

- G. IF SIC-R620 A/B DEMND OUTPT
AND SIC-R620 RECIR MASTR DEMND do NOT match,
THEN PRESS SIC-R621B PUMP B SPD CONT INCREASE
OR DECREASE push button to adjust B Pump speed so that the
B Pump speed as indicated on SIC-R620 A/B DEMND OUTPT
matches SIC-R620 RECIR MASTR DEMND (approximately). _____
- H. PRESS SIC-R621B PUMP B SPD CONT AUTO push button. _____
- I. CONTROL Recirculation Pump speed
AND Reactor Power by intermittently pressing appropriate
INCREASE OR DECREASE push button on SIC-R620 MASTER
SPD CONT as necessary. _____
- J. ADJUST TACS flow to 1AE-126 (1BE-126) MG Set A(B)
Hydraulic Oil Cooler to maintain lube oil temperature between
110°F and 130°F as indicated on TI-8290 A(B) MG Set A(B)
Lube Oil Temp (Local). _____

- 5.2.5 To CONTROL Recirc Pumps speed above 100% Total Core Flow: _____
- A. Intermittently PRESS SIC-R620 MASTER SPEED INCREASE
push button UNTIL 102% Total Core Flow is reached. _____
 - B. PRESS SIC-R621A PUMP A SPD CONT MANUAL push button. _____
 - C. PRESS SIC-R621B PUMP B SPD CONT MANUAL push button. _____

Continued on next page

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HC.OP-SO.BB-0002(Q)

5.2.5 (Continued)

CAUTION 5.2.5.D

A. Neither Recirculation Pump should be operated above the Danger Vibration Setpoint.

| | RADIAL | | AXIAL | |
|---------------|---------------------|----------|---------|----------|
| | ALERT | DANGER | ALERT | DANGER |
| Recirc Pump A | 11.0 mls | 21.0 mls | 7.0 mls | 11.0 mls |
| Recirc Pump B | 12.0 mls | 21.0 mls | 7.0 mls | 11.0 mls |

SOA

B. 105% Total Core Flow shall NOT be exceeded in the following step.

- D. INCREASE Recirculation Pumps speed to 105% Total Core Flow, as necessary, by Intermittently pressing SIC-R621A PUMP A SPD CONT AND SIC-R621B PUMP B SPD CONT INCREASE push buttons until desired speed is reached. _____
- E. DECREASE Recirculation Pumps speed to 100% Total Core Flow, as necessary, as follows: _____
1. Intermittently PRESS SIC-R621A PUMP A SPD CONT AND SIC-R621B PUMP B SPD CONT DECREASE push buttons UNTIL 100% Total Core Flow is reached. _____
 2. PLACE both Recirculation Pumps speed controllers in MASTER MANUAL IAW Steps 5.2.4.A through 5.2.4.I. _____
- F. ADJUST TACS flow to 1AE-126 (1BE-126) MG Set A(B) Hydraulic Oil Cooler to maintain lube oil temperature between 110°F and 130°F as indicated on TI-8290 A(B) MG Set A(B) Lube Oil Temp (Local). _____

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HC.OP-SO.BB-0002(Q)

NOTE 5.2.6.

The limitations of Tech Spec 3.4.1.1 shall be observed for flow mismatch requirements.

5.2.6 IF individual MANUAL operation is desired,
PERFORM the following:

- A. PRESS SIC-R621A PUMP A SPD CONT MANUAL push button. _____
- B. PRESS SIC-R621B PUMP B SPD CONT MANUAL push button. _____

CAUTION 5.2.6.C

A. Neither Recirculation Pump should be operated above the Danger Vibration Setpoint.

| | RADIAL | | AXIAL | |
|---------------|---------------------------------|----------|---------|----------|
| | ALERT | DANGER | ALERT | DANGER |
| Recirc Pump A | 11.0 mls | 21.0 mls | 7.0 mls | 11.0 mls |
| Recirc Pump B | 12.0 mls 11.0 mls | 21.0 mls | 7.0 mls | 11.0 mls |

B. 105% Total Core Flow shall NOT be exceeded in the following step.

- C. RAISE OR LOWER Reactor Recirc Pump speed by intermittently pressing INCREASE OR DECREASE push button on SIC-R621A(B) PUMP A(B) SPD CONT, push buttons until desired speeds are reached. _____
- D. ADJUST TACS flow to 1AE-126 (1BE-126) MG Set A(B) Hydraulic Oil Cooler to maintain lube oil temperature between 110°F and 130°F as indicated on TI-8290 A(B) MG Set A(B) Lube Oil Temp (Local). _____
- E. WHEN desired
AND <102% Total Core flow,,
PLACE both Recirc Pump Speed Controllers in Master Manual IAW Step 5.2.4.A through 5.2.4.I. _____

50A

5.3 Reactor Recirculation Single Loop Operation

NOTE 5.3

IF operating in Single Loop, the following actions must be taken to determine actual core flow:

- A. IF the operating loop Recirc Pump speed is $\geq 48\%$ AND drive flow is $\geq 23,000$ gpm, THEN core flow indication can be taken from the flow recorder.
- B. IF the operating loop recirc pump speed is $< 48\%$ speed AND $< 23,000$ gpm, THEN the flow in the Idle loop is positive (forward) flow. The idle loop jet pump flow AND the operating loop jet pump flow should be added to obtain actual core flow.

