Final Submittal

(Blue Paper)

SEQUOYAH APRIL/MAY 2007 EXAM

EXAM NOS. 05000327/2007301
AND 05000328/2007301

APRIL 9 - 11, 2007 AND
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As Given Simulator Scenario Operator Actions ES-D-2

Facility:	Sequoyah	Scenario No.:	1	Op Test No.:	NRC
Examiners:		Operators:			
Initial Conditions:	100% Power.				
	SG BD Rad Monitor OOS				
	B PZR Spray Valve Isolated				
	B CCP OOS				
Turnover:	Reduce Power to 90% for Turbine Steam Valve testing				
Target CTs:	Insert negative reactivity using rods and/or boration prior to completion of FR-S.1 step 4.				
	Isolate AFW flow to the faulted SG prior to transition from E-2				

Event No.	Malf. No.	Event Type*	Event Description
1 T+0	—	R-RO N-BOP/SRO	Reduce power from 100%
2 T+15	RX07A	I-RO/SRO TS-SRO	Controlling PZR pressure channel fails high - Tech Spec evaluation.
3 T+25	ior rxc0pc4620 CLOSE	C-BOP/SRO	MFP Master Pressure Controller Drifts low - Requires taking manual control of the Master controller to match steam and feed flow.
4 T+35	CN09	C-BOP	Degrading Condenser Vacuum – Requires power reduction
5 T+50	RD07D4	C- RO TS-SRO	Dropped Rod – Tech Spec evaluation.
6 T+60	RD07F10	M-All	2nd Dropped Rod during recovery – Reactor Trip required
7	RP01C	C-RO	RTBs fail to open – ATWS – Insert rods; Initiate boration
8	MS03A	C – BOP	#1 SG Safety Valve failed open; Requires isolation of Faulted SG.

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Scenario 1 Summary

The crew will assume the shift at 100% power with instructions to reduce power.

Shortly after turnover, the input to the PZR pressure controller fails high, requiring action to control RCS pressure in accordance with AOP-I.04. The SRO will enter technical specifications.

When the plant is stable and technical specifications have been addressed, the Feed Pump Master speed controller will fail low, requiring action to raise feed to match steam flow in accordance with AOP-S.01.

When feed is restored in manual, a loss of condenser vacuum will occur. The crew will respond in accordance with AOP-S.02, and reduce load to maintain vacuum.

When vacuum is restored, one rod will drop. The crew will take action to stabilize the plant in accordance with AOP-C.01. When stabilization steps have been performed, a second rod will drop, requiring a reactor trip.

The reactor will not trip automatically or manually. The crew will enter FR-S.1. In FR-S.1, SG safety valves will lift, and 1 SG safety valve will stick open, requiring action to stop the RCS cooldown after the reactor is subcritical.

The scenario may be terminated after performance of FR-S.1 or upon transition to ES-1.1.

EOP flow: E-0 – FR-S.1 – E-0 – E-2 - ES-1.1

PSA significant equipment OOS: B CCP
PSA significant transient: ATWS

ESG-1 SCN File 01/25/07

EVENT	IC/MF/RF/OR #	DESCRIPTION/EXPECTED ACTIONS/BOOTH FEEDBACK
Simulator IC	**IC-16** **'B' Train work week**	**100%, BOL [~1000 MWD/MTU]** **CB 'D' Rods @ 216 steps, all others @ 228 steps;** **[B] = 1093ppm; Ba Blender setting: 29% Xe/Sm @ equilibrium** ***Console Operator actions: Place simulator in run and perform the following:*** • **Adjust boric acid blender to 27%** • **Place 1A-A CCP in service and remove 1B-B-Place 1B-B CCP in P-T-L and tag with HO.** • **Place Loop 1 Spray valve in manual and tag with Pink Tag.** • **Place Train Week B sign**
MFs, RFs, ORs are active when the SCN file is loaded.	**IRF RMR19 f:3** **IMF RM90120 f:1** **IMF AN_OV_723 f:2**	**SG BD Rad Monitor OOS: 1-RM-120A & 121A. Place Pink Tags on MCB modules.**
	IMF RC06B f:0	**Loop 1 PZR Spray Valve Isolated (1-PCV-68-340D)**
	IMF CV01B f:1	**1B-B CCP OOS (Initial conditions)**
	IMF RP01C f:1	**Reactor Trip Signal Failure (ATWS)**
1.		Reduce Power to <93% for Turbine Valve testing. Reset integrators for PW and BA to zero.
2.	**IMF RX07A f:1 k:2**	**Pzr Press Ch. PT-68-340 fails high.** *Support staff report:* *When IMs or MSS is contacted to trip bistables using AOP-I.04 Appendix A, inform the crew that the IMs will report to the MCR in ~ 45 minutes.*
3.	**IOR RXCOPC4620 f:.001 k:3**	**MFP Master Controller failure;** controller output fails low resulting in lowering feed flow to all SGs. *Support staff report:* • *When MSS or IMs are contacted, inform the crew that the IMs will report to the MCR in ~ 45 minutes.*
4.	**IMF CN09 f:0.1 k:4** **DMF CN09 after flange is repaired.**	**Loss Of Condenser Vacuum** **NOTE:** Modulate/reduce f: (i.e.: 0.1 to .05) to slow condenser vacuum loss to maintain < 2.0 psia. Intent is to require a turbine load reduction to maintain vacuum. *Support staff report:* • *When [Ops Personnel] dispatched to investigate, wait ~ 2 minutes and report that vacuum breaker flange is leaking.* • *When [Maintenance Personnel] dispatched to assist, wait ~3 minutes and report that flange is tightened/temporarily repaired.*

EVENT	IC/MF/RF/OR #	DESCRIPTION/EXPECTED ACTIONS/BOOTH FEEDBACK
5.	**IMF RD07M2 f:1 k:5**	**Dropped Rod**: M2 SDB 'A' rod. *Support staff report:* • *MSS is notified to initiate maintenance, wait ≈5 minutes THEN DELETE MALFUNCTION. Notify UO that System Engineer found blown fuse in stationary gripper coil circuit. Fuse is replaced, and rod is ready for retrieval.* • *Reactor Eng. notified for power peaking, fuel failure, & xenon oscillation considerations, inform crew to proceed with rod retrieval using AOP-C.01 considerations (i.e.: <1 hour).*
6.	**IMF RD07F10 f:1 k:6**	**Dropped Rod-Rx Trip initiator**: F10 CB 'D' rod. 2nd dropped control rod- Reactor Trip required per AOP-C.01;
7.	**IMF RP01C f:1** (pre-inserted) *Malfunction removal allows breakers to trip in following step.*	**Reactor Trip Signal Failure (ATWS)** *When the reactor protection system (RPS) receives a trip signal, both reactor trip breakers will not open. The turbine will NOT trip from any reactor trip signal but will trip from a Hi-Hi S/G level or SI signal. Any functions that receive an initiation signal from P-4 auxiliary contacts of the reactor trip breakers will not work properly. The reactor first out annunciation will function properly.* **NOTE:** Malfunction removal allows breakers to trip.
8.	**IRF RPR05A f:1 k:9** **IRF RPR05B f:1 D:15 k:9**	**Associated Remote Functions- wait 5 minutes following AUO notification to insert: RPR05A & RPR05B** – simulates local opening Rx Trip Breakers (RTA & RTB) *Support staff report:* • *AUO reports to crew that the RTBs are open.*
9.	**IMF MS03A f:100 e:7**	**Single main steam safety valve fails open (SG #1) triggered on MT trip.** *Support staff report:* • *Report (as outside AUO) to crew that you observe steam coming from top of U1 West Valve Vault (for S/Gs #1 or #4).*
Termination Criteria		***Complete Faulted SG Isolation and verify Heat Sink established/available.***

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Event Description: Reduce Power

Time	Position	Applicant's Actions or Behavior
		Booth Instructor: **No action required for event 1**
		Indications available: **None Applicable**
	SRO	Direct a load reduction in accordance with 0-GO-5, Normal Power Operations, and 0-SO-62-7, Boron Concentration Control
	–	
		CAUTION **Returning the Boric Acid Blender to service after unplugging, cleaning, or maintenance on Boric Acid System could introduce debris, sludge, air or solidified boron into CCP suction resulting in pump damage. Extreme care must be exercised to properly flush the Boric Acid piping following an outage.**
		NOTE If a large amount of boration is required (plant shutdown), pzr heaters should be energized to cause spray operation for equalizing boron concentration in RCS and pressurizer.
	RO	**ENSURE** makeup system aligned for **AUTO** operation in accordance with Section 5.1.
		NOTE Steps 2 and 3 are **N/A** for minor power changes OR if immediate boration is required to

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Event Description: Reduce Power

Time	Position	Applicant's Actions or Behavior
maintain shutdown margin, to maintain rods above the insertion limit, during an emergency shutdown (AOP-C.03), during recovery of a dropped/misaligned rod (AOP-C.01), or at Chemistry recommendation in mode 3, 4, 5 or 6.		
	RO	**RECORD** the quantity of boric acid required to achieve desired boron concentration using Appendix D. _____ gals
	– Crew	**PERFORM** Appendix I Independent Verification of Calculation for Amount of Boric Acid or Primary Water. (N/A if App. D was performed by SRO to verify data from Rx Engineering)
	RO	**DETERMINE** available boric acid volume in in-service BAT. _____ gals
	RO	**PLACE [HS-62-140A]**, Boric Acid to Blender Flow Control Switch to the **STOP** position.
	RO	**PLACE [HS-62-140B]**, CVCS Makeup Selector Switch to the **BORATE** position.
	RO	**ADJUST [FC-62-139]**, Boric Acid Flow Controller to the desired flow rate.

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Event Description: Reduce Power

Time	Position	Applicant's Actions or Behavior
	RO	**SET [FQ-62-139]**, Batch Integrator to the desired quantity.
	RO	**PLACE [HS-62-140A]**, Boric Acid to Blender Flow Control Switch to the **START** position.
	RO	**ENSURE** Boric Acid Pump aligned to blender in FAST speed by right red light **LIT** on **[HS-62-230A] OR [HS-62-232A]**.
NOTE Flow oscillations and/or erratic controller response may require manual operation of Boric Acid Flow Controller **[FC-62-139]** until stable conditions exist.		
	RO	**VERIFY** Boric Acid Flow established.
NOTE It may take approximately 15 minutes before any changes to reactivity are indicated on nuclear instrumentation or RCS temperature indication.		
	RO	**IF** reactor is critical, **THEN MONITOR** nuclear instrumentation

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Event Description: Reduce Power

Time	Position	Applicant's Actions or Behavior
		and reactor coolant temperature to ensure proper response from boration.
NOTE BAT operability limits are prescribed by TRM 3.1.2.6 (Modes 1-3) or 3.1.2.5 (Modes 4-6).		
	RO	**MONITOR** Boric Acid Storage Tank level.
	–	
	RO	**IF** Volume Control Tank level increases to 63 percent, **THEN ENSURE [LCV-62-118]**, Volume Control Tank Divert Valve **OPENS** to divert excess water to the Holdup Tank.
NOTE Sample may be obtained at normal RCS sample intervals provided the unit is at power and the unit response following the boration is as expected.		
	RO	**WHEN** boration is complete, **THEN** • **PLACE [HS-62-140A]**, Boric Acid to Blender Flow Control Switch to the **STOP** position. • **CHECK** no primary water flow on either **[FI-62-142A] OR [FQ-62-142]**. • **ENSURE [FC-62-142]**, Primary Water to Blender Flow • Controller is in **AUTO** position and the potentiometer (dial indicator) is set at 35%. • **ADJUST [FC-62-139]**, Boric Acid Flow Controller to the desired blend solution in accordance with TI-44 Boron Tables.

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Event Description: Reduce Power

Time	Position	Applicant's Actions or Behavior
		• **ENSURE [FCV-62-128]** is **CLOSED**. • **PLACE [HS-62-140B]**, CVCS Makeup Selector Switch to the **AUTO** position. • **PLACE [HS-62-140A]**, Boric Acid to Blender Flow Control Switch to the **START** position. • **IF** RCS boron sample required, **THEN NOTIFY** Chem Lab to obtain RCS boron sample.

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Event Description: Reduce Power

Time	Position	Applicant's Actions or Behavior
		NOTE Boration is done in batches until the total boron and/or power change is completed.
	RO	**REPEAT** this section as required to complete total boron change.
	RO	**WHEN** total boration is complete, **THEN:** • **REALIGN** the blender controls for **AUTO** makeup to the CVCS in accordance with Section 5.1. • **NOTIFY** Chem Lab to obtain RCS boron sample.
	US	**IF** in modes 1, 2, or 3, **THEN ENSURE** requirements of TRM 3.1.2.6 are met.
		NOTE Lowering load on the Main Generator will cause VARs to trend in the positive direction (toward outgoing). This will require lowering generator voltage. Refer to GOI-6 Section E for MVAR limits for generator stability.

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Event Description: Reduce Power

Time	Position	Applicant's Actions or Behavior
	BOP	**PERFORM** the following as required: IF Automatic Voltage Control is in service, **THEN** **ADJUST** Main Generator VARs **USING [HS-57-22]** Exciter Voltage Auto Adjuster as necessary during power escalation.

NOTES

1) Guidance on restoration of EHC Controls after a BOP runback is contained in Appendix B, *Turbine Runback Restoration*.

2) For core operating recommendations for situations such as end of core life coast down or unusual power maneuvers, contact Reactor Engineering for guidance.
3) It is recommended that AFD be controlled within the target band.

4) The following general approach should be used during power reduction:
(a) borate RCS to reduce RCS TAVG within limits of TREF, (b) reduce turbine load to match TREF with TAVG (c) periodically take rod control to MANUAL from AUTO and insert the bank to move AFD near the target value, (d) return rod control to AUTO when not using the bank to control AFD, and (e) repeat the above as necessary to accomplish the load change.

5) Actions effecting reactivity are directed in the following step. 0-SO-62-7 requirements shall be adhered to for reactivity changes (i.e. reactivity balance, amounts of boric acid or water). All appropriate verifications and peer checks shall be utilized during performance.

	BOP	**INITIATE** a load reduction.
	BOP	**MONITOR** turbine load decreasing.

CAUTION

Do NOT exceed a load change rate of plus or minus 5%/minute or a step change of 10%

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Event Description: Reduce Power

Time	Position	Applicant's Actions or Behavior
		NOTE TAVG is programmed from 578.2°F at 100% power to 547°F at zero power at a rate of 0.312°F per % power.
	Crew	**MONITOR** the following during the load reduction: TAVG following TREF program. All RPIs, group step counters for rod insertion limits and inoperable rods or rod misalignment, Loop ΔT, and NIS for correct power distribution and quadrant power tilts. Core AFD within ~5% control band around the power level dependent target value.
	–	
		NOTE Valve position limit and governor control meter are displayed on EHC Display panel 1,2-XX-047-2000 (M-2).
	BOP	Valve position limit approximately 10% above the current governor control indication as turbine load is changed.
Lead Examiner may direct initiation of the next event at his discretion		

Op Test No.: NRC Scenario # 1 Event # 2 Page 11 of 40

Event Description: Controlling PZR pressure channel PT 68-340 fails high

Time	Position	Applicant's Actions or Behavior
Booth Instructor: **When directed, initiate event 2**		
Indications available: **1-AR-M6-A, C5, PRESSURIZER HIGH PRESSURE** **1-AR-M5-A, B3, PRESSURIZER PRESS ABOVE REF SETPOINT**		
	RO	Recognizes, announces controlling pressure channel failure, and takes Prudent Operator Action (POA) to manually close the PZR Spray Valve.
	Crew	Refer to alarm response procedures
	US	Determine Instrument Failure has occurred and direct entry to AOP-I.04, Pressurizer Instrument Malfunction, section 2.1
NOTE 1: Appendixes H is a layout of PZR pressure control provided for operator reference. **NOTE 2:** A failure of channel III (P-68-323) will affect the automatic actuation of PCV 68-334, PZR PORV, in the normal pressure control circuit. LTOPS operation of this PORV is unaffected by this failure. **NOTE 3:** A failure of channel IV (P-68-322) will affect the automatic actuation of PCV 68-340A, PZR PORV, in the normal pressure control circuit. LTOPS operation of this PORV is unaffected by this failure.		