CAUTION 5.3

- A. IF operation is to continue with one Recirculation Loop Shutdown, the Limitations of T/S 3.4.1.1 and surveillance requirement of T/S 4.4.1.2.b shall be observed. [T/S 4.4.1.2.b]
- B. With the operable loop drive flow near 23 Kgpm (approximately 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 can cause excessive jet pump vibration and the potential for consequent stress fatigue of the riser brace welds to the vessel. Operation in this area should be minimized. [80033270]

CAUTION 5.3.1

- A. The Limitations of T/S 3.4.1.1 shall be observed prior to the shutdown of an operating Reactor Recirc Pump during Operational Conditions 1 AND 2. Reactor Engineering AND Instrumentation and Controls have prerequisites to satisfy prior to the commencement of single loop operation. [T/S 3.4.1.1]

- B. Instrumentation and Controls must reduce the APRM Scram and Rod Block Monitor Trip Setpoints and Allowable Values to those applicable for single recirculation loop operation per Technical Specification 2.2.1, 3.2.2, & 3.3.6. This must be done within 4 hours of commencing single recirculation loop operation. Compliance with Action Statements 3.4.1.1.a.2, a.3 AND a.4 satisfies the APRM specifications in 2.2.1, 3.2.2, and 3.3.6 unless an event other than single loop operations affects these specifications, in which case, those Action Statements must also be entered. [T/S 3.4.1.1]

- C. IF operation is to continue with one Recirculation Loop Shutdown, the Limitations of T/S 3.4.1.1 and surveillance requirement of T/S 4.4.1.2.b shall be observed. [T/S 4.4.1.2.b]

- 5.3.1 ENSURE all prerequisites have been satisfied IAW Section 2.3. _____

- 5.3.2 NOTIFY Instrumentation and Controls that they have 4 hours to reduce APRM Scram and Rod Block Monitor Trip Setpoints and Allowable Values in accordance with Technical Specification 3.4.1.1. [T/S 3.4.1.1] _____

CAUTION 5.3.3

- A. Power-to-Flow Maps should be observed while decreasing power and prior to removing the recirculation pump from service. [Reference Attachment 1]**
- B. Core flow must be maintained > 40% during single loop operations to prevent cooldown of the idle loop.**
- C. With NO Recirc Pumps in service in Operational Condition 1, the Reactor shall be manually scrammed.**

- 5.3.3 **REDUCE** Reactor Power by decreasing core flow and/or inserting control rods IAW Reactor Engineering instructions. _____
- 5.3.4 **TRANSFER** Reactor Recirc Pump A AND B control to Manual Recirc Flow Control by pressing SIC-R621A AND B PUMP A AND B SPD CONT MAN push buttons. _____
- 5.3.5 **SIMULTANEOUSLY PERFORM** the following two steps: _____
 - On the pump remaining in-service, **INTERMITTENTLY PRESS** SIC-R621B(A) PUMP B(A) SPD CONT INCREASE/DECREASE push button UNTIL desired speed is reached, THEN RELEASE. _____
 - On the pump being removed from service, **INTERMITTENTLY PRESS** SIC-R621A(B) PUMP A(B) SPD CONT DECREASE push button UNTIL minimum speed is reached, THEN RELEASE. _____
- 5.3.6 **PRESS** PUMP A(B) MOTOR BRKR TRIP push button. _____

NOTE 5.3.7

- A. IF BB-HV-F031A(B) can NOT be opened in the following step, then Step 5.3.8 must be performed. Otherwise, Step 5.3.8 may be disregarded.
- B. BB-HV-F031A(B) PUMP A(B) DISCH VALVE should be left closed following the 5 minutes IF Shutdown Cooling is to be placed in service or for pump maintenance that requires the discharge valve to remain closed. [CD-976B]

5.3.7 **CLOSE** BB-HV-F031A(B) PUMP A(B) DISCH VALVE for approximately 5 minutes,
THEN RE-OPEN the valve to keep the loop Temperature within 50°F of the Reactor coolant temperature (push button must be pressed and held to effect valve opening). [CD-976B]

5.3.8 **IF** BB-HV-F031A(B) PUMP A(B) DISCH VALVE can **NOT** be opened (loop remains isolated),
THEN RECORD the time isolated in HC.OP-DL.ZZ-0026(Q), Surveillance Log, Attachment 3v (T/S item 4.4.1.1.2.c),
AND INFORM System Engineering.

Continued on next page

5.3 (Continued)

NOTE 5.3.9

- A. Recirc Flow control must remain in local Manual Mode, THERMAL POWER must remain $\leq 70\%$ of Rated AND Recirc Pump speed must remain $\leq 90\%$ of rated pump speed (90% of rated pump speed is 79% indicated), while operating with a single recirc loop in service.
- B. IF core flow can NOT be increased above 40% in the following step OR drops below 40%, then Step 5.3.10 must be performed. Otherwise, Step 5.3.10 may be disregarded.

CAUTION 5.3.9

- A. The limitations of Tech Spec 3.4.1.1 shall be observed during Operational Conditions 1 AND 2 with a single recirculation loop in service.
- B. Core flow must be maintained $> 40\%$ during single loop operations to prevent cooldown of the idle loop.

5.3.9 **INCREASE** core flow to $> 40\%$ of rated core flow, as required. Recirculation Pump speed AND Reactor Power are now controlled by pressing the appropriate **INCREASE** OR **DECREASE** push button on SIC-R621B(A) Pump B(A) SPD CONT as necessary.

5.3.10 IF core flow can NOT be increased above 40% OR drops below 40%, THEN **RECORD** the time in HC.OP-DL.ZZ-0026(Q), Surveillance Log, Attachment 3v (T/S 3.4.1.1, ACTIONS c and d), AND **INFORM** System Engineering.

- 5.3.11 IF the MG Set A(B) Lube Oil system associated with the Recirc Pump removed from service is itself to be removed from service, THEN PERFORM the following: _____
- A. ENSURE Motor-Generator set A(B) has stopped turning (Local). _____
 - B. PRESS MAN push button of PUMP A(B) AUXILIARIES LUBE OIL PUMP A1P120(BP120) OR A2P120(BP120) which was in standby. _____
 - C. PLACE the (Local) control switch for AP-113(BP-113) Emergency Lube Oil Pump in OFF. _____
 - D. AFTER MG Set lube oil temperature has decreased to $< 110^{\circ}\text{F}$ as indicated on TI-8290A(B) MG Set A(B) Lube Oil Temp, STOP PUMP A(B) AUXILIARIES LUBE OIL PUMP A1P120(B1P120) OR A2P120(B2P120). _____
 - E. STOP Fluid Coupler Oil Mist Eliminator 1A(B)V135 (Local) AND/OR REMOVE Oil Mist Eliminator 1A-V-136 IAW section 5.8. _____
- 5.3.12 IF the MG Set A(B) Lube Oil System was left in service, THEN ADJUST TACS flow to 1AE-126 (1BE-126) MG Set A(B) Hydraulic Oil Cooler to maintain lube oil temperature between 110°F and 130°F as indicated on TI-8290 A(B) MG Set A(B) Lube Oil Temp (Local). _____
- 5.3.13 IF Reactor Recirc Pump isolation is desired, THEN REFER to Section 5.6, Reactor Recirculation System Shutdown. _____
- 5.3.14 WHEN ready to return the second Recirc Pump to service, THEN REFER to Section 5.1, Reactor Recirculation System Startup. _____

5.4 Resetting Reactor Recirculation Pump Runback

CAUTION 5.4

- A. **WHEN** a scoop tube is locked up, a recirculation runback may create a large flow mismatch. Timely action must be taken to match loop flows by either resetting the runback, if possible, **AND** increasing the flow in the runback loop **OR** by unlocking the scoop tube to lower flow in the locked up loop. **IF** action cannot be taken in a timely manner, the Recirc Pump in the low flow (unlocked) loop should be tripped.
- B. **IF BOTH** pumps are NOT in manual prior to attempting to reset a runback, unwanted reactivity manipulation/power decrease may occur.

- 5.4.1 ENSURE all Prerequisites have been satisfied IAW Section 2.4. _____
- 5.4.2 ENSURE BOTH SIC-R621A PUMP A SPD CONT is in MAN AND SIC-R621B PUMP B SPD CONT is in MAN. _____
- 5.4.3 ENSURE the A/B DEMND OUTPT on SIC-R620 MASTER SPD CONT is less than or equal to the SPEED DEMAND indicated on SIC-R621 A(B) PUMP A(B) SPD CONT by performing the following: _____
 - A. PRESS OUTPUT A(B) SELECT on SIC-R620 MASTER SPD CONT. _____
 - B. REDUCE A/B DEMND OUTPT on SIC-R620 MASTER SPD CONT by pressing the DECREASE push button on SIC-R621 A(B) PUMP A(B) SPD CONT until the A/B DEMND OUTPT on the SIC-R620 MASTER SPD CONT is less than or equal to the SPEED DEMAND on SIC-R621 A(B) PUMP A(B) SPD CONT. _____
 - C. REDUCE SIC-R620 MASTER SPD CONT RECIR MASTR DEMND to match A/B DEMND OUTPT (approximately). _____
- 5.4.4 PRESS the following for Reactor Recirc Pump A(B): _____
 - A. INTMD RUNBACK RESET push button _____
 - B. FULL RUNBACK RESET push button _____

5.5 Scoop Tube Positioner Lockup Operation

CAUTION 5.5

WHEN a scoop tube is locked up, a recirculation runback may create a large flow mismatch. Timely action must be taken to match loop flows by either resetting the runback, if possible, **AND** increasing the flow in the runback loop **OR** by unlocking the scoop tube to lower flow in the locked up loop. **IF** action cannot be taken in a timely manner, the Recirc Pump in the low flow (unlocked) loop should be tripped.

5.5.1 **ENSURE** all Prerequisites have been satisfied IAW Section 2.5.

NOTE 5.5.2

This step is written for routine transfer to the Lockup position **AND** is **NOT** to be used for an emergency lockup.

- 5.5.2 **PERFORM** the following to lock up the Reactor Recirc Pump Motor/Generator Scoop Tube Positioner:
- A. **PRESS** SIC-R621A
AND B PUMP A AND B SPD CONT MAN push buttons.
 - B. **EQUALIZE** A **AND** B Recirc Pump Speeds by increasing **OR** decreasing pump speeds with SIC-R621A **AND** B PUMP A AND B SPD CONT while maintaining constant Reactor Power.
 - C. **PRESS** SCOOP TUBE TRIP push button A(B)
AND **ENSURE** SCOOP TUBE LOCKUP light comes on for the desired Motor/Generator.

NOTE 5.5.3

Operation of the Scoop Tube Controller locally shall be performed by a Licensed Operator.

5.5.3 **PERFORM** the following to manually control the speed of Reactor Recirc Pump A(B) from the Scoop Tube Positioner (Local):

A. **REQUEST** NCO in the Main Control Room to maintain constant communications while adjusting pump speed.

CAUTION 5.5.3.B

The Scoop Tube Positioner should not be manually positioned unless the Scoop Tube Positioner power switch is OFF.

B. **PLACE** Reactor Recirc A(B) Scoop Tube Positioner power switch in OFF.

C. **REMOVE** handcrank from inside Positioner on mounting bracket.

D. **INSTALL** handcrank on shaft.

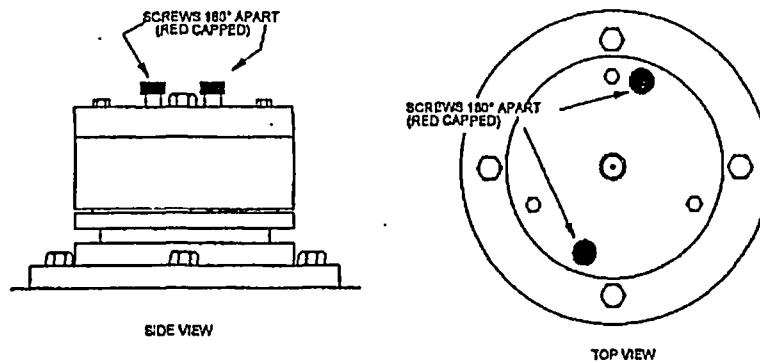
NOTE 5.5.3.E

A firm grip must be applied to the handcrank before releasing the Brake to prevent the load from driving through the Control Drive.

E. **DISENGAGE** the Reactor Recirc A(B) Scoop Tube Positioner Disc Brake manually by turning down on the (2) Red Capped dial screws at 180° apart (**REFER TO** Figure 1).