Op Test No.: NRC	Scenario # 1	Event # 2	Page 12 of 40
Event Description: Controlling PZR pressure channel PT 68-340 fails high			

Time	Position	Applicant's Actions or Behavior
Evaluator Note: Operator may take action to close the Pzr Spray Valve prior to entering the AOP		
	RO	**MONITOR** pressurizer pressure stable or trending to desired pressure. **NO** • **RESTORE** pressurizer pressure **USING** manual control of the following: • PIC-68-340A **OR** • PZR Spray controllers PIC-68-340D (Loop 1) **AND/OR** PIC-68-340B (Loop 2) **OR** • Pressurizer Heaters
	RO	**CHECK** PI-68-340A indicates NORMAL. **NO** **PERFORM** the following: • **ENSURE** LOOP TAVG ΔT REC/SEL selector switch XS-68-2B in LOOP 2, 3, or 4. • **ENSURE** PRESS CONTROL SELECTOR switch XS-68-340D in PT-68-334 & 323. • **ENSURE** PRESS REC CHANNEL SELECTOR XS-68-340B in PT-68-334, PT-68-323, or PT-68-322.
	US	**EVALUATE** the following Tech Specs for applicability: • **3.2.5.b. DNB Parameters action. If pressure drops below 2205 psig (2220 psia), 2-hours to restore to normal.** • **3.3.1.1 (3.3.1), Reactor Trip System Instrumentation (Action 6)** • **3.3.2.1 (3.3.2), Engineered Safety Feature Actuation System Instrumentation (Action 17)** • 3.3.3.5 Remote Shutdown Instrumentation
	RO	**WHEN** malfunction has been identified AND isolated OR corrected, **THEN CHECK** PZR PRESS and PZR SPRAY controllers in AUTO.

Op Test No.: NRC Scenario # 1 Event # 2 Page 13 of 40

Event Description: Controlling PZR pressure channel PT 68-340 fails high

Time	Position	Applicant's Actions or Behavior
	RO	**PERFORM** the following: • **ENSURE** Master Pzr Pressure Controller PIC–68–340A Output Percent Meter is less than 40%. • **ENSURE** PZR PRESS. controller, PZR SPRAY controller, and PZR HTRS in AUTO.
NOTE: If performing AOP in conjunction with AOP-I.11 for an Eagle LCP failure, then actions to hard trip bistables should be delayed until Eagle system reset is attempted. Actions to hard trip bistables must be completed within 6 hours UNLESS affected loop is restored to operable status by resetting Eagle rack.		
	US	**NOTIFY** IM to remove failed pressurizer pressure channel from service **USING** appropriate Appendix: • Appendix A
When Technical Specifications are identified or at discretion of the Lead Examiner, proceed to the next event		

Op Test No.: NRC Scenario # 1 Event # 3 Page 14 of 40

Event Description: MFP Master Speed Controller Failure

Time	Position	Applicant's Actions or Behavior
Booth Instructor: **When directed, initiate event 3**		
Indications available: **1-AR-M5-A, B7, STEAM GEN LVL HIGH-LOW DEVIATION** **All SG levels decreasing**		
	Crew	Refer to alarm response procedure
	–	
	US	Direct entry to AOP S.01, Loss of Normal Feedwater, Section 2.2
NOTE: Appendix C may be used to determine the program feedwater D/P for current power.		
	BOP	**MAINTAIN** feedwater pressure on program: **PLACE** affected MFP speed controller(s) in MANUAL: • PC-46-20, MFPT 1A(2A) 1B(2B) Speed Control. • SIC-46-20A, MFPT 1A(2A) Speed Controller • SIC-46-20B, MFPT 1B(2B) Speed Controller **CONTROL** speed on affected MFP(s) to restore feedwater pressure to program. (MFPC $\Delta p \approx 194$ psid @ 100%)

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Event Description: MFP Master Speed Controller Failure

Time	Position	Applicant's Actions or Behavior
		CAUTION: **Feed flow transients may impact core thermal power.**
	BOP	**MAINTAIN** steam generator level(s) on program. **STEAM GEN LVL HIGH-LOW DEVIATION annunciator clear.**
	US	**INITIATE** repairs on failed equipment.
	Crew	**GO TO** appropriate plant procedure.
		When SG levels are controlled with Master Speed Controller in manual or at Lead Examiner's discretion, proceed to the next event

Op Test No.: NRC	Scenario # 1	Event # 4	Page 16 of 40
Event Description: Loss of Condenser Vacuum			

Time	Position	Applicant's Actions or Behavior
Booth Instructor: **When directed, initiate Event 4**		
Indications available: **0-M-12A, C-2, 1-RA-90-119B COND VAC PMP LO RNG AIR EXH MON INSTR MALFUNC** **1-AR-M2-C, C6, CONDENSER VACUUM LOW** **Condenser Vacuum degrading, Air in leakage increasing.**		
Evaluator Note: Booth Operator is modulating Condenser Vacuum		
	Crew	Refer to alarm response procedure
	BOP	**VERIFY** alarm via **[1-P/TR-2-2]** recorder.
	BOP	**VERIFY** required number of CCW pumps are inservice.
	BOP	**CHECK** condenser vacuum exhaust on ICS using either: a. 1F2700A if 1-FCV-2-255 is closed b. 1F2263A if 1-FCV-2-255 is open.
	BOP	**IF** condenser vacuum exhaust flow > 45 CFM, **THEN ENSURE** 1-FCV-2-255 **OPEN.**

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Event Description: Loss of Condenser Vacuum

Time	Position	Applicant's Actions or Behavior
	US	**IF** alarm is valid, **THEN GO TO** AOP-S.02, *Loss of Condenser Vacuum.*
NOTE: Use of the highest reading operable condenser pressure instrument is conservative and recommended by engineering.		
	BOP	**MONITOR** condenser pressure for turbine trip criteria. • **CHECK** turbine load greater than or equal to 30%. MT Low Condenser Vacuum Trip @ 3.9 psia increasing
	BOP	**CHECK** condenser pressure less than or equal to 2.7 psia. **1-AR-M2-C, C-6, CONDENSER VACUUM LOW** @ 2.7 psia increasing.
	BOP	**ENSURE** condenser vacuum pumps RUNNING. Operator starts 1B Condenser Vacuum Pump
	BOP	**ENSURE** condenser vacuum breaker CLOSED.

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Event Description: Loss of Condenser Vacuum

Time	Position	Applicant's Actions or Behavior
	BOP	**CHECK** required CCW Pumps RUNNING [M-15].
		NOTE: ICS points F2700A and F2263A will alarm if Condenser Vacuum Exhaust Flow is > 45 cfm.
	BOP	**DETERMINE** volume of condenser inleakage **USING** the following plant computer points: • F2700A • F2263A • F2260A
	BOP	**VERIFY** inleakage value is < 45 cfm as indicated by both F2700A and F2263A. **NO** **PERFORM** the following: • **ENSURE** FCV-2-255, Condenser Vacuum Exhaust Bypass, is OPEN. • **IF** greater than 5% RTP, **THEN NOTIFY** Chem Lab to reevaluate Vent Flow Rate Monitor setpoint in accordance with 0-SI-CEM-030-415.0.

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Event Description: Loss of Condenser Vacuum

Time	Position	Applicant's Actions or Behavior
	Crew	**DISPATCH** an operator to PERFORM the following: • **CHECK** loop seal on vacuum breaker [Turbine Bldg, 706' elev]. • **CHECK** the following components: • Main Turbine rupture discs intact • Condenser shell intact • Main Feedwater Pump rupture discs intact • Main Turbine exhaust hoods • **VERIFY** Main Steam Dump Drain Tank level control operating properly.
	RO	**ENSURE** control rods controlling in AUTO.
	BOP	**CHECK** condenser pressure STABLE or DROPPING. (NO) **REDUCE** turbine load to maintain condenser vacuum **USING** one of the following: • AOP-C.03, Rapid Shutdown or Load Reduction. (preferred) **OR** • Valve Position Limiter.
On Lead Examiner's cue, proceed to the next event		

Op Test No.: NRC	Scenario # 1	Event # 5	Page 20 of 40
Event Description: Dropped Rod			

Time	Position	Applicant's Actions or Behavior
Booth Instructor: **When directed, initiate Event 5**		
Indications available: **1-AR-M4-B, D4, COMPUTER ALARM ROD DEV & SEQ PWR RANGE TILTS** **1-AR-M4-B, D7, FULL LENGTH RODS AT BOTTOM** **1-AR-M4-B, E3, NIS POWER RANGE CHANNEL DEVIATION** **1-AR-M4-B, B3, NIS POWER RANGE UPPER DETECTOR HI FLUX DEVN OR AUTO DEFEAT (Later)** **1-AR-M4-B-C3, NIS POWER RANGE LOWER DETECTOR HI FLUX DEVN OR AUTO DEFEAT (Later)** **1 Rod Bottom Light illuminated on M-4 IRPI Display**		
	Crew	Acknowledge alarms
	US	Direct entry to AOP-C.01, Rod Control System Malfunctions, section 2.2
Evaluator Note:		Control rods may have been placed in manual prior to entering AOP.
	RO	**PLACE** rod control in MANUAL.
	RO	**VERIFY** ONLY ONE rod dropped.

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Event Description: Dropped Rod

Time	Position	Applicant's Actions or Behavior
		NOTE: If a dropped rod occurs at low power level, retrieval of the dropped rod is NOT the conservative action to take and could violate Tech Specs (if Mode 2 has been entered).
	RO	**MONITOR** reactor power greater than 5%.
	BOP	**REDUCE** load to control T-avg: • **MONITOR** T-avg greater than 541°F. (LCO 3.1.1.4) • **CHECK** main turbine loaded. o **REDUCE** turbine load to establish T-avg within 3°F of T-ref. **(not required)**
	RO	**MONITOR** Quadrant Power Tilt Ratio (QPTR) less than 1.09 **USING** one of the following: • ICS **OR** • 0-SI-NUC-000-133.0, Quadrant Power Tilt Ratio.
	US	**NOTIFY** MSS to initiate maintenance for affected rod.

Op Test No.: NRC	Scenario # 1	Event # 5	Page 22 of 40
Event Description: Dropped Rod			

Time	Position	Applicant's Actions or Behavior
		NOTE : Core thermal power must be reduced to less than 75% within one hour and shutdown margin must be verified within one hour UNLESS dropped rod can be restored in one hour. (MOVABLE CONTROL ASSEMBLIES – Group Height, LCO 3.1.3.1 action c)
	Crew	**PERFORM** the following to comply with LCO 3.1.3.1: **SRO determines and enters LCO 3.1.3.1 action C. (Movable Control Assemblies – Group Height)** **INITIATE** power reduction to less than 75% **USING** one of the following: • AOP-C.03, Rapid Shutdown or Load Reduction **OR** • 0-GO-5, Normal Power Operation. • **VERIFY** adequate Shutdown Margin within 1 hour and once every 12 hours **USING** SI-NUC-000-038.0.
	RO	**MONITOR** QPTR less than 1.02 **USING** one of the following: • ICS OR • 0-SI-NUC-000-133.0, Quadrant Power Tilt Ratio. **IF** QPTR exceeds 1.02 **AND** core thermal power is greater than 50%, **THEN PERFORM** the following: • **PERFORM** 0-SI-NUC-000-133.0 at least once per hour to comply with Tech Spec LCO 3.2.4. • **ENSURE** core thermal power reduced as required by LCO 3.2.4. • **COMPLY** with all other applicable actions of LCO 3.2.4.
		NOTE

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Event Description: Dropped Rod

Time	Position	Applicant's Actions or Behavior
Power range high flux trip setpoint must be reduced to less than or equal to 85% within four hours UNLESS dropped rod is restored. (LCO 3.1.3.1 action c). LCO 3.2.4, Quadrant Power Tilt Ratio may require more limiting setpoint if QPTR exceeds 1.02.		
	US	**NOTIFY** MIG to prepare to reduce high neutron flux trip setpoint to less than or equal to applicable value from LCO 3.1.3.1 action C.3 or 3.2.4 action A.1.a **USING** 0-SI-IXX-092-N40.0.
	US	**NOTIFY** Reactor Engineer and **COMPLETE** notifications **USING** SPP-3.5, Regulatory Reporting Requirements.
	US	**CHECK** the following: • repairs COMPLETE • ROD CONTROL URGENT FAILURE alarm NOT LIT. [M-4B, window A-6]
CAUTION: **Prior to retrieving a dropped rod at power, SRO and Reactor Engineer will determine length of time the affected rod has been dropped/misaligned. Any attempt to realign the rod should be coordinated with Reactor Engineer's recommendations to prevent localized power peaking, possible fuel failure, and to minimize xenon oscillations.**		
	RO	**CHECK** NC-41U/NC-41K NIS POWER RANGE HIGH NEUTRON FLUX RATE alarm DARK [M-6A, B1]

Op Test No.: NRC Scenario # 1 Event # 5 Page 24 of 40

Event Description: Dropped Rod

Time	Position	Applicant's Actions or Behavior
		• **RESET** affected neutron flux rate module [M-13].
When technical specifications have been identified or at discretion of the Lead Examiner, proceed to the next event		

Op Test No.: NRC Scenario # 1 Event # 6, 7, 8 Page 25 of 40

Event Description: Dropped Rod, ATWS, Stuck open SG Safety Valve

Time	Position	Applicant's Actions or Behavior
		Booth Instructor:
		When directed, initiate event 6
		Indications available:
		Second dropped rod.
		No reactor trip indication.
		EVALUATOR NOTE: S/G #1 main steam safety valve fails open on Turbine trip.
	-Crew	Recognize a second rod has dropped and determine reactor trip required
	US	Direct reactor trip and turbine trip
	RO	Attempt to trip reactor
	BOP	Verify turbine trip
	US	Direct entry to FR-S.1, Nuclear Power Generation/ATWS
		NOTE Steps 1 and 2 are immediate action steps.

Op Test No.: NRC Scenario # 1 Event # 6, 7, 8 Page 26 of 40

Event Description: Dropped Rod, ATWS, Stuck open SG Safety Valve

Time	Position	Applicant's Actions or Behavior
CRITICAL TASK	RO	**VERIFY** reactor TRIPPED: • Reactor trip breakers OPEN • Reactor trip bypass breakers OPEN or DISCONNECTED • Neutron flux DROPPING • Rod bottom lights LIT • Rod position indicators less than or equal to 12 steps. **TRIP** reactor. **IF** reactor trip breakers will NOT open, **THEN** **MAINTAIN** auto or manual rod insertion at max achievable rate UNTIL rods are at bottom. Insert negative reactivity within 35 seconds of second dropped rod.
	BOP	**VERIFY** turbine TRIPPED: • ALL turbine stop valves CLOSED
	BOP	**CHECK** AFW System operation: MD AFW pumps RUNNING (NO) • **START** pumps. TD AFW pump RUNNING as necessary. MD AFW LCVs in AUTO. • **PLACE** AFW LCVs in AUTO or **OPEN** in MANUAL as necessary. TD AFW LCVs OPEN. • MD AFW pump recirculation valves FCV-3-400 and FCV-3-401 CLOSED.