Continued on next page

5.5.3 (Continued)



(2) SCREWS 180° apart

Figure 1

- F. After receiving the proper instructions from the NCO as to direction of pump speed, slowly **ROTATE** shaft clockwise to reduce speed OR counterclockwise to increase speed. _____

- G. WHEN speed has been adjusted to the proper level, **ENGAGE** the Reactor Recirc A(B) Scoop Tube Positioner Disc Brake manually by turning up on the (2) Red Capped dial screws at 180° apart (**REFER TO** Figure 1). _____

- H. IF manual adjustment of the Scoop Tube is to be terminated, THEN PERFORM the following: _____
 - 1. **REMOVE** handcrank from shaft. _____
 - 2. **PLACE** the handcrank in its mounting bracket. _____
 - 3. **PLACE** Reactor Recirc A(B) Scoop Tube Positioner Power Switch in ON. _____
 - 4. To remove the Scoop Tube from the Locked-up position, **CONTINUE** with Step 5.5.4. _____

- 5.5.4 To unlock the Reactor Recirc Pump Motor/Generator
Scoop Tube Positioner,
PERFORM the following:

NOTE 5.5.4.A

IF the Scoop Tube Lockup condition was a result of either:

- (1) reaching the electrical stops OR
(2) pressing the Scoop Tube Trip push button, AND NO manual speed adjustments
have been made, THEN Step 5.5.4.A should NOT be performed (continue at
Step 5.5.4.B).

- A. **VERIFY** the Reactor Recirc A(B) Scoop Tube Positioner Disc
Brake is engaged manually by turning up on the (2) Red Capped
dial screws at 180° apart (SEE Figure 1).

NOTE 5.5.4.B

Speed demand will drift continuously and care must be used when Scoop Tube
Lockup is reset.

- B. **PRESS** SIC-R621A(B) PUMP A(B) SPD CONT INCREASE
OR DECREASE push button as necessary to null indicated speed on
SIC-R621A(B) with associated pump output signal at A/B DEMND
OUTPT on SIC-R620 MASTER SPD CONT.

NOTE 5.5.4.C

A small speed change of < 5% may be experienced when coming out of Lockup.

CAUTION 5.5.4.C

When coming out of Scoop Tube Lockup, the potential exists for the Recirc Pump
to "Run Away", and the operator should be prepared to take appropriate action.

- C. WHEN SIC-R621A(B) PUMP A(B) SPD CONT SPEED
DEMAND indicator is slightly less than indicated speed,
PRESS SCOOP TUBE TRIP RESET
AND ENSURE SCOOP TUBE LOCK-UP light goes off.
- D. **ADJUST** speed(s) as necessary.

5.6 Reactor Recirculation System Shutdown

NOTE 5.6

IF shutdown of the Reactor Recirculation System is to be performed to accommodate placing Shutdown Cooling in operation, consideration may be given to maintaining Reactor Recirculation in service to provide forced core flow until the required RHR flow is achieved. During the transition from normal Reactor Recirculation System operations to establishment of Shutdown Cooling, only the AP201 Reactor Recirculation Pump may be left in operation until the BP202 RHR pump is operating satisfactorily, AND then only until the required B RHR Loop flow of 10, 000 gpm is achieved.

CAUTION 5.6.1

- A. The limitations of Tech Spec 3.4.1.1 shall be observed prior to the shutdown of an operating Reactor Recirc Pump during Operational Conditions 1 and 2.
- B. With **NO** Recirc Pumps in service and in Operational Condition 1, then the Reactor shall be manually scrammed

- 5.6.1 ENSURE all prerequisites have been satisfied IAW Section 2.6. _____
- 5.6.2 REDUCE Reactor Power by decreasing core flow and/or inserting control rods IAW Reactor Engineering instructions. _____
- 5.6.3 TRANSFER Reactor Recirc Pump A AND B control to Manual Recirc Flow Control by pressing SIC-R621A AND B.PUMP A AND B SPD CONT MAN push buttons. _____
- 5.6.4 PRESS SIC-R621A(B) PUMP A(B) SPD CONT DECREASE push button UNTIL minimum speed is reached. _____
- 5.6.5 PRESS PUMP A(B) MOTOR BRKR TRIP push button. _____

CAUTION 5.6.6

BB-HV-F031A(B) PUMP A(B) DISCH VALVE should be left closed following the 5 minutes IF Shutdown Cooling is to be placed in service OR for pump maintenance that requires the discharge valve to remain closed. [CD-976B]

- 5.6.6 **CLOSE BB-HV-F031A(B) PUMP A(B) DISCH VALVE** for approximately 5 minutes, **THEN RE-OPEN** BB-HV-F031A(B) to keep the loop temperature within 50°F of the reactor coolant temperature (push button must be pressed and held to effect valve opening). [CD-976B] _____
- 5.6.7 **IF** the MG Set A(B) Lube Oil system is to be removed from service, **THEN PERFORM** the following: _____
- A. **ENSURE** Motor-Generator Set A(B) has stopped turning (Local). _____
 - B. **PRESS MAN** push button of PUMP A(B) AUXILIARIES LUBE OIL PUMP A1P120(B1P120) **OR** A2P120(B2P120) which was in standby. _____
 - C. **PLACE** the (local) control switch for AP-113(BP-113) the Emergency Lube Oil Pump in OFF. _____
 - D. **AFTER** the MG Set lube oil temperature has decreased to < 110°F as indicated on TI-8290A(B) MG Set A(B) Lube Oil Temp, **STOP** PUMP A(B) AUXILIARIES LUBE OIL PUMP A1P120(B1P120) **OR** A2P120(B2P120). _____
 - E. **STOP** Fluid Coupler Oil Mist Eliminator 1A(B)V135 (Local) **AND/OR REMOVE** Oil Mist Eliminator 1A-V-136 IAW section 5.8. _____
- 5.6.8 **IF** the MG Set A(B) Lube Oil system was left in service, **THEN ADJUST** TACS flow to 1AE-126 (1BE-126) MG Set A(B) Hydraulic Oil Cooler to maintain lube oil temperature between 110°F and 130°F as indicated on TI-8290 A(B) MG Set A(B) Lube Oil Temp (local). _____

CAUTION 5.6.9

- A. Closure of both Reactor Recirc Pump suction valves will result in a loss of suction to the Reactor Water Cleanup System, unless the RWCU bottom head suction path is established.
- B. To avoid over-pressurizing and overcooling the pump casing, the Seal Purge Water for the Reactor Recirc Pump seals must be secured prior to isolating the pump. [CD-219B]

5.6.9 IF isolation of Reactor Recirc Pump A(B) is desired,
THEN PERFORM the following:

- A. CLOSE 1-BF-V805(V804) CRD Drive Water Filter to Recirc Loop A(B) to prevent lifting relief valve.
- B. CLOSE 1-BF-V100 (101) RX RECIRC PUMP A(B) CRD SEAL ISLN.
- C. UNCAP AND INSTALL a hose at 1-BF-V156 (V773) Recirc Pmps Seal Purge Supply Hdr Vent Vlv (Torus Access, Rm. 4223 (4321 Pipechase)) AND ROUTE to nearest floor/equipment drain.
- D. OPEN 1-BF-V155 (V772) Recirc Pmps Seal Purge Supply Hdr Vent Vlv.
- E. OPEN 1-BF-V156 (V773) Recirc Pmps Seal Purge Supply Hdr Vent Vlv.
- F. CLOSE BF-HV-3800A(B) SEAL PURGE WTR VALVE.
- G. CLOSE BB-HV-F023A(B) SUCTION VALVE.
- H. ENSURE BB-HV-F031A(B) PUMP DISCH VALVE is CLOSED.
- I. CLOSE BG-HV-F100(F106) RWCU SUCTION VALVE.
- J. CLOSE 1-BB-V042(V046) Seal Purge Manual Isolation.

Continued on next page

5.6.9 (Continued)

- K. **OPEN 1-BB-V050(V052)**
AND 1-BB-V051(V053) Seal Vent. _____

- L. **IF pump draining is required (for seal replacement, the pump is kept full for shielding),**
THEN PERFORM the following: _____
 - 1. **OPEN 1-BG-V167(V169)**
AND 1-BG-V168(V170) Pump Drains. _____

 - 2. **OPEN 1-BB-V647(V681)**
AND 1-BB-V648(V682). _____

- M. **CLOSE 1-ED-V023(V024)**
AND 1-ED-V025(V026) RACS Isolation Valves. _____

NOTE 5.7

- A. This subsection may be used to restart one or both Reactor Recirc Pumps to prevent thermal stratification following a plant transient, but only when in Operational Condition 3 or 4. [70031515]
- B. This subsection should not be used if the Recirc System has been out of service for an extended period as determined by the SM/CRS.
- C. All operations are performed from 10C651 Section C unless otherwise noted.

5.7 Reactor Recirculation Pump Quick Restart

- 5.7.1 **ENSURE** all prerequisites have been satisfied IAW Section 2.7. _____
- 5.7.2 **ENSURE** Reactor level is greater than +30 inches to ensure adequate NPSH is available. _____
- 5.7.3 **VERIFY** BB-HV-F023A(B) SUCTION VALVE
AND BG-HV-F100(F106) RWCU SUCTION VALVE are OPEN. _____
- 5.7.4 **PREPARE** the Reactor Recirc Pump for start as follows: _____
 - A. **VERIFY** that PUMP A(B) LOCKOUT BUS POWER AVAILABLE light is illuminated. _____
 - B. **VERIFY** the following MG Set parameters: _____
 - 1. Computer Point D2915 (D2916) RECIRC MG A(B) DRV LUBO PRESS is NOT in alarm. _____
 - 2. Computer Point D2913 (D2914) RECIRC MG A(B) LUBE OIL TEMP is NOT in alarm. _____

Continued on next page

5.7.4 (Continued)

- C. **VERIFY** the following: _____
1. PUMP A(B) - MOT-GEN-FIELD BRKR TRIPPED is ON. _____
 2. All protective
AND Generator Lockout relays are reset
(Local Panel A(B)C158). _____
 3. REACTOR RECIRC "A"("B") TROUBLE annunciator
C1-D4 (C1-D5) is CLEAR. _____
 4. PUMP B - RSP TK OVR is OFF. _____
- D. IF RECIRC PUMP TRIP A(B)P201
PUMP MTR BRKR 1AN205
AND 1CN205 (1BN205 AND 1DN205) have TRIPPED,
THEN **PERFORM** the following: _____
1. **ENSURE** the following switches are in BYP: _____
 - C71-512A
RECIRC PUMP TRIP SYSTEM A DISABLE. _____
 - C71-512B
RECIRC PUMP TRIP SYSTEM B DISABLE. _____
 2. **ENSURE** RRCS is RESET. _____
 3. **CLOSE** RECIRC PUMP TRIP A(B)P201
PUMP MTR BRKR 1AN205 .
AND 1CN205 (1BN205 AND 1DN205). _____
- E. **PRESS** the following push buttons for
REACTOR RECIRCULATION PUMP A
AND PUMP B. _____
1. HIGH VIBRATION TRIP RESET. _____
 2. SCOOP TUBE TRIP RESET (SCOOP TUBE LOCK UP
light goes off). _____

- 5.7.5 IF desired,
START the first idle Reactor Recirc Pump as follows
(A Reactor Recirc Pump is preferred):

NOTE 5.7.5.A

The limitations of Technical Specification 3.4.1.4 shall be observed prior to starting an idle Reactor Recirculation Pump.

- A. Within 15 minutes prior to starting pump,
VERIFY temperature differential between Reactor coolant
within idle loop AND coolant in pressure vessel is $\leq 50^{\circ}\text{F}$
as indicated by: [T/S 4.4.1.4]
1. Dome temperature calculated from REACTOR PRESSURE
IAW HC.OP-DL.ZZ-0026(Q).
 2. RECIRC PUMP SUCTION LOOP A(B) TEMP IAW
HC.OP-DL.ZZ-0026(Q).
- B. **LOG** the above temperatures in HC.OP-DL.ZZ-0026(Q),
Attachment 3v.