Op Test No.: NRC Scenario # 1 Event # 6, 7, 8 Page 27 of 40

Event Description: Dropped Rod, ATWS, Stuck open SG Safety Valve

Time	Position	Applicant's Actions or Behavior
CRITICAL TASK	BOP	**EMERGENCY BORATE** RCS by performing the following: **ENSURE** at least one CCP RUNNING. **INITIATE** Emergency Boration **USING** EA-68-4. • **PLACE** boric acid transfer pumps in fast speed. • **ADJUST** emergency borate valve **[FCV-62-138]** to obtain boric acid flow between 35 gpm and 150 gpm on **[FI-62-137A]**. o **MONITOR** emergency boration flow: • **CHECK** emergency boration flow established on **[FI-62-137A]**. o **IF** boric acid flow less than 35 gpm, **THEN** • **CLOSE** recirculation valve for the BAT aligned to the blender: o 1-FCV-62-237 for BAT A. o 0-FCV-62-241 for BAT C. o 2-FCV-62-237 for BAT B. • **VERIFY** charging flow path established: o FCV-62-90 OPEN o FCV-62-91 OPEN o FCV-62-86 or FCV-62-85 OPEN. • **CHECK** pressurizer pressure less than 2335 psig.
	Crew	**VERIFY** Containment Purge isolated: **VERIFY** containment purge and vent dampers (System 30) CLOSED. [Panel 6K and 6L]

Op Test No.: NRC Scenario # 1 Event # 6, 7, 8 Page 28 of 40

Event Description: Dropped Rod, ATWS, Stuck open SG Safety Valve

Time	Position	Applicant's Actions or Behavior
	Crew	**MONITOR** SI NOT actuated: S.I. ACTUATED permissive DARK [M-4A, D4].
Evaluator Note: Crew may elect to manually initiate Safety Injection, Main Steam Line Isolation and/or isolate AFW prior to procedural direction (POAs/Fold out page) if conditions dictate based on excessive cooldown.		
	Crew	Reactor TRIPPED.
	US	**PERFORM** the following: • **DISPATCH** personnel to locally open reactor trip breakers and MG set output breakers [MG Set Room, Aux Bldg el. 759]. • **DISPATCH** personnel to locally open breakers to MG sets [480V Unit Boards A and B].
	BOP	Turbine TRIPPED: • ALL turbine stop valves CLOSED.
	RO	**MONITOR** reactor subcritical: • Power range channels less than 5%. • Intermediate range SUR NEGATIVE.

Op Test No.: NRC Scenario # 1 Event # 6, 7, 8 Page 29 of 40

Event Description: Dropped Rod, ATWS, Stuck open SG Safety Valve

Time	Position	Applicant's Actions or Behavior
	US	**GO TO** Step 19.
	US	**ENSURE** status tree monitoring initiated.
	RO	**MONITOR** boration termination criteria: • **NOTIFY** Chem Lab to sample RCS boron concentration. • **CHECK** for all of the following: o all control rods FULLY INSERTED o RCS temperature greater than 540°F o no RCS dilution has occurred.
	RO/US	**WHEN** emergency boration is no longer needed, **THEN STOP** emergency boration **USING** EA-68-4, Emergency Boration. **RETURN TO** procedure and step in effect.
	US	Directs transition to E-0, Reactor Trip or Safety Injection

Op Test No.: NRC Scenario # 1 Event # 6, 7, 8 Page 30 of 40

Event Description: Dropped Rod, ATWS, Stuck open SG Safety Valve

Time	Position	Applicant's Actions or Behavior
	RO	VERIFY reactor TRIPPED: • Reactor trip breakers OPEN • Reactor trip bypass breakers DISCONNECTED or OPEN • Neutron flux DROPPING • Rod bottom lights LIT • Rod position indicators less than or equal to 12 steps.
	BOP	VERIFY turbine TRIPPED: • Turbine stop valves CLOSED.
	BOP	VERIFY at least one train of shutdown boards ENERGIZED.
	RO	DETERMINE if SI actuated: • ECCS pumps RUNNING. • Any SI alarm LIT [M-4D] **May manually actuate SI.**
Evaluator Note: BOP may isolate TDAFW flow to #1 SG, or all SGs based on POAs-overfill or excessive cooldown.		
	BOP	PERFORM ES-0.5, Equipment Verifications WHILE continuing in this procedure. **(At end of scenario)**
	RO	DETERMINE if secondary heat sink available:

Op Test No.: NRC Scenario # 1 Event # 6, 7, 8 Page 31 of 40

Event Description: Dropped Rod, ATWS, Stuck open SG Safety Valve

Time	Position	Applicant's Actions or Behavior
		a. CHECK total AFW flow greater than 440 gpm. b. CHECK narrow range level greater than 10% [25 ADV] in at least one S/G. c. CONTROL feed flow to maintain narrow range level between 10% [25% ADV] and 50% in all S/Gs.
	RO	CHECK if main steam lines should be isolated: a. CHECK if any of the following conditions have occurred: • Any S/G pressure less than 600 psig AND STEAMLINE PRESS ISOL SI BLOCK RATE ISOL ENABLE permissive DARK [M-4A, A4] OR • Any S/G pressure dropping UNCONTROLLED. OR • Phase B actuation b. ENSURE MSIVs and MSIV bypass valves CLOSED. **May have already closed MSIVs.**
		NOTE: Loss of seal injection flow could adversely affect RCP seals.

Op Test No.: NRC Scenario # 1 Event # 6, 7, 8 Page 32 of 40

Event Description: Dropped Rod, ATWS, Stuck open SG Safety Valve

Time	Position	Applicant's Actions or Behavior
	RO	CHECK RCP trip criteria: a. CHECK the following: • RCS pressure less than 1250 psig. (NO) AND • At least one CCP OR SI pump RUNNING
	_ RO	MONITOR RCS temperatures: • IF any RCP running, THEN CHECK T-avg stable at or trending between 547 degrees F and 552 degrees F. OR • IF RCP's stopped, THEN CHECK T-cold stable or trending to between 547 degrees F and 552 degrees F.
	RO	CHECK pressurizer PORV's, safeties, and spray valves: a. Pressurizer PORV's CLOSED. b. Pressurizer safety valves CLOSED. c. Normal spray valves CLOSED. d. Power to at least one block valve AVAILABLE. e. At least one block valve OPEN.

Op Test No.: NRC Scenario # 1 Event # 6, 7, 8 Page 33 of 40

Event Description: Dropped Rod, ATWS, Stuck open SG Safety Valve

Time	Position	Applicant's Actions or Behavior
	RO	CHECK S/G secondary pressure boundaries INTACT: • All S/G pressures CONTROLLED or RISING **(NO)** • All S/G pressures greater than 140 psig.
	US	Direct entry to E-2, Faulted SG Isolation
Caution Unisolating the Faulted S/G increases the potential for personnel injury, equipment damage, and an uncontrolled RCS cooldown. This option is NOT be considered UNLESS needed for RCS cooldown.		
	RO/BOP	**CHECK** MSIVs and MSIV bypass valves CLOSED.
	RO/BOP	**CHECK** ANY S/G secondary pressure boundary INTACT: • Any S/G pressure controlled or rising.

Op Test No.: NRC Scenario # 1 Event # 6, 7, 8 Page 34 of 40

Event Description: Dropped Rod, ATWS, Stuck open SG Safety Valve

Time	Position	Applicant's Actions or Behavior
	RO/BOP	**IDENTIFY** Faulted S/G(s): **CHECK** S/G pressures: • Any S/G pressure DROPPING in an uncontrolled manner. **OR** • Any S/G pressure less than 140 psig.
Caution Secondary heat sink requires at least one S/G available. **Caution** Isolating both steam supplies to the TD AFW pump when it is the only source of feed flow will result in loss of secondary heat sink.		
Evaluator Note: AFW may have previously been isolated per E-0 fold-out page		
CRITICAL TASK	RO/BOP	**ISOLATE** Faulted S/G(s): • **ISOLATE** MFW. • **ISOLATE** AFW. • **CLOSE** TD AFW pump steam supply from faulted S/G o FCV-1-15 (S/G 1) or FCV-1-16 (S/G 4). • **VERIFY** S/G blowdown valves CLOSED. • **VERIFY** atmospheric relief CLOSED.
	RO/BOP	**CHECK** CST level greater than 5%.
Note: Chem Lab samples may require resetting Phase A and opening blowdown isolation		

Op Test No.: NRC Scenario # 1 Event # 6, 7, 8 Page 35 of 40

Event Description: Dropped Rod, ATWS, Stuck open SG Safety Valve

Time	Position	Applicant's Actions or Behavior
valves as necessary.		
	Crew	**VERIFY** secondary radiation NORMAL: **NOTIFY** Chem Lab to take S/G activity samples. **NOTIFY** RADCON to survey main steamlines and S/G blowdown. **CHECK** following rad monitors, including available trends prior to isolation: • Main steamline NORMAL • Condenser exhaust NORMAL • S/G blowdown recorder RR-90-120 NORMAL • Post-Accident Area Radiation Monitor recorder RR-90-268B, points 3 (blue), 4 (violet), 5 (black) and 6 (brown) NORMAL. [M-31 (back of M-30)]

Op Test No.: NRC Scenario # 1 Event # 6, 7, 8 Page 36 of 40

Event Description: Dropped Rod, ATWS, Stuck open SG Safety Valve

Time	Position	Applicant's Actions or Behavior
	Crew	**CHECK** SI termination criteria: RCS subcooling based on core exit T/Cs greater than 40°F. Secondary heat sink: • Narrow range level in at least one Intact S/G greater than 10% [25% ADV] **OR** • Total feed flow to Intact S/Gs greater than 440 gpm. Secondary heat sink: • Narrow range level in at least one Intact S/G greater than 10% [25% ADV] **OR** • Total feed flow to Intact S/Gs greater than 440 gpm. RCS pressure stable or rising. Pressurizer level greater than 10% [20% ADV]. **GO TO** ES-1.1, SI Termination.

Scenario may be terminated when crew transitions to ES-1.1, SI Termination

Time	Position	Applicant's Actions or Behavior
		ES-0.5 Actions
	BOP	**CHECK** ERCW system operation: • **VERIFY** at least four ERCW pumps RUNNING. • **VERIFY** D/G ERCW supply valves OPEN.
	BOP	**VERIFY** CCS pumps RUNNING: • Pump 1A-A (2A-A) • Pump 1B-B (2B-B) • Pump C-S.
	BOP	**VERIFY** EGTS fans RUNNING.
	BOP	**VERIFY** generator breakers OPEN.
	BOP	**VERIFY** AFW pumps RUNNING: • MD AFW pumps • TD AFW pump.

Time	Position	Applicant's Actions or Behavior
		NOTE AFW level control valves should NOT be repositioned if manual action has been taken to control S/G levels, to establish flow due to failure, or to isolate a faulted S/G.
	BOP	**CHECK** AFW valve alignment: a. **VERIFY** MD AFW LCVs in AUTO. b. **VERIFY** TD AFW LCVs OPEN. c. **VERIFY** MD AFW pump recirculation valves FCV-3-400 and FCV-3-401 CLOSED.
	–	
	BOP	**VERIFY** MFW Isolation: • MFW pumps TRIPPED • MFW regulating valves CLOSED • MFW regulating bypass valve controller outputs ZERO • MFW isolation valves CLOSED • MFW flow ZERO.
	BOP	**MONITOR** ECCS operation: **VERIFY** ECCS pumps RUNNING: • CCPs • RHR pumps • SI pumps

Time	Position	Applicant's Actions or Behavior
	BOP	**VERIFY** CCP flow through CCPIT. • **CHECK** RCS pressure less than 1500 psig. • **VERIFY** SI pump flow. • **CHECK** RCS pressure less than 300 psig. • **VERIFY** RHR pump flow.
	BOP	**VERIFY** ESF systems ALIGNED: • Phase A ACTUATED: o CONTAINMENT ISOLATION PHASE A TRAIN A alarm LIT [M-6C, B5]. o CONTAINMENT ISOLATION PHASE A TRAIN B alarm LIT [M-6C, B6]. • Containment Ventilation Isolation ACTUATED: o CONTAINMENT VENTILATION ISOLATION TRAIN A alarm LIT [M-6C, C5]. o CONTAINMENT VENTILATION ISOLATION TRAIN B alarm LIT [M-6C, C6]. • Status monitor panels: o 6C DARK o 6D DARK o 6E LIT OUTSIDE outlined area o 6H DARK o 6J LIT. • Train A status panel 6K: o CNTMT VENT GREEN o PHASE A GREEN • Train B status panel 6L: o CNTMT VENT GREEN o PHASE A GREEN

Time	Position	Applicant's Actions or Behavior
	BOP	**MONITOR** containment spray NOT required: • Phase B NOT ACTUATED **AND** • Containment pressure less than 2.81 psig • Ensure Containment Spray is actuated
	BOP	**VERIFY** pocket sump pumps STOPPED: [M-15, upper left corner] • HS-77-410, Rx Bldg Aux Floor and Equipment Drain Sump pump A • HS-77-411, Rx Bldg Aux Floor and Equipment Drain Sump pump B.
	BOP	**DISPATCH** personnel to perform EA-0-1, Equipment Checks Following ESF Actuation.

Operations Chemistry Information

Boron Results					
Sample Point	**Units**	**Boron**	**Date / Time**	**Goal**	**Limit**
U1 RCS	ppm	1093	Today / Now	Variable	Variable
U2 RCS	ppm	816	Today / Now	Variable	Variable
U1 RWST	ppm	2601	Today / Now	2550 - 2650	2500 - 2700
U2 RWST	ppm	2569	Today / Now	2550 - 2650	2500 - 2700
BAT A	ppm	6850	Today / Now	Variable	Variable
BAT B	ppm	6850	Today / Now	Variable	Variable
BAT C	ppm	6850	Today / Now	Variable	Variable
U1 CLA #1	ppm	2556	Today / Now	2470-2630	2400-2700
U1 CLA #2	ppm	2575	Today / Now	2470-2630	2400-2700
U1 CLA #3	ppm	2591	Today / Now	2470-2630	2400-2700
U1 CLA #4	ppm	2589	Today / Now	2470-2630	2400-2700
U2 CLA #1	ppm	2531	Today / Now	2470-2630	2400-2700
U2 CLA #2	ppm	2650	Today / Now	2470-2630	2400-2700
U2 CLA #3	ppm	2522	Today / Now	2470-2630	2400-2700
U2 CLA #4	ppm	2526	Today / Now	2470-2630	2400-2700
Spent Fuel Pool	ppm	2547	Today / Now	$\geq$ 2050	$\geq$ 2000
Lithium Results				**Goal**	**Midpoint**
U1 RCS	ppm	1.1	Today / Now	>1	>1
U2 RCS	ppm	2.43	Today / Now	2.18-2.48	2.33

Primary to Secondary Leakrate Information (Total CPM RM-90-99/119)					
Indicator	**Units**	**U1**	**Date / Time**	**U2**	**Date/Time**
SI 50 S/G Leakage?	Yes/No	No	Today / Now	No	Today / Now
SI 137.5 CVE Leakrate	gpd	< 0.1	Today / Now	< 0.1	Today / Now
5 gpd leak equivalent	cpm	380	Today / Now	68	Today / Now
30 gpd leak equivalent	cpm	1980	Today / Now	83	Today / Now
50 gpd leak equivalent	cpm	3250	Today / Now	206	Today / Now
75 gpd leak equivalent	cpm	4850	Today / Now	455	Today / Now
150 gpd leak equivalent	cpm	9750	Today / Now	870	Today / Now
CVE Air Inleakage	cfm	10	Today / Now	12.5	Today / Now
Bkgd on 99/119	cfm	50	Today / Now	40	Today / Now

APPENDIX C

SHIFT TURNOVER CHECKLIST Page 1 of 3 Today

☐ SM			
☐ US/MCR	Unit	1	
☐ UO	Unit	1	Off-going – Name
☐ AUO	Station	SQN	
☐ STA (STA Function)	AUO Comp Actions		On-coming – Name

Part 1 - Completed by Off-going Shift/Reviewed by On-coming Shift:

Abnormal Equipment Lineup/Conditions:

MAIN CONTROL ROOM(7690) (593-5409)

Train B Week

- ***1-PCV-68-340D Valve Controller setpoint drift; (WO 06-080000-000). Pink tag on 1-M-4.***

TURBINE BUILDING (7771) (593-5416)

- ***1-RM-90-120&121 SG BD Rad Monitor OOS; Investigate the pump/instrument failure (WO 06-080880-000). Pink tag on 1-M-12.***

OUTSIDE (7666) (593-5399)

- ***All equipment normal***

AUXILIARY BUILDING (7775) (593-5414)