Continued on next page

5.7.5 (Continued)

NOTE 5.7.5.C

The RWCU System must be in service with BG-HV-F101 SUCT FROM RPV BOT DRN open to obtain a true bottom head drain temperature reading on Computer point A2942.

- C. Within 15 minutes prior to starting pump, **VERIFY** temperature differential between Reactor coolant within dome **AND** bottom head drain is $\leq 145^{\circ}\text{F}$ as indicated by:
[T/S 4.4.1.4]
 - 1. Computer Point A2942-REAC BOT HD DRN TEMP _____
 - 2. Dome temperature calculated from REACTOR PRESSURE IAW HC.OP-DL.ZZ-0026(Q). _____
- D. **LOG** the above temperatures in HC.OP-DL.ZZ-0026(Q), Attachment 3v. _____
- E. After loop temperature requirements are satisfied, **IF** BB-HV-F031A(B) PUMP A(B) DISCH VALVE is open, **THEN CLOSE** BB-HV-F031A(B) PUMP A(B) DISCH VALVE. _____
- F. **ENSURE** the temperature requirements of Technical Specification 3.4.1.4 are satisfied prior to performing the following step. _____

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5.7.5 (Continued)

NOTE 5.7.5.G

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 AND 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.

G. **PRESS REACTOR RECIRCULATION PUMP
A(B) MOTOR BRKR CLOSE** push button. _____

H. **VERIFY BB-HV-F031A(B) REACTOR RECIRCULATION
PUMP A(B) DISCH VALVE** opens according to jog sequence
(approximately 80 seconds for full travel). _____

I. **ADJUST TACS flow to 1AE-126 (1BE-126) MG Set A(B)
Hydraulic Oil Cooler to maintain lube oil temperature between
110°F and 130°F as indicated on TI-8290 A(B) MG Set A(B)
Lube Oil Temp (Local).** _____

5.7.6 IF desired,
START the second Reactor Recirc Pump as follows: _____

NOTE 5.7.6.A

The limitations of Technical Specification 3.4.1.4 shall be observed prior to starting an idle Reactor Recirculation Pump.

- A. Within 15 minutes prior to starting pump,
ENSURE operating Loop flow is \leq (50% rated loop flow),
as indicated on B31-FR-R614 RECIRC LOOP A / LOOP B
FLOW. [T/S 4.4.1.4] _____
- B. LOG FLOW in HC.OP-DL.ZZ-0026(Q), Attachment 3v. _____
- C. Within 15 minutes prior to starting pump,
ENSURE temperature differential between idle
AND operating Reactor Recirculation Loops is \leq 50°F,
IAW HC.OP-DL.ZZ-0026(Q). [T/S 4.4.1.4] _____
- D. LOG temperatures in HC.OP-DL.ZZ-0026(Q), Attachment 3v. _____

Continued on next page

5.7.6 (Continued)

NOTE 5.7.6.E

The RWCU System must be in service with BG-HV-F101 SUCT FROM RPV BOT DRN open to obtain a true bottom head drain temperature reading on Computer Point A2942.

- E. Within 15 minutes prior to starting pump, **ENSURE** temperature differential between Reactor coolant within dome AND bottom head drain is $\leq 145^{\circ}\text{F}$ as indicated by the following:
[TS 4.4.1.4] _____
 - Computer Point A2942-REAC BOT HD DRN TEMP _____
 - Dome temperature calculated from REACTOR PRESSURE, IAW HC.OP-DL.ZZ-0026(Q). _____
- F. LOG temperatures in HC.OP-DL.ZZ-0026(Q), Attachment 3v. _____
- G. **THROTTLE OPEN** BB-HV-F031A(B) PUMP A(B) DISCH VALVE as necessary to increase loop temperatures (push button must be pressed and held to effect valve opening). _____
- H. After loop temperature requirements are satisfied, IF BB-HV-F031A(B) PUMP A(B) DISCH VALVE is open, THEN CLOSE BB-HV-F031A(B) PUMP A(B) DISCH VALVE. _____
- I. **ENSURE** the temperature requirements of Technical Specification 3.4.1.4 are satisfied prior to performing the following step. _____

Continued on next page

5.7.6 (Continued)

NOTE 5.7.6.J

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 AND 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.

J. **PRESS REACTOR RECIRCULATION PUMP A(B)
MOTOR BRKR CLOSE** push button. _____

K. **VERIFY BB-HV-F031A(B) REACTOR RECIRCULATION
PUMP A(B) DISCH VALVE** opens according to jog sequence
(approximately 80 seconds for full travel). _____

CAUTION 5.7.6.L

Approximately 45 minutes may be required to stabilize motor-generator lube oil temperatures during post-maintenance equipment starts. Control Room temperature recorders B31-TRR625 and CRIDS points A2911 and A2912 provide pertinent parameter information and should be monitored for this duration. Local observation should also be in place. [70031515]

L. **ADJUST TACS flow to 1AE-126 (1BE-126) MG Set A(B)
Hydraulic Oil Cooler to maintain lube oil temperature between
110°F and 130°F as indicated on TI-8290 A(B) MG Set A(B) Lube
Oil Temp (Local).** _____

5.8 Oil Mist Eliminator Operation
[70038194]

- 5.8.1 To place the 1A(B)-V-135 Oil Mist Eliminator in service,
PLACE the Motor Starter for 1A(B)-V-135 to "ON". _____
- 5.8.2 To remove the 1A(B)-V-135 Oil Mist Eliminator from service,
PLACE the Motor Starter for 1A(B)-V-135 to "OFF". _____

CAUTION 5.8.3

Due to concerns with Oil Vapors being released to the atmosphere of the M-G room, the "A" Reactor Recirc Pump M-G Oil Mist Eliminator (H1BB -1A-V-136) should only be placed in-service when the "A" Reactor Recirculation Pump is being maintained at a steady speed ("Stable Power Operation"), and should not be used while "Maneuvering Power". Minor adjustments in Reactor Recirc Pump Speed, to maintain "Stable Power Operation", should be considered as "Stable Power Operation".
[70036590]

- 5.8.3 To place the 1A-V-136 Oil Mist Eliminator in service,
PERFORM the following:
- A. POSITION Mg Set A Fluid Drive Blower
Flow Damper 1-BB-V290 to "1/2" OPEN. _____
 - B. PLACE Motor Starter Operator For
Demister 1A-V-136, 1A-N-120 to ON. _____
 - C. FULLY OPEN Mg Set A Fluid Drive Blower
Flow Damper 1-BB-V290. _____
- 5.8.4 To remove the 1A-V-136 Oil Mist Eliminator from service,
PERFORM the following:
- A. PLACE Motor Starter Operator For
Demister 1A-V-136, 1A-N-120 to OFF. _____
 - B. CLOSE Mg Set A Fluid Drive Blower
Flow Damper 1-BB-V290. _____

6.0 RECORDS

None.