- ***CCP 1B-B Out of Service: Tagged for maintenance to repair leak on pump discharge. (WO 06-080025-000) (Out for previous 16 hours). ETR 12 hours.***

RCS Leakage (SI-137.0)

Total 0.03 gpm / Identified 0.02gpm / Unidentified 0.01 gpm. (Today 0600)

SI/Test in Progress/Planned: (Including Need for New Brief)

- ***SI-401 release package (w/ Chem Supvr) for SGBD releases to the river.***

Major Activities/Procedures in Progress/Planned:

- ***Reduce to <93% turbine power for Turbine Valve Testing. Initiate boration per Rx Engineering Spreadsheet. Spreadsheet has been verified by the STA.***

Radiological Changes in Plant During Shift:

None

LCO/ODCM/TRM ACTIONS

- ***TS 3.5.2.a, TRM 3.1.2.2. for 1B-B CCP OOS.***
- ***ODCM 1.1.1 action 31 for 1-RM-90-120/121 OOS***

Part 2 - Performed by on-coming shift

- ☐ Review of Operating Log Since Last Shift Held or 3 Days, Whichever is Less (N/A for AUO's)
- ☐ Review of Rounds Sheets/Abnormal Readings (AUO's only)

Review the Following Programs for Changes Since Last Shift Turnover:

- ☐ Standing Orders
- ☐ LCO(s) in Actions (N/A for AUOs)
- ☐ Immediate Required Reading
- ☐ TACF (N/A for AUO's)

Part 3 - Performed by both off-going and on-coming shift

- ☐ Walkdown of MCR Control Boards (N/A for AUO's)

Relief Time: Relief Date: today

Disabled Annunciators

PANEL	WINDOW	ANNUNCIATOR	WO / PER Number

Equipment Off-Normal (Pink Tags)

UNID And Noun Name	Panel	Problem Description	WO / PER Number

MCR WO List

ID And Noun Name	Panel	Problem Description	WO/PER Number

UNIT ONE REACTIVITY BRIEF

Date: Today Time: Now

General Information

RCS Boron: **1093** ppm Today	BA Controller Setpoint: **27%** *		RCS B-10 Depletion: **2** ppm
Operable BAT: **A**	BAT A Boron: **6850** ppm	BAT C Boron: **6850** ppm	RWST Boron: **2601** ppm
Nominal Gallons per rod step from 219: **7** gallons of acid, **36** gallons of water			

* Verify boric acid flow controller is set at Adjusted BA Controller Setting iaw 0-SO-62-7 section 5.1

Estimated values for a 1° Change in Tave **

Gallons of acid: **26**	Gallons of water: **138**	Rod Steps: **4**

Estimated rods/boron for emergency step power reduction **

(Assuming Xenon equilibrium and no reactivity effects due to Xenon. 2/3 total reactivity from rods, 1/3 from boron)

Power reduction amount	Estimated Final Rod Position	Estimated boron addition
10%	**198** Steps on bank D	**101** gallons
30%	**174** Steps on bank D	**295** gallons
50% –	**152** Steps on bank D	**485** gallons

** These values are approximations and not intended nor expected to be exact. The values may be superceded by Rx Engineering or SO-62-7 calculated values. These values are calculated assuming 100% steady state power operation only. Engineering data last updated **one week ago**. Data Valid until **one week from now**.

Previous Shift Reactivity Manipulations

Number of dilutions: 0***	Number of borations: 0	Rod steps in: 0
Gallons per dilution: 0	Gallons per boration: 0	Rod steps out: 0
Total amount diluted: 0	Total amount borated: 0	Net change: 0 IN/Out

Current Shift Estimated Reactivity Manipulations

Number of dilutions: 0	Number of borations: 0	Rod steps in: 0
Gallons per dilution: 0	Gallons per boration: 0	Rod steps out: 0
Total expected dilution: 0	Total expected boration: 0	Net change: 0 In/Out

Remarks:

Rx Power – 100% MWD/MTU – 1000 Xenon & Samarium at Equilibrium

***The boron letdown curve is flat for the next 25 EFPD.

Next Unit 1 Flux Map is scheduled - <u>three weeks from now</u>

Unit Supervisor: _____

Name/Date

Operations Chemistry Information

Boron Results					
Sample Point	**Units**	**Boron**	**Date / Time**	**Goal**	**Limit**
U1 RCS	ppm	1093	Today / Now	Variable	Variable
U2 RCS	ppm	816	Today / Now	Variable	Variable
U1 RWST	ppm	2601	Today / Now	2550 - 2650	2500 - 2700
U2 RWST	ppm	2569	Today / Now	2550 - 2650	2500 - 2700
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U1 CLA #2	ppm	2575	Today / Now	2470-2630	2400-2700
U1 CLA #3	ppm	2591	Today / Now	2470-2630	2400-2700
U1 CLA #4	ppm	2589	Today / Now	2470-2630	2400-2700
U2 CLA #1	ppm	2531	Today / Now	2470-2630	2400-2700
U2 CLA #2	ppm	2650	Today / Now	2470-2630	2400-2700
U2 CLA #3	ppm	2522	Today / Now	2470-2630	2400-2700
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Lithium Results				**Goal**	**Midpoint**
U1 RCS	ppm	1.1	Today / Now	>1	>1
U2 RCS	ppm	2.43	Today / Now	2.18-2.48	2.33

Primary to Secondary Leakrate Information (Total CPM RM-90-99/119)					
Indicator	**Units**	**U1**	**Date / Time**	**U2**	**Date/Time**
SI 50 S/G Leakage?	Yes/No	No	Today / Now	No	Today / Now
SI 137.5 CVE Leakrate	gpd	< 0.1	Today / Now	< 0.1	Today / Now
5 gpd leak equivalent	cpm	380	Today / Now	68	Today / Now
30 gpd leak equivalent	cpm	1980	Today / Now	83	Today / Now
50 gpd leak equivalent	cpm	3250	Today / Now	206	Today / Now
75 gpd leak equivalent	cpm	4850	Today / Now	455	Today / Now
150 gpd leak equivalent	cpm	9750	Today / Now	870	Today / Now
CVE Air Inleakage	cfm	10	Today / Now	12.5	Today / Now
Bkgd on 99/119	cfm	50	Today / Now	40	Today / Now

APPENDIX C

SHIFT TURNOVER CHECKLIST Page 1 of 3 Today

☐ SM			
☐ US/MCR	Unit	1	
☐ UO	Unit	1	Off-going – Name
☐ AUO	Station	SQN	
☐ STA (STA Function)	AUO Comp Actions		On-coming – Name

Part 1 - Completed by Off-going Shift/Reviewed by On-coming Shift:

Abnormal Equipment Lineup/Conditions:

MAIN CONTROL ROOM(7690) (593-5409)

Train B Week

- ***1-PCV-68-340D Valve Controller setpoint drift; (WO 06-080000-000). Pink tag on 1-M-4.***

TURBINE BUILDING (7771) (593-5416)

- ***1-RM-90-120&121 SG BD Rad Monitor OOS; Investigate the pump/instrument failure (WO 06-080880-000). Pink tag on 1-M-12.***

OUTSIDE (7666) (593-5399)

- ***All equipment normal***

AUXILIARY BUILDING (7775) (593-5414)

- ***CCP 1B-B Out of Service: Tagged for maintenance to repair leak on pump discharge. (WO 06-080025-000) (Out for previous 16 hours). ETR 12 hours.***

RCS Leakage (SI-137.0)

Total 0.03 gpm / Identified 0.02gpm / Unidentified 0.01 gpm. (Today 0600)

SI/Test in Progress/Planned: (Including Need for New Brief)

- ***SI-401 release package (w/ Chem Supvr) for SGBD releases to the river.***

Major Activities/Procedures in Progress/Planned:

- ***Reduce to <93% turbine power for Turbine Valve Testing. Initiate boration per Rx Engineering Spreadsheet. Spreadsheet has been verified by the STA.***

Radiological Changes in Plant During Shift:

None

LCO/ODCM/TRM ACTIONS

- ***TS 3.5.2.a, TRM 3.1.2.2. for 1B-B CCP OOS.***
- ***ODCM 1.1.1 action 31 for 1-RM-90-120/121 OOS***

Part 2 - Performed by on-coming shift

☐ Review of Operating Log Since Last Shift Held or 3 Days, Whichever is Less (N/A for AUO's)

☐ Review of Rounds Sheets/Abnormal Readings (AUO's only)

Review the Following Programs for Changes Since Last Shift Turnover:

☐ Standing Orders ☐ LCO(s) in Actions (N/A for AUOs)

☐ Immediate Required Reading ☐ TACF (N/A for AUO's)

Part 3 - Performed by both off-going and on-coming shift

☐ Walkdown of MCR Control Boards (N/A for AUO's)

Relief Time: Relief Date: today

Disabled Annunciators

PANEL	WINDOW	ANNUNCIATOR	WO / PER Number

Equipment Off-Normal (Pink Tags)

UNID And Noun Name	Panel	Problem Description	WO / PER Number

MCR WO List

ID And Noun Name	Panel	Problem Description	WO/PER Number

UNIT ONE REACTIVITY BRIEF

Date: Today Time: Now

General Information

RCS Boron: **1093** ppm Today		BA Controller Setpoint: **27%** *	RCS B-10 Depletion: **2** ppm
Operable BAT: **A**	BAT A Boron: **6850** ppm	BAT C Boron: **6850** ppm	RWST Boron: **2601** ppm
Nominal Gallons per rod step from 219: **7** gallons of acid, **36** gallons of water			

* Verify boric acid flow controller is set at Adjusted BA Controller Setting iaw 0-SO-62-7 section 5.1

Estimated values for a 1° Change in Tave **

Gallons of acid: **26**	Gallons of water: **138**	Rod Steps: **4**

Estimated rods/boron for emergency step power reduction **

(Assuming Xenon equilibrium and no reactivity effects due to Xenon. 2/3 total reactivity from rods, 1/3 from boron)

Power reduction amount	Estimated Final Rod Position	Estimated boron addition
10%	**198** Steps on bank D	**101** gallons
30%	**174** Steps on bank D	**295** gallons
50%	**152** Steps on bank D	**485** gallons

** These values are approximations and not intended nor expected to be exact. The values may be superceded by Rx Engineering or SO-62-7 calculated values. These values are calculated assuming 100% steady state power operation only. Engineering data last updated **one week ago**. Data Valid until **one week from now.**

Previous Shift Reactivity Manipulations

Number of dilutions: 0***	Number of borations: 0	Rod steps in: 0
Gallons per dilution: 0	Gallons per boration: 0	Rod steps out: 0
Total amount diluted: 0	Total amount borated: 0	Net change: 0 IN/Out

Current Shift Estimated Reactivity Manipulations

Number of dilutions: 0	Number of borations: 0	Rod steps in: 0
Gallons per dilution: 0	Gallons per boration: 0	Rod steps out: 0
Total expected dilution: 0	Total expected boration: 0	Net change: 0 In/Out

Remarks:

Rx Power – 100% MWD/MTU – 1000 Xenon & Samarium at Equilibrium

***The boron letdown curve is flat for the next 25 EFPD.

Next Unit 1 Flux Map is scheduled - three weeks from now

Unit Supervisor: _____

Name/Date

Operations Chemistry Information

Boron Results					
Sample Point	**Units**	**Boron**	**Date / Time**	**Goal**	**Limit**
U1 RCS	ppm	1093	Today / Now	Variable	Variable
U2 RCS	ppm	816	Today / Now	Variable	Variable
U1 RWST	ppm	2601	Today / Now	2550 - 2650	2500 - 2700
U2 RWST	ppm	2569	Today / Now	2550 - 2650	2500 - 2700
BAT A	ppm	6850	Today / Now	Variable	Variable
BAT B	ppm	6850	Today / Now	Variable	Variable
BAT C	ppm	6850	Today / Now	Variable	Variable
U1 CLA #1	ppm	2556	Today / Now	2470-2630	2400-2700
U1 CLA #2	ppm	2575	Today / Now	2470-2630	2400-2700
U1 CLA #3	ppm	2591	Today / Now	2470-2630	2400-2700
U1 CLA #4	ppm	2589	Today / Now	2470-2630	2400-2700
U2 CLA #1	ppm	2531	Today / Now	2470-2630	2400-2700
U2 CLA #2	ppm	2650	Today / Now	2470-2630	2400-2700
U2 CLA #3	ppm	2522	Today / Now	2470-2630	2400-2700
U2 CLA #4	ppm	2526	Today / Now	2470-2630	2400-2700
Spent Fuel Pool	ppm	2547	Today / Now	$\geq$ 2050	$\geq$ 2000
Lithium Results				**Goal**	**Midpoint**
U1 RCS	ppm	1.1	Today / Now	>1	>1
U2 RCS	ppm	2.43	Today / Now	2.18-2.48	2.33

Primary to Secondary Leakrate Information (Total CPM RM-90-99/119)					
Indicator	**Units**	**U1**	**Date / Time**	**U2**	**Date/Time**
SI 50 S/G Leakage?	Yes/No	No	Today / Now	No	Today / Now
SI 137.5 CVE Leakrate	gpd	< 0.1	Today / Now	< 0.1	Today / Now
5 gpd leak equivalent	cpm	380	Today / Now	68	Today / Now
30 gpd leak equivalent	cpm	1980	Today / Now	83	Today / Now
50 gpd leak equivalent	cpm	3250	Today / Now	206	Today / Now
75 gpd leak equivalent	cpm	4850	Today / Now	455	Today / Now
150 gpd leak equivalent	cpm	9750	Today / Now	870	Today / Now
CVE Air Inleakage	cfm	10	Today / Now	12.5	Today / Now
Bkgd on 99/119	cfm	50	Today / Now	40	Today / Now

APPENDIX C

SHIFT TURNOVER CHECKLIST Page 1 of 3 Today

☐ SM			
☐ US/MCR	Unit 1		
☐ UO	Unit 1		Off-going – Name
☐ AUO	Station SQN		
☐ STA (STA Function)	AUO Comp Actions		On-coming – Name

Part 1 - Completed by Off-going Shift/Reviewed by On-coming Shift:

Abnormal Equipment Lineup/Conditions:

MAIN CONTROL ROOM(7690) (593-5409)

Train B Week

- ***1-PCV-68-340D Valve Controller setpoint drift; (WO 06-080000-000). Pink tag on 1-M-4.***

TURBINE BUILDING (7771) (593-5416)

- ***1-RM-90-120&121 SG BD Rad Monitor OOS; Investigate the pump/instrument failure (WO 06-080880-000). Pink tag on 1-M-12.***

OUTSIDE (7666) (593-5399)

- ***All equipment normal***

AUXILIARY BUILDING (7775) (593-5414)

- ***CCP 1B-B Out of Service: Tagged for maintenance to repair leak on pump discharge. (WO 06-080025-000) (Out for previous 16 hours). ETR 12 hours.***

RCS Leakage (SI-137.0)

Total 0.03 gpm / Identified 0.02gpm / Unidentified 0.01 gpm. (Today 0600)

SI/Test in Progress/Planned: (Including Need for New Brief)

- ***SI-401 release package (w/ Chem Supvr) for SGBD releases to the river.***

Major Activities/Procedures in Progress/Planned:

- ***Reduce to <93% turbine power for Turbine Valve Testing. Initiate boration per Rx Engineering Spreadsheet. Spreadsheet has been verified by the STA.***

Radiological Changes in Plant During Shift:

None

LCO/ODCM/TRM ACTIONS

- ***TS 3.5.2.a, TRM 3.1.2.2. for 1B-B CCP OOS.***
- ***ODCM 1.1.1 action 31 for 1-RM-90-120/121 OOS***

Part 2 - Performed by on-coming shift

☐ Review of Operating Log Since Last Shift Held or 3 Days, Whichever is Less (N/A for AUO's)

☐ Review of Rounds Sheets/Abnormal Readings (AUO's only)

Review the Following Programs for Changes Since Last Shift Turnover:

☐ Standing Orders ☐ LCO(s) in Actions (N/A for AUOs)

☐ Immediate Required Reading ☐ TACF (N/A for AUO's)

Part 3 - Performed by both off-going and on-coming shift

☐ Walkdown of MCR Control Boards (N/A for AUO's)

Relief Time: Relief Date: today

Disabled Annunciators

PANEL	WINDOW	ANNUNCIATOR	WO / PER Number

Equipment Off-Normal (Pink Tags)

UNID And Noun Name	Panel	Problem Description	WO / PER Number

MCR WO List

ID And Noun Name	Panel	Problem Description	WO/PER Number

UNIT ONE REACTIVITY BRIEF

Date: Today Time: Now

General Information

RCS Boron: **1093** ppm Today	BA Controller Setpoint: **27%** *		RCS B-10 Depletion: **2** ppm
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Nominal Gallons per rod step from 219: **7** gallons of acid, **36** gallons of water			

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Gallons of acid: **26**	Gallons of water: **138**	Rod Steps: **4**

Estimated rods/boron for emergency step power reduction **

(Assuming Xenon equilibrium and no reactivity effects due to Xenon. 2/3 total reactivity from rods, 1/3 from boron)

Power reduction amount	Estimated Final Rod Position	Estimated boron addition
10%	**198** Steps on bank D	**101** gallons
30%	**174** Steps on bank D	**295** gallons
50% –	**152** Steps on bank D	**485** gallons

** These values are approximations and not intended nor expected to be exact. The values may be superceded by Rx Engineering or SO-62-7 calculated values. These values are calculated assuming 100% steady state power operation only. Engineering data last updated **one week ago**. Data Valid until **one week from now**.

Previous Shift Reactivity Manipulations

Number of dilutions: 0***	Number of borations: 0	Rod steps in: 0
Gallons per dilution: 0	Gallons per boration: 0	Rod steps out: 0
Total amount diluted: 0	Total amount borated: 0	Net change: 0 IN/Out

Current Shift Estimated Reactivity Manipulations

Number of dilutions: 0	Number of borations: 0	Rod steps in: 0
Gallons per dilution: 0	Gallons per boration: 0	Rod steps out: 0
Total expected dilution: 0	Total expected boration: 0	Net change: 0 In/Out

Remarks:

Rx Power – 100% MWD/MTU – 1000 Xenon & Samarium at Equilibrium

***The boron letdown curve is flat for the next 25 EFPD.

Next Unit 1 Flux Map is scheduled - three weeks from now

Unit Supervisor: _____

Name/Date

Unit 1

DELTA TIME (hrs)	REACTOR POWER (%)	POWER DEFECT (pcm)	ASSUMED ROD HT (steps)	INSERTED WORTH (pcm)	EXPECTED XENON (pcm)	DELTA RHO BORON (pcm)	BORON CONC (ppm)	DELTA PPM (ppm)	RECOMMEND DILUTION (gal)	RECOMMEND BORATION (gal)	IODINE CONC (% eq)
0.0	100.0	1732.0	216.0	-24.5	-2728.0	---	1093.0	---	---	---	100.0
1.0	93.0	1608.0	204.0	-83.7	-2742.5	-50.4	1100.8	7.8	0	87	99.7
2.0	93.0	1604.5	204.0	-83.7	-2764.3	18.4	1098.0	-2.9	168	0	99.0
3.0	100.0	1729.6	216.0	-24.5	-2762.9	64.4	1087.9	-10.0	594	0	98.8
4.0	100.0	1734.4	216.0	-24.5	-2747.7	-10.4	1089.6	1.6	0	18	98.9
5.0	100.0	1733.7	216.0	-24.5	-2736.8	-11.7	1091.4	1.8	0	20	99.0
6.0	100.0	1732.8	216.0	-24.5	-2729.0	-8.6	1092.7	1.3	0	15	99.1
7.0	100.0	1732.2	216.0	-24.5	-2723.7	-6.0	1093.7	0.9	0	10	99.2
8.0	100.0	1731.7	216.0	-24.5	-2720.1	-4.1	1094.3	0.6	0	7	99.3
9.0	100.0	1731.4	216.0	-24.5	-2717.8	-2.6	1094.7	0.4	0	4	99.3
10.0	100.0	1731.2	216.0	-24.5	-2716.4	-1.5	1094.9	0.2	0	3	99.4
11.0	100.0	1731.1	216.0	-24.5	-2715.7	-0.8	1095.1	0.1	0	1	99.5
12.0	100.0	1731.0	216.0	-24.5	-2715.6	-0.2	1095.1	0.0	0	0	99.5
13.0	100.0	1731.0	216.0	-24.5	-2715.7	0.1	1095.1	0.0	1	0	99.6
14.0	100.0	1731.0	216.0	-24.5	-2716.1	0.4	1095.0	-0.1	4	0	99.6
15.0	100.0	1731.1	216.0	-24.5	-2716.7	0.6	1094.9	-0.1	5	0	99.6
16.0	100.0	1731.1	216.0	-24.5	-2717.3	0.7	1094.8	-0.1	6	0	99.7
17.0	100.0	1731.2	216.0	-24.5	-2718.0	0.7	1094.7	-0.1	7	0	99.7
18.0	100.0	1731.2	216.0	-24.5	-2718.7	0.8	1094.6	-0.1	7	0	99.7
19.0	100.0	1731.3	216.0	-24.5	-2719.4	0.8	1094.5	-0.1	7	0	99.8
20.0	100.0	1731.3	216.0	-24.5	-2720.1	0.7	1094.3	-0.1	7	0	99.8
21.0	100.0	1731.4	216.0	-24.5	-2720.7	0.7	1094.2	-0.1	6	0	99.8
22.0	100.0	1731.4	216.0	-24.5	-2721.4	0.7	1094.1	-0.1	6	0	99.8
23.0	100.0	1731.5	216.0	-24.5	-2721.9	0.6	1094.0	-0.1	6	0	99.8
24.0	100.0	1731.5	216.0	-24.5	-2722.5	0.6	1093.9	-0.1	5	0	99.9
25.0	100.0	1731.6	216.0	-24.5	-2723.0	0.5	1093.8	-0.1	5	0	99.9
26.0	100.0	1731.6	216.0	-24.5	-2723.4	0.5	1093.8	-0.1	5	0	99.9
27.0	100.0	1731.6	216.0	-24.5	-2723.9	0.5	1093.7	-0.1	4	0	99.9
28.0	100.0	1731.7	216.0	-24.5	-2724.2	0.4	1093.6	-0.1	4	0	99.9
29.0	100.0	1731.7	216.0	-24.5	-2724.6	0.4	1093.6	-0.1	4	0	99.9
30.0	100.0	1731.7	216.0	-24.5	-2724.9	0.4	1093.5	-0.1	3	0	99.9
31.0	100.0	1731.8	216.0	-24.5	-2725.2	0.3	1093.5	0.0	3	0	99.9
32.0	100.0	1731.8	216.0	-24.5	-2725.5	0.3	1093.4	0.0	3	0	99.9
33.0	100.0	1731.8	216.0	-24.5	-2725.7	0.3	1093.4	0.0	2	0	99.9
34.0	100.0	1731.8	216.0	-24.5	-2725.9	0.2	1093.3	0.0	2	0	99.9
35.0	100.0	1731.9	216.0	-24.5	-2726.1	0.2	1093.3	0.0	2	0	100.0

36.0	100.0	1731.9	216.0	-24.5	-2726.3	0.2	1093.3	0.0	2	0	100.0
37.0	100.0	1731.9	216.0	-24.5	-2726.5	0.2	1093.3	0.0	2	0	100.0
38.0	100.0	1731.9	216.0	-24.5	-2726.6	0.2	1093.2	0.0	1	0	100.0
39.0	100.0	1731.9	216.0	-24.5	-2726.8	0.1	1093.2	0.0	1	0	100.0
40.0	100.0	1731.9	216.0	-24.5	-2726.9	0.1	1093.2	0.0	1	0	100.0
41.0	100.0	1731.9	216.0	-24.5	-2727.0	0.1	1093.2	0.0	1	0	100.0
42.0	100.0	1731.9	216.0	-24.5	-2727.1	0.1	1093.2	0.0	1	0	100.0
43.0	100.0	1731.9	216.0	-24.5	-2727.2	0.1	1093.1	0.0	1	0	100.0
44.0	100.0	1732.0	216.0	-24.5	-2727.3	0.1	1093.1	0.0	1	0	100.0
45.0	100.0	1732.0	216.0	-24.5	-2727.3	0.1	1093.1	0.0	1	0	100.0
46.0	100.0	1732.0	216.0	-24.5	-2727.4	0.1	1093.1	0.0	1	0	100.0
47.0	100.0	1732.0	216.0	-24.5	-2727.5	0.1	1093.1	0.0	1	0	100.0
48.0	100.0	1732.0	216.0	-24.5	-2727.5	0.1	1093.1	0.0	1	0	100.0
49.0	100.0	1732.0	216.0	-24.5	-2727.6	0.1	1093.1	0.0	0	0	100.0
50.0	100.0	1732.0	216.0	-24.5	-2727.6	0.0	1093.1	0.0	0	0	100.0
51.0	100.0	1732.0	216.0	-24.5	-2727.6	0.0	1093.1	0.0	0	0	100.0
52.0	100.0	1732.0	216.0	-24.5	-2727.7	0.0	1093.1	0.0	0	0	100.0
53.0	100.0	1732.0	216.0	-24.5	-2727.7	0.0	1093.0	0.0	0	0	100.0
54.0	100.0	1732.0	216.0	-24.5	-2727.7	0.0	1093.0	0.0	0	0	100.0
55.0	100.0	1732.0	216.0	-24.5	-2727.8	0.0	1093.0	0.0	0	0	100.0
56.0	100.0	1732.0	216.0	-24.5	-2727.8	0.0	1093.0	0.0	0	0	100.0
57.0	100.0	1732.0	216.0	-24.5	-2727.8	0.0	1093.0	0.0	0	0	100.0
58.0	100.0	1732.0	216.0	-24.5	-2727.8	0.0	1093.0	0.0	0	0	100.0
59.0	100.0	1732.0	216.0	-24.5	-2727.8	0.0	1093.0	0.0	0	0	100.0
60.0	100.0	1732.0	216.0	-24.5	-2727.9	0.0	1093.0	0.0	0	0	100.0
								Total	884	166	

1000	MWD/MTU
6820	BAT ppm

Hold Tavg = Tref +/- 1.5F

Small hourly boration/dilution volumes may be accumulated for larger single additions

Reason for Downpower	Unit 1 Cycle 15 TV test
Date	
RxENG Name	Beeper 70808
Comments	

APPENDIX D
Page 1 of 1

CALCULATION FOR AMOUNT OF BORIC ACID OR PRIMARY WATER (TI-44)

NOTE 1 One calculation is required for each major change.

NOTE 2 Boric acid amounts to achieve required RCS boron concentration may be significantly higher than calculated amounts if CVCS demin resins are removing boron. Amount of boron removal by mixed bed resins will depend on RCS boron, resin age, whether demin bed was previously borated, and letdown temperature. Chemistry should be consulted if required to evaluate resin bed removal.

[1] **IF** REACTF not used,
THEN
CALCULATE amount of primary water or boric acid required using TI-44.

RCS BORON	PPM CHANGE	AMOUNT PRIMARY WATER OR BORIC ACID
1093 ppm Current		
	7.8	87 gal
1100.8 ppm Target		
		TOTAL GAL(s)

NOTE REACTF datasheets are to be signed by the preparer and reviewer.

[2] **IF** REACTF used attach printout to procedure. N/A

NOTE IV is not required if appendix is performed by an SRO to verify data provided by Rx. Eng.

[3] **ENSURE** independently verified by an SRO in accordance with Appendix I.

_____
Initials

END OF TEXT

Unit 1 Date Today

6.4 Borate

CAUTION **Returning the Boric Acid Blender to service after unplugging, cleaning, or maintenance on Boric Acid System could introduce debris, sludge, air or solidified boron into CCP suction resulting in pump damage. Extreme care must be exercised to properly flush the Boric Acid piping following an outage. [C.2]**

NOTE If a large amount of boration is required (plant shutdown), pzr heaters should be energized to cause spray operation for equalizing boron concentration in RCS and pressurizer.

[1] **ENSURE** makeup system aligned for **AUTO** operation in accordance with Section 5.1. MLM

NOTE Steps 2 and 3 are **N/A** for minor power changes OR if immediate boration is required to maintain shutdown margin, to maintain rods above the insertion limit, during an emergency shutdown (AOP-C.03), during recovery of a dropped/misaligned rod (AOP-C.01), or at Chemistry recommendation in mode 3, 4, 5 or 6.

[2] **RECORD** the quantity of boric acid required to achieve desired boron concentration using Appendix D.

87 gals MLM

[3] **PERFORM** Appendix I Independent Verification of Calculation for Amount of Boric Acid or Primary Water. (N/A if App. D was performed by SRO to verify data from Rx Engineering) RHE
SRO

[4] **DETERMINE** available boric acid volume in in-service BAT.

_____ gals _____

[5] **PLACE [HS-62-140A]**, Boric Acid to Blender Flow Control Switch to the **STOP** position. ____/____
1st CV

Unit_____ Date_____

6.4 Borate (Continued)

[6] PLACE [HS-62-140B], CVCS Makeup Selector Switch to the **BORATE** position. _____

[7] ADJUST [FC-62-139], Boric Acid Flow Controller to the desired flow rate. _____/_____ 1st CV

[8] SET [FQ-62-139], Batch Integrator to the desired quantity. _____/_____ 1st CV

[9] PLACE [HS-62-140A], Boric Acid to Blender Flow Control Switch to the **START** position. _____/_____ 1st CV

[10] ENSURE Boric Acid Pump aligned to blender in FAST speed by right red light **LIT** on **[HS-62-230A] OR [HS-62-232A]**. _____

NOTE Flow oscillations and/or erratic controller response may require manual operation of Boric Acid Flow Controller **[FC-62-139]** until stable conditions exist.

[11] VERIFY Boric Acid Flow established. _____

NOTE It may take approximately 15 minutes before any changes to reactivity are indicated on nuclear instrumentation or RCS temperature indication.

[12] IF reactor is critical,
THEN
MONITOR nuclear instrumentation and reactor coolant temperature to ensure proper response from boration. ☐

NOTE BAT operability limits are prescribed by TRM 3.1.2.6 (Modes 1-3) or 3.1.2.5 (Modes 4-6).

[13] MONITOR Boric Acid Storage Tank level. ☐

Unit_____ Date_____

6.4 **Borate** (Continued)

[14] IF Volume Control Tank level increases to 63 percent, **THEN**

ENSURE [LCV-62-118], Volume Control Tank Divert Valve **OPENS** to divert excess water to the Holdup Tank. _____

NOTE Sample may be obtained at normal RCS sample intervals provided the unit is at power and the unit response following the boration is as expected.

[15] WHEN boration is complete, **THEN**

[a] **PLACE** [HS-62-140A], Boric Acid to Blender Flow Control Switch to the **STOP** position. ____ / ____ 1st CV

[b] **CHECK** no primary water flow on either [FI-62-142A] **OR** [FQ-62-142]. _____

[c] **ENSURE** [FC-62-142], Primary Water to Blender Flow Controller is in **AUTO** position and the potentiometer (dial indicator) is set at 35%. _____

[d] **ADJUST** [FC-62-139], Boric Acid Flow Controller to the desired blend solution in accordance with TI-44 Boron Tables. ____ / ____ 1st CV

[e] **ENSURE** [FCV-62-128] is **CLOSED**. _____

[f] **PLACE** [HS-62-140B], CVCS Makeup Selector Switch to the **AUTO** position. _____

[g] **PLACE** [HS-62-140A], Boric Acid to Blender Flow Control Switch to the **START** position. ____ / ____ 1st CV

[h] **IF** RCS boron sample required, **THEN**

NOTIFY Chem Lab to obtain RCS boron sample. _____

Unit_____ Date_____

6.4 **Borate** (Continued)

NOTE Boration is done in batches until the total boron and/or power change is completed.