7.0 REFERENCES

7.1 P&ID:

M41-1 Sht 1, Sht 2
M42-1 Sht 1, Sht 2
M43-1 Sht 1, Sht 2

7.2 Logic Drawings:

J43-0 Sht 1, Sht2, Sht 3, Sht 4, Sht 6, Sht 7, Sht 8, Sht 9, & Sht 10

7.3 Vendor Drawings

PN1-B31-S001-0120

7.4 Electrical Drawings:

E-4-1
E-13, Sht 1, Sht 2, Sht 3
E-24-1
E-31-1
E-6016-0 Sht 2
E-6766-0

7.5 Vendor Manuals:

N-1 B-31-124(1)-4 Reactor Coolant Pump
N-1 B-31-125(1)-2
N-1 B-31-119(1)-3 Nuclear Reactor Water Pump Recirculating Motors
N-1 B-31-120(1)-1 Variable Frequency Motor Generator Set

7.6 Panel Drawings:

J-0650-1, Sht. 9
J-0651-1, Sht. 6

7.7 DITS:

D3.30, Rev. 1

7.8 GE Documents:

GEK-90300, Vol. III, Part 1, Sept. 1983

7.9 Procedures

HC.OP-AP.ZZ-0109(Q) Equipment Operational Control
HC.OP-DL.ZZ-0026(Q) Surveillance Log

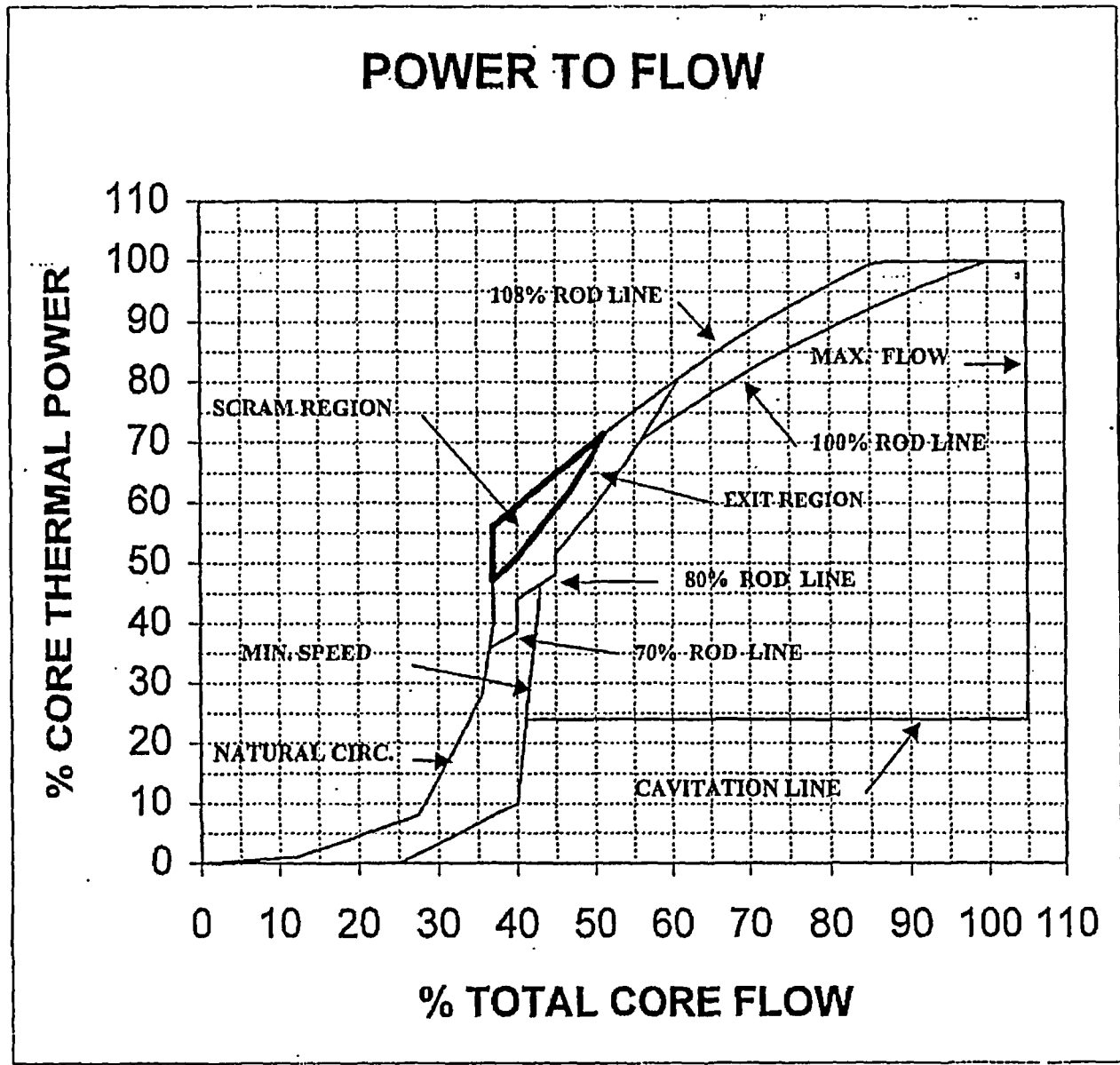
7.10 Commitment Documents

CD-781A (GE SIL 203 and 203 Supp. 1)
CD-806A (GE SIL 062)
CD-184B (SOER 83-04)
CD-219B (INPO 0&MR 113)
CD-976B (GE SIL 368)
CD-389E SIL 436
CD-354F (NRC Bulletin 88-07)
CD-230G NHO INCI 354/92-073
CD-250G NHO INCI 354/92-089
CD-405H LER 95-039
CD-455H Level 2, Level 1 PR Upgrade by SORC (PR #960330084)
CD-191F GE SIL 459- Recirc pump shaft failure
CD-921E Thermal cracking inspection of Recirc Pump
PR 981019199 GE SIL 621 - Recirc operation with locked scoop tube
70031515 Recirc Pump Quick Restart
70029861 Recirc Pump Seal Purge