[16] **REPEAT** this section as required to complete total boron change. _____

[17] **WHEN** total boration is complete, **THEN**

[a] **REALIGN** the blender controls for **AUTO** makeup to the CVCS in accordance with Section 5.1. _____

[b] **NOTIFY** Chem Lab to obtain RCS boron sample. _____

[18] **IF** in modes 1, 2, or 3, **THEN**

ENSURE requirements of TRM 3.1.2.6 are met. _____

[19] **IF** in modes 4, 5, or 6, **THEN**

ENSURE requirements of TRM 3.1.2.5 are met. _____

[20] **ENSURE** boration is logged in Unit Narrative Log. ☐

End of Section 6.4

Sequoyah Nuclear Plant

Unit 1 & 2

General Operating Instructions

0-GO-5

NORMAL POWER OPERATION

Revision 0047

Quality Related

Level of Use: Continuous Use

Effective Date: 10-10-2006

Responsible Organization: OPS, Operations

Prepared By: Jimmy Morris

Approved By: D. A. Porter

Current Revision Description

Revised step in section 5.4 concerning control rods, ref. NB 060297. Added references to existing precautions to applicable sections concerning voltage control as a minor editorial change, ref. 060531. Added step to section 5.1 concerning MFPT master controller output, ref. PER 100196-03.

PERFORMANCE OF THIS PROCEDURE COULD IMPACT REACTIVITY.

Table of Contents

1.0 INTRODUCTION

1.1 Purpose

This General Operating (GO) Instruction provides guidance for power ascension from approximately 30 to 100% power, at power conditions, power reduction from 100 to 30% power, Power Coastdown at End of Life operations, and Load Follow operations.

This instruction provides additional guidance for turbine control restoration following a turbine runback.

1.2 Scope

This GO contains the following sections:

5.1 Power Ascension From 30% Power to 100%

5.2 At Power Conditions

5.3 Power Reduction From 100% to 30%

5.4 Power Coastdown at End of Life

5.5 Load Follow Operations

2.0 REFERENCES

2.1 Performance References

A. 1,2-SO-5-1, *Feedwater Heaters and Moisture Separator Reheaters*

B. 1,2-SO-5-2, *No. 3 Heater Drain Tank and Pumps*

C. 1,2-SO-5-3, *No. 7 Heater Drain Tank and Pumps*

D. 1,2-SO-2/3-1, *Condensate and Feedwater System*

E. 1,2-SO-2-9, *Condenser Vacuum and Turbine Steam Seal Systems Operation*

F. 0-SO-12-1, *Auxiliary Boiler System*

G. 0-SO-35-4, *Monitoring Generator Parameters*

H. 0-SO-58-1. *Main Generator Bus Duct Cooling System*

I. 0-SI-NUC-000-038.0, *Shutdown Margin*

J. 0-SO-62-7, *Boron Concentration Control*

K. 1,2-SO-62-9, *CVCS Purification System*

L. 0-SO-68-3, *Pressurizer Spray and Heater Pressure Control System*

M. 0-SO-85-1, *Control Rod Drive System*

N. 0-PI-OPS-000-666.0, *River Temperature Limits Specified by NPDES permit*

O. 0-SI-OPS-092-078.0, *Power Range Neutron Flux Channel Calibration By Heat Balance Comparison*

P. 0-SI-CEM-000-050.0, *72-Hour Chemistry Requirements*

Q. 0-SI-CEM-030-407.2, *Radioactive Gaseous Waste Effluent Particulate and Iodine Dose Rates from Shield and Auxiliary Building Exhausts (Weekly/Special) and Condenser Vacuum Exhausts (Special)*

R. 0-SI-CEM-030-415.0, *Gaseous Effluent Requirements (Gross Alpha, Noble Gas and Tritium*

S. 0-SI-OPS-000-001.0, Initial Startup System Parameter Log

T. TI-40, *Determination of Preconditioned Reactor Power*

2.2 Developmental References

A. Memorandum from System Engineering concerning MSR operation - RIMS S57 880322 999

B. Memo from Reactor Engineering - RIMS S57 941219 934

C. S57-880322-999 and S57-880808-851

D. W Letter GP89-076 (RIMS No. S53 890427 984)

E. W Letter GP 89-155 (RIMS S57 891026 972)

F. W Letter GP 86-02(B44 861112 002)

G. SSP-2.3, *Administration of Site Procedures*

H. TVA-NQA-PLN89-A

I. GOI-10, *Reactivity Control at End of Cycle Life* (Trojan Nuclear Plant)

J. FSAR, Section 13.5

K. Memo from Reactor Engineering - August 6, 1996 (G Bair)

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Precautions

A. To ensure that NIS Reactor Power level indications remain within 2% of true power during power level changes, a check should be performed about every 20% power level change, when greater than 15% power, by comparing calorimetric power to each NIS Power Range drawer. The 20% power level check does not preclude the operating crews from making necessary changes in response to changing plant conditions.

B. TRM 3.3.3.15 requires LEFM core thermal power (U2118) to be used to perform 0-SI-OPS-092-078.0 above 15% reactor power. LEFM indication is available if the following conditions are met:

- LEFM status NORMAL on ICS Calorimetric Data screen.
- LEFM core thermal power (ICS point U2118) shows good (green) data.
- LEFM MFW header temp (ICS point T8502MA) greater than or equal to 250°F.

If LEFM indication is NOT available above 15% reactor power, then TR 3.3.3.15 action must be entered.

C. The following should be used to determine the most accurate reactor power indication for comparison with NIS:

- When reactor power is greater than 15%, use LEFM calorimetric power indication (U2118).
- If LEFM is NOT available, then use average loop ΔT (UO485 or M-5 indicators) up to 40%. Above 40%, use computer point U1118.

D. The turbine should be operated in "IMP OUT" control during normal unit operation. "IMP IN" operation results in system swings and should only be used during the performance of valve tests. (W Ltr GP 89-155; RIMS S57 891026 972)

E. Pressurizer heaters and sprays may be operated as required to maintain pressurizer and RCS boron concentration within 50 ppm. If loop boron concentration is changed by 20 ppm or greater, use the pressurizer backup heaters to initiate automatic spray.

3.1 Precautions (continued)

F. Condensate DI polishing operations during power ascension are controlled by staying within system parameters and by recommendations from the Chemistry Section.

G. The valve position limiter should be periodically positioned approximately 10% above the current governor control indications (keeps governor valves off of the limiter) as turbine load is changed. This prevents inadvertent load increases by limiting governor valve opening and allows a faster response of the runback feature which ensures main feedwater system will supply the required amount of flow.

H. Any off-frequency turbine operation is to be reported to Engineering for record keeping. The report will include duration and magnitude of off-frequency operation.

I. Operation at off-frequencies is to be avoided in order to prevent the probable occurrence of turbine blade resonance. Prolonged periods of operation at certain off-design frequencies could cause excessive vibratory stresses which could eventually generate fatigue cracking in the blades. Off-frequency operation is permitted to the degree and time limit specified on the chart "Off-Frequency Turbine Operation", Figure A.26 of TI-28.

J. The potential exists for condensation formation in steam extraction lines when feedwater heaters are isolated.

K. Initial Startup After Refueling - After refueling operations, the NIS indications may be inaccurate until calibration at higher power levels. The NIS calibration procedures will adjust the PRM trip setpoints to ensure that the excore detectors do not contribute to an overpower condition at the following RTP hold points. Reactor Engineering and/or Systems Engineering will determine procedure performance. **[C.3]**

1. At < 50% RTP a flux map and single point alignment, a hot channel factor determination, an axial imbalance comparison, and a PR NIS calibration will be performed. The PR high range trip setpoint will then be increased to its normal value of 109%.

2. At < 75% RTP, calorimetric calculations and RCS flow verification may be performed, EAGLE-21 updated prior to increasing power, a flux map, a hot channel factor determination, an axial imbalance comparison may be required if not performed at < 50%, a detector calibration (if Δ AFD $\geq$ 3%), and a PR NIS calibration may be performed.

3.1 Precautions (continued)

3. If not performed at 75% hold point, an axial imbalance comparison and a detector calibration (if Δ AFD $\geq$ 3%) should be performed at ~ 100% RTP. Engineering will determine if PR NIS calibration must be performed. Calorimetric calculations, RCS flow verification, a hot channel factor determination, and a reactivity balance will be performed and EAGLE-21 updated. Reactor Engineering will notify Operations that normal full power operations may proceed.

4. Preconditioned Power Levels and Maximum Allowable Rates of Power Increase are specified in TI-40, *Determination of Preconditioned Reactor Power.*

5. During initial startups, based on Westinghouse recommendations, a lower power ramp rate limit has been implemented for power levels above the intermediate power threshold. The Intermediate Power Threshold is unit/cycle dependent and is determined by the Vendor. Refer to TI-40.

6. TCS will automatically monitor pre-conditioned power level as follows:

   a. Point U1127 is reactor power in percent of RTP based on either secondary calorimetric or RCS ΔT depending on power level.

   b. Point UO103 is a 20 minute rolling average of reactor power rate-of-change fitted over a 20 minute period. UO103 is a leading indicator of %/hour power ramp rate and can be used in deciding to speed up or slow down the ramp rate.

   c. Point UO104 is a 1 hour rolling average of reactor power rate-of-change fitted over a 1 hour period. *UO104 is used in demonstrating compliance with fuel pre-conditioning power ramp rate limits.*

   d. Point K0058 is the currently qualified (or pre-conditioned) power level.

   e. These points can all be monitored with the ICS group display "TI40". Appendix A may be used if the ICS is unavailable.

L. TI-40 power increase limits that are exceeded, in any one hour, are evaluated in accordance with SPP-3.1.

3.1 Precautions (continued)

M. Power Coastdown At End Of Life:

1. Reactor power changes should be limited to less than or equal to 1% per hour to avoid causing xenon peaking which could force a plant shutdown.

2. Do not perform unnecessary unit power maneuvers or testing (e.g., turbine valve testing). Such testing could result in an uncontrollable Xenon oscillation.

3. Nonessential work on systems which could cause a plant upset should be deferred.

4. Secondary Plant runbacks such as Main Feed Pump Turbine trip or #3 Heater Drain Tank runback will require a unit shutdown if Reactor power is not promptly returned to pre-transient level due to the resulting severe Xenon transient. If a system power alert is in effect, and electrical generation is critical, unit load should be reduced as necessary keeping T_{AVG} on program. Contact Reactor Engineering for an evaluation and guidance concerning unit shutdown or reduction of load.

5. Management should be consulted to evaluate the feasibility of a unit restart if a reactor trip occurs with RCS equilibrium boron concentration less than 50 ppm. If the reactor is to be restarted, the power level shall be limited to nominal pre-trip power level.

N. Axial Flux Difference Management:
When the reactor is operating at a steady power or during normal load changes, maintain ΔI within the operating limits of the Core Operating Limits Report (COLR). It is recommended that the core axial flux difference (AFD) be maintained within $\pm$ 5% of the target band at all times, excluding the performance of 0-PI-NUC-092-036.0, "Incore - Excore Calibration," and End of life power coast downs. Operating time outside the band, which is given in TI-28 Attachments 1 and 2, should be minimized. Reactor Engineering should be contacted if time out of the $\pm$ 5% target band exceeds approximately 30 minutes.

O. The position of control bank D should normally be $\geq$ 215 steps when power level is steady state at or above 85% RTP. At steady state power levels below 85%, control bank D should normally be $\geq$ 165 steps. If rod position is more than 2 steps below this guidance for long term, then impact may occur to safety analysis assumptions.

P. During heatup and cooldown transients, RCS density changes will cause changes in NIS indicated power. At constant reactor power, a 1°F change in T_{AVG} may cause as much as a 1% (or more) change in indicated NIS power.

3.1 Precautions (continued)

Q. Operation of main generator without automatic voltage control could impact grid voltage requirements. The South East Area Load Dispatcher (SELD) should be notified immediately if generator is in service without automatic voltage regulator. Also, refer to Section E of GOI 6 for MVAR limits.

R. Main Generator operation without Automatic Voltage control requires that Narrative Log entries be made (time, date, reason & duration) and that notification be made to Operations Duty Specialist (ODS) within twenty four (24) hours.

S. Main Generator operation outside of the Voltage Schedule in GOI-6 requires that Narrative Log entries be made (time, date, reason & duration) and that notification be made to South East Area Load Dispatcher (SELD) within one (1) hour.

T. The following limitations are applicable to Unit Two ONLY.

1. In winter months #7 HDTP capacity is not adequate to pump #6 Heater drains when all Condensate Demineralizer pumps are in service. Current practice is to run two Cond DI Pumps and / or throttle the condensate system to reduce backpressure. The preferred method is to throttle condensate pressure instead of running only two Condensate Demineralizer booster pumps at full power due to pump runout concerns.

2. Siemens-Westinghouse analysis has determined that the maximum unit power with one MFP operation is 65% under worst case conditions. The plant could operate higher if plant conditions permit.

3. MFP flow from the lead MFP should not exceed 53.7% of the total flow. Flow rates above this would result in HP steam flow tot he lead MFPT. Computer points 1(2)UO504 and UO505 can be used to monitor.

3.2 Limitations

A. When the axial flux difference monitor alarm is inoperable, the AFD must be logged every hour by performing 0-SI-NUC-000-044.0.

(SR 4.2.1.1.a.2 & 4.2.1.1.b)

B. When both the plant computer and NIS QPTR alarm systems are inoperable, the QPTR must be calculated every 12 hours by performing 0-SI-NUC-000-133.0. (SR 4.2.4.1.b)

C. Do not exceed a load change rate of plus or minus 5% per minute or a step change of 10%.

D. River water temperatures shall be maintained within the limitations of the NPDES permit as specified in 0-PI-OPS-000-666.0.

NOTE

Westinghouse should be contacted if the turbine is operated outside of its operating limits as stated below.

E. To prevent high vibratory stresses and fatigue damage to the last stage turbine blading, do not operate the turbine outside of limits listed below: [W Ltr GP 86-02 (B44 861112 002)]

1. At loads less than or equal to 30% (350 MW), the maximum permissible backpressure is 1.72 psia. (3.5" Hg)

2. At loads greater than 30%, the maximum permissible backpressure is 2.7 psia (5.5" Hg) with a 5 minute limitation before tripping the turbine.

F. Do not allow the generator to become underexcited.

G. In the event of a change in the rated thermal power level exceeding 15% in one hour, notify Chemistry to initiate the conditional portions of 0-SI-CEM-000-050.0, 0-SI-CEM-030-407.2 and 0-SI-CEM-000-415.0 due to the thermal power change.

3.2 Limitations (continued)

H. The following Main Turbine vibration limitations and actions should be adhered to:

1. Vibration levels which exceed 7 mils (alarm setpoint) should be verified by Predictive Maintenance Group.

2. Vibration levels greater than 7 mils and less than 14 mils should be continuously monitored by Predictive Maintenance Group.

3. IF vibration level is greater than or equal to 14 mils, THEN TRIP the turbine.

I. Westinghouse recommends that if any throttle valve is held closed for more than 10 minutes, then it should be re-tested immediately upon reopening in accordance with 1,2-PI-OPS-047-002.0.

J. The generator may be operated without a bus duct cooler up to approximately 729 MW turbine load.

K. To ensure sufficient voltage for a safe shutdown after loss of both units, voltage and reactive power should be maintained within the limits of GOI-6.

L. With LEFM calorimetric power indication available, full power operation is defined as approximately 3455 MW_T not to exceed 3455.0 MW_T averaged over a 8-hour period. **[C.1]** If LEFM is available, power shall be monitored using plant computer point U2118 Instantaneous Value. **DO NOT** allow average thermal power to exceed 3455 MW thermal for two consecutive hours.

M. The following restrictions apply if LEFM calorimetric power indication (U2118) is unavailable:

1. Applicable action of TRM 3.3.3.15 must be entered.

2. AFD limits in COLR and TI-28 must be made more restrictive by 1%.

3. Rod insertion limits in COLR must be raised by 3 steps.

4. If reactor power is greater than 40%, power should be monitored using U1118. If U1118 is also unavailable, use the highest reading NIS channel.

5. If reactor power is less than 40%, use the RCS average ΔT as the preferred method for determining power level.

N. IF equilibrium conditions are achieved, after exceeding by 10% or more of rated thermal power the thermal power at which the heat flux hot channel factor was last determined, THEN conditional performance of 0-SI-NUC-000-126.0, Hot Channel Factor Determination is required.

3.2 Limitations (continued)

O. At low power levels, the LP Heaters may be unbalanced in extraction steam supply use and heat pickup across the condensate side of the heater string. This condition should correct itself as the unit approaches 45-50% Turbine Power. (Ref: PER 99-003789-000)

P. With one LP heater string out of service (isolated), power is limited to 86% (Unit 1) or 90% (Unit 2). This is based on LP turbine blading limitations. (Ref: DCN E21203A).

STARTUP No._____ Unit 1 Date 7/2/09

4.0 PREREQUISITES

NOTES

1) Throughout this Instruction where an **IF/THEN** statement exists, the step should be **N/A'd** if the condition does not exist.

2) Prerequisites may be completed in any order.

[1] **ENSURE** Instruction to be used is a copy of effective version. RLT

[2] T_{AVG} is being maintained within 1.5°F of T_{REF}. ☑

[3] SG level controls are being maintained in AUTO (**N/A** if auto control **NOT** available). ☑

[4] Control rods are being maintained within the operating band of Core Operating Limits Report (COLR) (**N/A** if shutting down due to dropped or misaligned rod). ☑

[5] Steam dump control system is in the T_{AVG} mode (**N/A** if Tavg Mode **NOT** available). ☑

[6] The EHC system should be in OPER AUTO (pushbutton lit). ☑

[7] Generator pressurized with hydrogen according to capability curve. (TI-28, Fig. A.I4) ☑

NOTE

During start up after a cold shutdown the Condensate DI normally will be aligned for full flow polishing until the MSRs are in service.

[8] **ENSURE** Condensate DI polishing operation in accordance with RCL recommendations. RLT

STARTUP No._____ Unit 1 Date Feb

4.0 PREREQUISITES (continued)

[9] **ENSURE** each performer documents their name and initials:

Print Name	Initials

5.0 INSTRUCTIONS

CAUTION

Steps of this procedure must be performed sequentially, unless specifically stated otherwise.

NOTES

1) RADCON should be notified during normal plant operations if power level increases or decreases are either stopped or started.

2) Guidance on restoration of EHC Controls after a BOP runback is contained in Appendix B, *Turbine Runback Restoration*. **[C.4]**

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100%

NOTES

1) Main Generator operation without Automatic Voltage control requires that Narrative Log entries be made (time, date, reason & duration) and that notification be made to Operations Duty Specialist (ODS) within twenty four (24) hours.

2) Main Generator operation outside of the Voltage Schedule in GOI-6 requires that Narrative Log entries be made (time, date, reason & duration) and that notification be made to South East Area Load Dispatcher (SELD) within one (1) hour.

3) Operation of main generator without automatic voltage control could impact grid voltage requirements. The South East Area Load Dispatcher (SELD) should be notified immediately if generator is in service without automatic voltage regulator. Also, refer to Section E of GOI 6 for MVAR limits.

4) Confirmation from Chemistry Section **SHALL** be obtained prior to exceeding **30%** reactor power.

[1] **ENSURE** Section 4.0, Prerequisites complete. _____

[2] **VERIFY** from Chemistry Section that SG and feedwater secondary chemistry is within acceptable limits. ☐

_____
Chemistry personnel contacted

[3] **IF** this is a startup following refueling, **THEN**

ENSURE applicable portions of 0-RT-NUC-000-001.0 are **COMPLETE** for operation above 35% power.

_____
Rx Engr.

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

NOTES

1) This step may be performed out of sequence as necessary to meet power level.

2) 0-SI-OPS-092-078.0 may be performed at the discretion of the Operator if one or more PRMs is indicating close to the ± 2% tolerance.

[4] **PERFORM** the following at approximately 35% reactor power:

[4.1] **IF** LEFM indication is available,
THEN

CALCULATE Calorimetric power:

Calorimetric power= U2118 $\frac{\_\_\_\_\_}{34.55}$ = _____%

☐

[4.2] **IF** LEFM indication is NOT available,
THEN

CALCULATE reactor power:

Average value of RCS ΔT (U0485)= _____% _____

[4.3] **VERIFY** all NIS Power Range channel drawers are within ± 2% of the calculated reactor power:

N-41	(XI-92-5005B)	YES ☐	NO ☐
N-42	(XI-92-5006B)	YES ☐	NO ☐
N-43	(XI-92-5007B)	YES ☐	NO ☐
N-44	(XI-92-5008B)	YES ☐	NO ☐

_____

[4.4] **IF** any of the above steps are checked NO,
THEN

PERFORM 0-SI-OPS-092-078.0. _____

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

NOTES

1) With reactor engineering concurrence, power increase per steps 5.1[6] through 5.1[9] may be performed in parallel with this step.

2) If startup is following refueling operations and secondary side chemistry is acceptable for power increase, then N/A Step 5.1[5]. (Startup Reactivity Calibrations and Tests will be performed at ≈ 45% Reactor Power if not performed at ≈ 30% Power).

[5] **IF** startup is following refueling activities and secondary chemistry hold is precluding power ascension, **THEN**

ENSURE the following have been performed prior to exceeding 50% rated thermal power: (May be performed in any order)

[5.1] 0-SI-NUC-000-126.0, Hot Channel Factor Determination.

_____ _____
Rx Eng Date

[5.2] 0-SI-NUC-092-079.0, Incore-Excore Axial Imbalance Comparison.

_____ _____
Rx Eng Date

[5.3] 0-PI-NUC-092-002.0, Detector Single Point Alignment.

_____ _____
Rx Eng Date

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

[5.4] 0-PI-IXX-092-N45.0, PR NIS Calibration.

_____ _____
MIG Date

[5.5] PR High Flux Trip reset to 109%. **[C.3].**

_____ _____
MIG Date

[5.6] Applicable portions of 0-RT-NUC-000-001.0 **COMPLETE** for operation above 50% power.

_____ _____
Rx Eng Date

[6] **DETERMINE** the following from TI-40 AND **RECORD** in narrative log AND below:

[6.1] Reactor preconditioned power level. _____ ☐

[6.2] Ramp rate restrictions._____ ☐

NOTE

N/A Substep 5.1[6.3] and 5.1[6.4] if not initial startup after refueling outage.

[6.3] Intermediate power threshold_____ ☐

[6.4] Ramp Rate above the intermediate power threshold. _____ ☐

[7] **MONITOR** TI-40 limits (using ICS trend features if available). ☐

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

NOTE

Raising load on the Main Generator will cause VARs to trend in the negative direction (toward incoming). This will require raising generator voltage. Refer to GOI-6 Section E for MVAR limits for generator stability. Refer to precautions Q, R, and S.

[8] **PERFORM** the following as required:

[8.1] IF Automatic Voltage Control is in service,
THEN
ADJUST Main Generator VARs **USING**
[HS-57-22] Exciter Voltage Auto Adjuster as necessary during power escalation. _____

[8.2] IF Automatic Voltage Control is NOT in service,
THEN
ADJUST Main Generator VARs **USING**
[HS-57-23] Exciter Voltage Base Adjuster as necessary during power escalation. _____

NOTES

1) Steps 5.1[9] through 5.1[15] may be performed concurrently or out of sequence.

2) Valve position limit and governor control meter are displayed on EHC Display panel 1,2-XX-047-2000 (M-2).

3) Valve position limit and governor control meter are displayed on EHC Display panel 1,2-XX-047-2000 (M-2).

4) Actions effecting reactivity are directed in the following step. 0-SO-62-7 requirements shall be adhered to for reactivity changes (i.e. reactivity balance, amounts of boric acid or water). All appropriate verifications and peer checks shall be utilized during performance.

[9] **INITIATE** power increase to between 45 and 49% and

MAINTAIN valve position limit approximately 10% above current governor control indication as turbine load is changed. ☐

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

NOTE

Control rods may be used along with dilution during reactor power increase to maintain AFD within the target control band.

[10] **IF** diluting the RCS to increase T_{AVG}, **THEN**

CONTINUE dilution and increase turbine load to maintain T_{REF} with T_{AVG}.(0-SO-62-7) ☐

[11] **PERFORM** the following during power increase:

NOTE

T_{AVG} will be programmed from 547°F at no load to 578.2°F at 100% load at a rate of 0.312°F per % power.

[11.1] **MONITOR** T_{AVG} following TREF on program. ☐

[11.2] **MONITOR** pressurizer level on program (25 to 60% as a function of T_{AVG}). ☐

NOTE

If LEFM is available, computer point U2118 should be used as true reactor power. If LEFM is NOT available, use U1118 when greater than or equal to 40% and the average value of RCS ΔT when less than 40%.

[11.3] **MONITOR** all RPIs, group step counters for rod insertion limits and inoperable rods or rod misalignment, Loop ΔT, and NIS for correct power distribution and quadrant power tilts. ☐

NOTE

Generator MVARs may be reduced if the Generator Stator Ground Fault Relay indication approaches the alarm value of 50%. Automatic trip function is disabled by TACF 1-03-029-057 for Unit 1 and TACF 2-05-012-057 for Unit 2. Refer to GOI-6 Section E for MVAR limits for generator stability.

[11.4] **MONITOR** generator conditions in accordance with **0-SO-35-4,** *Monitoring Generator Parameters.* [C.6] ☐

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

NOTE

The turbine load increase should be stopped until the main feedwater reg valves are operating in the acceptable band.

[11.5] **ENSURE** main feedwater reg valves are operating properly in auto (within ± 5% from zero deviation is acceptable). ☐

[11.6] **IF** main feedwater reg. valves are NOT maintaining within the 5% band, THEN

NOTIFY Instrument Maintenance. ☐

CAUTION

The potential exists for condensation formation in steam extraction lines when feedwater heaters are isolated.

NOTE

Instrument Maintenance support may be required if controller adjustments are needed.

[11.7] **ENSURE** Feedwater Heaters 5 and 6, MSR Drain Tank, and #7 Heater Drain Tank level controllers are adjusted to maintain levels within normal ranges. ☐

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

[12] **WHEN** reactor power is approximately 35%, **THEN**

VERIFY annunciator XA-55-4A, window C-5:

P-8 LOW POWER LOW FLOW TRIP BLOCK

is **DARK**. ☐

[13] **IF** unit is returning to service after a power reduction and the MSRs were removed from service, **THEN**

PLACE MSR HP steam warming valves to **OPEN** position:

MSR	HANDSWITCH	WARMING VALVE	INITIALS
A1	HS-1-142	FCV-1-142	_____ 1st _____ CV
B1	HS-1-144	FCV-1-144	_____ 1st _____ CV
C1	HS-1-146	FCV-1-146	_____ 1st _____ CV
A2	HS-1-136	FCV-1-136	_____ 1st _____ CV
B2	HS-1-138	FCV-1-138	_____ 1st _____ CV
C2	HS-1-140	FCV-1-140	_____ 1st _____ CV

[14] **ENSURE** #3 and #7 heater drain tanks on recirc in accordance with 1,2-SO-5-2 and 1,2-SO-5-3. ☐

[15] **ENSURE** the remaining available pumps are aligned and ready for service in accordance with 1,2-SO-2/3-1:

[15.1] Condensate booster pumps. ☐

[15.2] Hotwell pump. ☐

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

NOTES

1) When placing additional condensate pumps inservice, or HDT pumps in service, ensure that the main reg valves respond correctly and then stabilize in the acceptable band.

2) The following step may be performed out of sequence and may be marked N/A if it was previously performed in 0-GO-4.

[16] **WHEN** the condensate booster pump reaches approximately 140 amps, **THEN**

START the following pumps in accordance with 1,2-SO-2/3-1:

[16.1] Third HW pump (if available). _____

[16.2] Second CBP. _____

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

CAUTION

Valves 106A and 106B shall be verified to be controlling properly after each #3 HDT pump start.

NOTES

1) When placing additional condensate pumps or HDT pumps in service, ensure that the main reg valves respond correctly and then stabilize in the acceptable band.

2) With verbal approval from the Operations Superintendent, pumping forward of the #3 and #7 Heater Drain System may be deferred until turbine load is approximately 60%, if system conditions warrant.

3) Steps 5.1[17] through 5.1[22] may be performed out of sequence.

[17] **DETERMINE** if #3 and #7 heater drain tank pumps can be aligned to pump forward:

[17.1] **WHEN** confirmation obtained from Chemistry Section that #3 heater drain tank chemistry is within limits, **THEN**

START pumping forward using two (2) #3 heater drain tank pumps using 1,2-SO-5-2. _____

[17.2] **WHEN** confirmation obtained from Chemistry Section that #7 heater drain tank chemistry is in limits, **THEN**

START pumping forward using the #7 heater drain tank pumps using 1,2-SO-5-3. _____

[18] **IF** turbine load increase continues without the #3 heater drain tank pumps pumping forward, **THEN**

[18.1] **MAINTAIN** Condensate Booster Pump suction pressure greater than or equal to 75 psig (PI-2-77). ☐

[18.2] **MAINTAIN** Main Feedwater Pump suction pressure greater than 330 psig (PI-2-129). ☐

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

CAUTIONS

1) **MSR heatup limits are restricted to 100°F per hour or 25°F in a 15-minute period (automatic mode) or 50°F in a 30-minute period (manual mode). (SECO limits, contract 85P62-836839)**

2) **On the LP turbine inlet, do NOT exceed an instantaneous change of 50°F or a rate of change of 125°F/Hr for turbine expansion considerations.**

3) **For a cold start, the HP bundle warming valves should be opened at least 15 minutes before bringing the MSR in service.**

NOTE

Placing MSRs in service before 35% turbine load can cause turbine rotor long condition.

[19] **WHEN** ≥ 35% turbine load, **THEN**

[19.1] **IF** cold start (LP turbine inlet metal temperature less than 300°F), **THEN**

DEPRESS the RESET pushbutton on the moisture separator reheater control panel. ☐

[19.2] **CLOSE** the following steam inlet leakoff isolation valves:

MSR	VALVE	POSITION	INITIALS
A-1	1-679	CLOSED	_____
	1-714	CLOSED	_____
B-1	1-680	CLOSED	_____
	1-715	CLOSED	_____
C-1	1-681	CLOSED	_____
	1-716	CLOSED	_____
A-2	1-682	CLOSED	_____
	1-717	CLOSED	_____
B-2	1-683	CLOSED	_____
	1-718	CLOSED	_____
C-2	1-684	CLOSED	_____
	1-719	CLOSED	_____

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

NOTE

Due to required interlocks on MSR valves the following valves listed in the table should be performed in sequential order. For example: Open FCV-1-241 and when full open, then open FCV-1-141.

[19.3] **ENSURE** MSR HP steam supplies ALIGNED as follows:

MSR	EQUIPMENT	HANDSWITCH	POSITION	√
A1	MSR BYPASS ISOL	HS-1-241A	OPEN	☐
	MSR MAIN ISOL	HS-1-141A	OPEN	☐
B1	MSR BYPASS ISOL	HS-1-243A	OPEN	☐
	MSR MAIN ISOL	HS-1-143A	OPEN	☐
C1	MSR BYPASS ISOL	HS-1-245A	OPEN	☐
	MSR MAIN ISOL	HS-1-145A	OPEN	☐
A2	MSR BYPASS ISOL	HS-1-235A	OPEN	☐
	MSR MAIN ISOL	HS-1-135A	OPEN	☐
B2	MSR BYPASS ISOL	HS-1-237A	OPEN	☐
	MSR MAIN ISOL	HS-1-137A	OPEN	☐
C2	MSR BYPASS ISOL	HS-1-239A	OPEN	☐
	MSR MAIN ISOL	HS-1-139A	OPEN	☐

NOTES

1) Control valves ramp open for 120 minutes for turbine cold start.

2) MSR Control valves ramp open from the 400°F position to full open in one hour when Hot Start button was previously depressed during performance of 0-GO-4 or 0-GO-11.