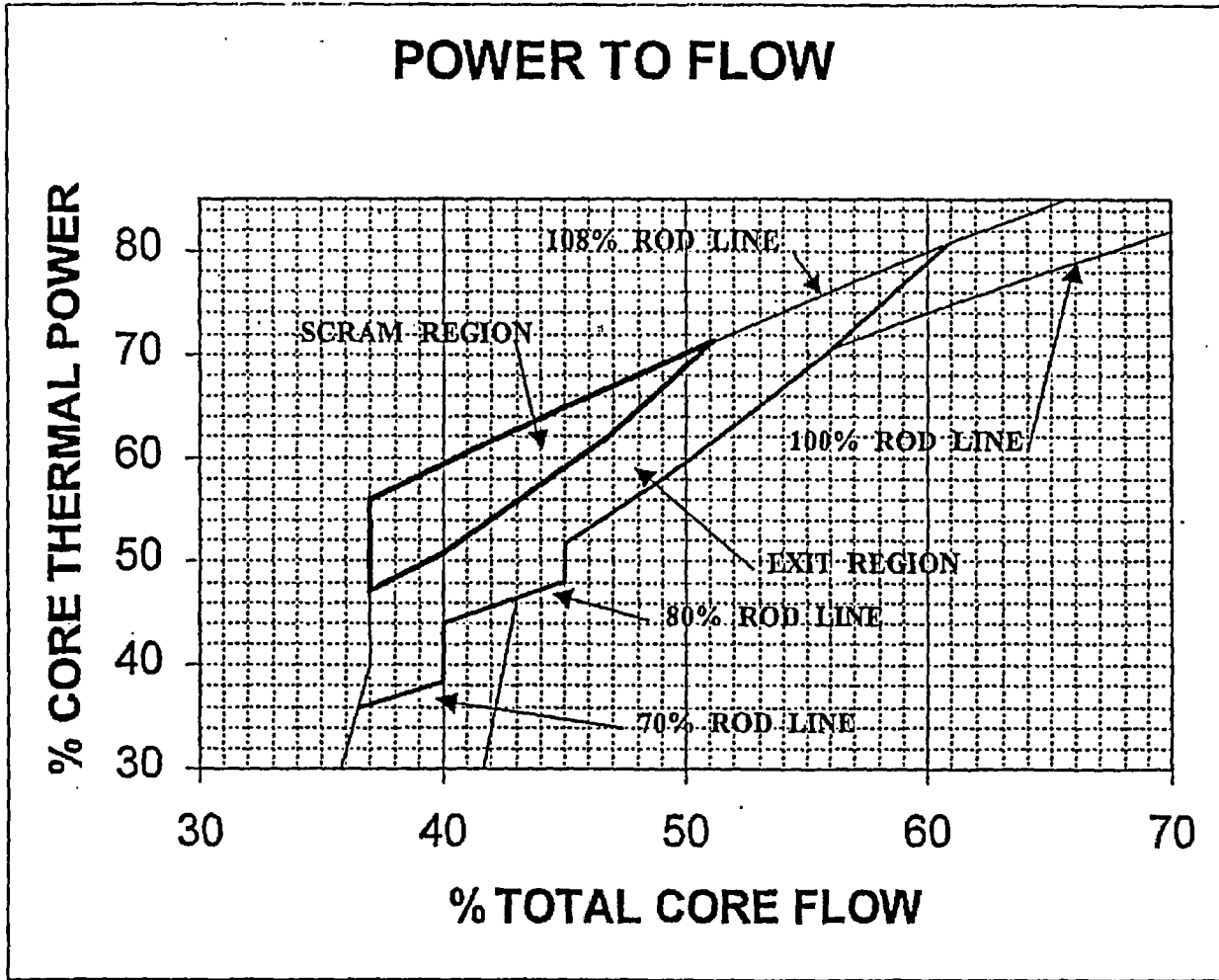
7.11 Other Documents:

DCR No. 4-EMJ-86-093 (and 093A)
DCR No. 4-HM-0006
DCR No. 4-HM-0172
Memorandum HCT-95-194
Memorandum HCT-95-198
INPO SER 7-95
Letter NE-95-1411
CR #950919568
PR #960330084
PR #951005196
Technical Specifications,
2.2.1, 3.2.2, 3.3.6, 3/4.4.1.1, 3/4.4.1.3, 3/4.4.1.4, 3/4.4.5, 3.4.6.1
PR 961227150
PR 960105118
DCP 4EC-3458
DCP 80006592
PR 980720223 - Added Section 5.8; Reactor Recirculation Pump Quick Restart
PR 981121110 - Added limitation 3.2.11 and direction into Note 5.3.21.B
CR990410137, 80008321 - Recirc Seal Purge Header and Seal Cavity Venting
80029235 - T-MOD 01-007 (60019637) 'B' Reactor Recirc Pump Vibration setpoints
80033270 GE SIL 628
70031631 Recirc Flow Loop
70036590 "A" Recirc M-G Demister
70038946 Recirc MG Set Oil Level

ATTACHMENT 1
POWER TO FLOW MAP
(Page 1 of 2)



ATTACHMENT 1
POWER TO FLOW MAP
(Page 2 of 2)



**EXHIBIT 1
REACTOR RECRICULATION PUMP MOTOR**