[19.4] **DEPRESS** the RAMP pushbutton on the moisture separator reheater control panel to initiate steam flow to the reheater. ☐

(step continued on next page)

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

[19.5] **IF** MSR controls will NOT function in RAMP mode, **THEN**

PERFORM the following:

A. **DEPRESS** MANUAL pushbutton on MSR control panel. _____

B. **ADJUST** manual potentiometer to gradually open MSR TCVs over approx. 120 minutes **WHILE** continuing in this procedure. _____

[19.6] **OPEN** all MSR OPERATING vents (6-3 thru 6-93) on panel XS-6-3. _____

[19.7] **CLOSE** all MSR STARTUP vents (6-1 thru 6-91) on panel XS-6-1. _____

[19.8] **PERFORM** Appendix C to locally isolate MSR startup vents. _____

[19.9] **ENSURE** MSR HP steam warming valves are CLOSED:

MSR	EQUIPMENT	HANDSWITCH	POSITION	√
A1	MSR WARMING LINE	HS-1-142	CLOSED	☐
B1	MSR WARMING LINE	HS-1-144	CLOSED	☐
C1	MSR WARMING LINE	HS-1-146	CLOSED	☐
A2	MSR WARMING LINE	HS-1-136	CLOSED	☐
B2	MSR WARMING LINE	HS-1-138	CLOSED	☐
C2	MSR WARMING LINE	HS-1-140	CLOSED	☐

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

[19.10] **IF** this power ascension is during the months of October 1 through March 31, **THEN**

REFER to 0-PI-OPS-000-006.0 and consult System Engineer for position of MSR doghouses' vent dampers. _____

[19.11] **IF** this power ascension is during the months of April 1 through September 30, **THEN**

OPEN MSR doghouses' vent dampers. _____

[20] **IF** pumping forward with #3 HDT, **THEN**

ENSURE 1,2-LCV-6-106A and B are maintaining #3 heater drain tank level. ☐

NOTE

Benchboard instruments PI-5-87A for #7 heater and PI-5-84A for #6 heater may be used to determine heater shell side pressure.

[21] **IF** #7 heater drain tank (HDT) pressure is indicating an overpressure condition, **THEN**

PERFORM 1,2-SO-5-3, Section 8.0, Infrequent Operation to prevent #7 HDT overpressurization. _____

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

[22] **WHEN** approximately 40% turbine load:

[22.1] **VERIFY** annunciator XA-55-4A, window E-7:

C-20 AMSAC ARMED

is **LIT**. ☐

[22.2] **CLOSE** the drains on the operating main feedwater pump turbine (N/A other pump).

MFPT	DESCRIPTION	HANDSWITCH	POSITION	INITIALS
A	DRAIN VALVES	HS-46-14	CLOSED	_____
B	DRAIN VALVES	HS-46-41	CLOSED	_____

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

NOTE

With verbal approval from the Operations Superintendent, placing the second main feed pump in service may be deferred until power is approximately 55% (Unit 1) or 65% (Unit 2). Logic prevents opening the standby MFPT condenser isolation valves if the pump is **NOT** reset prior to exceeding 9 million lbs/hr flow on the running pump.

[23] **WHEN** approximately 40 to 45% turbine load, **THEN**

PLACE second MFPT in service by performing the following:

[23.1] **IF** the Operations Superintendent has approved one MFP operation during the power ascension, **THEN**

A. **1.RECORD** which MFPT is in service.

_____MFPT _____

B. **MONITOR** loading of the MFP in service as load is increased. ☐

[23.2] **WHEN second MFPT is to be placed in service, THEN**

PLACE second MFPT in service in accordance with 1,2-SO-2/3-1. ☐

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

NOTE

This step and individual substeps may be performed out of sequence.

[24] **PERFORM** the following as system parameters permit:

[24.1] **VERIFY** three (3) Hotwell pumps running (if available). ☐

[24.2] **VERIFY** two (2) Condensate booster pumps running. ☐

[24.3] **VERIFY** MFW pump(s) in service (only 1 required if approved by Operations Superintendent). ☐

[24.4] **VERIFY** two (2) #3 heater drain tank pumps running. ☐

[24.5] **VERIFY** one (1) #7 Heater Drain Tank pump in service. ☐

[24.6] **ENSURE** one gland steam exhauster running and one stopped in AUTO position:

EXHAUSTER	HANDSWITCH	(√)	(√)
A	HS-47-209A	AUTO ☐	START ☐
B	HS-47-209B	AUTO ☐	START ☐

[24.7] **IF gland seal water is being supplied from opposite unit, THEN**

RESTORE normal gland seal water alignment (supplied from this unit) in accordance with 1,2-SO-37-1, Gland Seal Water System. ☐

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

NOTE

Steps 5.1[25] through 5.1[30] may be performed out of sequence.

[25] **IF** the second #7 heater drain tank pump has not been started, **THEN**

START the second #7 heater drain tank pump in accordance with 1,2-SO-5-3. _____

NOTE

Hydrogen pressure should be maintained greater than or equal to 66 psig.

[26] **ENSURE** generator hydrogen pressure is sufficient for anticipated load in accordance with TI-28, Figure A.14, Generator Capability Curve. _____

[27] **VERIFY** river water temperature within the limitations of the NPDES permit as specified in 0-PI-OPS-000-666.0. ☐

CAUTION

After refueling operations, the NIS indications may be inaccurate until calibration at higher power levels. DO NOT increase power greater than 50% until Reactor Engineering has ensured that applicable portions of 0-RT-NUC-000-001.0 are complete.

[28] **IF** applicable portions of 0-RT-NUC-000-001.0 are complete for power increase above 50% of rated thermal power, **THEN**

N/A the following Step 5.1[29]. (Reactor Engineering) _____

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

[29] **IF** startup is following refueling activities, **THEN**

ENSURE the following have been performed prior to exceeding 50% rated thermal power: (may be performed in any order)

A. 0-SI-NUC-000-126.0, Hot Channel Factor Determination.

_____ _____
Rx Eng Date

B. 0-SI-NUC-092-079.0, Incore-Excore Axial Imbalance Comparison.

_____ _____
Rx Eng Date

C. 0-PI-NUC-092-002.0, Detector Single Point Alignment.

_____ _____
Rx Eng Date

D. 0-PI-IXX-092-N45.0, PR NIS Calibration..

_____ _____
MIG Date

E. PR High Flux Trip reset to 109%. **[C.3].**

_____ _____
MIG Date

F. Applicable portions of 0-RT-NUC-000-001.0 **COMPLETE** for operation above 50% power.

_____ _____
Rx Eng Date

[30] **WHEN** reactor power is approximately 49%, **THEN**

PERFORM the following: (in any order).

[30.1] **ENSURE** indicated Axial Flux Difference is within the limits specified in the COLR (TS 3.2.1.1). _____

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

[30.2] **PERFORM** a conditional 0-SI-NUC-000-044.0, *Axial Flux Difference.* _____

NOTE

QPTR alarms pertain to the plant computer and annunciator panel AR-M4-B, windows B-3, C-3, and D-4. Alarms may sporadically occur at 1.5% when the setpoint is 2%.

[30.3] **PERFORM** a conditional 0-SI-NUC-000-133.0, *Quadrant Power Tilt Ratio.* _____

[30.4] **IF** QPTR exceeds 1.015, **THEN**

CONTACT Reactor Engineering for evaluation. _____

NOTE

Ramp load rate increases shall be within the limits stated in TI-40.

[31] **RECORD** the following fromTI-40:

[31.1] Power ascension ramp rate from TI-40. _____ ☐

NOTE

N/A substep 5.1[31.2] and 5.1[31.3] if **NOT** initial startup after refueling outage.

[31.2] Intermediate power threshold setpoint_____ ☐

[31.3] Ramp Rate above the intermediate power threshold. ☐

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

[32] **CONTINUE** reactor power ascension to 74%. ☐

NOTE

Control rods may be used along with dilution during reactor power increase to maintain AFD within the target control band.

[33] **IF** diluting the RCS to increase T_{AVG}, **THEN**

CONTINUE dilution and increase turbine load to maintain T_{REF} with T_{AVG}. (0-SO-62-7) ☐

NOTE

Valve position limit and governor control meter are displayed on EHC Display panel 1,2-XX-047-2000 (M-2).

[34] **MONITOR** the turbine load increasing and

MAINTAIN valve position limit approximately 10% above current governor control indication as turbine load is changed. ☐

NOTE

Steps 5.1[35] through 5.1[37] may be performed out of sequence.

[35] **WHEN** greater than or equal to 50% reactor power, **THEN**

[35.1] **VERIFY** annunciator XA-55-4A, window E-4:

P-9 LOW POWER TURB TRIP-REAC TRIP BLOCK	is **DARK.**

☐

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

[35.2] **VERIFY** annunciator XA-55-4B, window B-3:

NIS POWER RANGE UPPER DETECTOR HI FLUX DEVN OR AUTO DEFEAT

is **DARK**. ☐

[35.3] **VERIFY** annunciator XA-55-4B, window C-3:

NIS POWER RANGE LOWER DETECTOR HI FLUX DEVN OR AUTO DEFEAT

is **DARK**. ☐

[35.4] **VERIFY** annunciator XA-55-4B, window D-4:

COMPUTER ALARM ROD DEV & SEQ NIS PWR RANGE TILTS

is **DARK**. ☐

[36] **ENSURE** MFPTC vacuum normal (greater than 20 inches HG vacuum) using PI-2-331A and PI-2-331B on Panel L-69. ☐

NOTE

During power operation above 50%, condenser air inleakage should be maintained less than 6 CFM.

[37] **IF** condenser air inleakage exceeds 10 CFM, **THEN**

INITIATE actions to identify the source of inleakage and **NOTIFY** Engineering and the Operations Superintendent or Plant Manager. _____

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

NOTES

1) Steps 5.1[38] through 5.1[41] may be performed out of sequence.

2) 0-SI-OPS-092-078.0 may be performed at the discretion of the Operator if one or more PRMs is indicating close to the ± 2% tolerance.

[38] **PERFORM** the following at approximately 55% reactor power:

[38.1] **IF** LEFM indication is available, **THEN**

CALCULATE Calorimetric power:

Calorimetric power= U2118 $\frac{\_\_\_\_\_}{34.55}$ = _____% ☐

[38.2] **IF** LEFM indication is NOT available, **THEN**

CALCULATE reactor power:

Calorimetric power= U1118 $\frac{\_\_\_\_\_}{34.55}$ = _____% ☐

[38.3] **VERIFY** that all operable NIS Power Range channel drawers are within ± 2% of the calculated calorimetric power.

N-41	(XI-92-5005B)	YES ☐	NO ☐
N-42	(XI-92-5006B)	YES ☐	NO ☐
N-43	(XI-92-5007B)	YES ☐	NO ☐
N-44	(XI-92-5008B)	YES ☐	NO ☐

_____

[38.4] **IF** any of the above steps are checked NO, **THEN**

PERFORM 0-SI-OPS-092-078.0. _____

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

NOTES

1) More restrictive turbine load limit for Unit 1 is based on ensuring adequate MFP suction pressure to allow pumping against higher S/G pressures following S/G replacement. (Ref: DCN E21203A).

2) Siemens Westinghouse analysis has determined that the maximum Unit Two unit power with 1 MFP operation is 65% under worst case conditions. Operation at higher power levels are dependent on current conditions. This would require System Engineering evaluation.(Ref: DCN D21732A).

[39] **ENSURE** second MFPT is in service PRIOR TO increasing turbine load above 55% (Unit 1) or 65% (Unit 2). _____

[40] **ENSURE** at least one bus duct cooler is in service **USING** 0-SO-58-1 PRIOR TO increasing load above 729 MWe. _____

CAUTION

#3 and #7 heater drains must be pumping forward prior to exceeding 60% turbine load. This load limit assumes that both MFW pumps are in service. If only one MFWP is running, turbine load must be further limited to maintain adequate MFWP suction pressure.

[41] **ENSURE** both #3 and #7 heater drain tank systems are pumping forward PRIOR TO increasing turbine load above 60%. _____

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

CAUTIONS

1) Valves 106A and 106B shall be verified to be operating properly after each #3 HDT pump start.

2) At approximately 79% turbine load with LCV-6-105A or B open and only two #3 HDT pumps are in service, the required NPSH for the MFP will be insufficient.

NOTES

1) When placing HDT pumps in service, ensure main feedwater pumps and main reg valves respond correctly and then stabilize in an acceptable band.

2) LCV-6-105A will come open at about 70% turbine load if condensate discharge pressure is high. Minimize duration at this load to reduce wear on the valve. As load is increased to 100% condensate pressure will gradually decrease allowing the #3 HDT pumps to pump forward and the condenser bypass valve(s) to close.

3) Steps 5.1[42] through 5.1[45] may be performed in any order.

[42] **WHEN** approximately 70% turbine load, **THEN**

[42.1] **PLACE** the third #3 heater drain pump in service in accordance with 1,2-SO-5-2. [C.2] _____

[42.2] **ENSURE** valves LCV-6-106A and LCV-6-106B are controlling #3 heater drain tank level properly. _____

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

CAUTION

Evaluate starting and stopping of Condensate Demineralizer pumps using condensate pressure, MFP inlet pressure, condensate booster pump inlet pressure, and #3 and #7 HDT pump and bypass valve operation. The US/SRO may start or stop Condensate Demineralizer pumps at his discretion, but if any of the following occurs the pumps must be started:

1) **Condensate Booster Pump suction pressure is less than 125 psig, as indicated on [PI-2-77].**

2) **Main Feedwater Pump suction pressure less than 420 psig, as indicated on [PI-2-129].**

3) **Injection Water Pump discharge pressure is less than 265 psig, as indicated by an alarm on XA-55-3B window E-1.**

NOTES

1) Should #7 heater drain tank pump(s) amps swing or if system pressure needs to be increased by approximately 40 psig, then Cond DI Booster pumps can be started; however, two of the three pumps must be started at the same time.

2) When placing condensate pumps in service, ensure main reg valves respond correctly and then stabilize in an acceptable band.

[43] **EVALUATE** starting two condensate demineralizer booster pumps in accordance with 1,2-SO-2/3-1 (This step can be N/A'd or signed-off at time when pumps are started). _____

NOTE

If starting up following refueling operations and reactivity calculations and tests were completed at ≈ 30% reactor power, then reactivity calculations and tests must be performed again at ≈ 75% RTP.

[44] **IF** all applicable portions of 0-RT-NUC-000-001.0 are complete for power increase above 75% of rated thermal power, **THEN**

N/A the following Step 5.1[45]. (Reactor Engineering) _____

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

CAUTION

After refueling, NIS indications may be inaccurate until calibration at higher power levels. DO NOT increase power above 75% until applicable portions of 0-RT-NUC-000-001.0 are complete.

[45] **IF** startup is following refueling, **THEN**

PERFORM the following prior to operation above 75% power: (may be performed in any order)

[45.1] **ENSURE** the following have been performed (may be N/A'd by Reactor Eng. and Instrument Maint. if NOT required):

A. 0-SI-NUC-000-126.0, Hot Channel Factor Determination.

_____ _____
Rx Eng Date

B. 0-SI-NUC-092-079.0, Incore-Excore Axial Imbalance Comparison.

_____ _____
Rx Eng Date

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

C. 0-PI-NUC-092-036.0, Incore/Excore Detector Calibration (**N/A** if **NOT** required or if ΔAFD < 3%).

_____ _____
Rx Eng Date

D. 0-PI-NUC-092-002.0, Detector Single Point Alignment.

_____ _____
Rx Eng Date

E. 0-PI-IXX-092-N45.0, PR NIS Calibration.

_____ _____
Rx Eng Date

[45.2] **NOTIFY** Systems Eng to perform 0-PI-SXX-000-022.2 to check RCS Loop ΔT Zeros. [C.7] ☐

[45.3] **ENSURE** applicable portions of 0-RT-NUC-000-001.0 are complete for operation above 75% RTP.

_____
Rx Engr.

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

NOTES

1) 0-SI-OPS-092-078.0 may be performed at the discretion of the Operator if one or more PRMs is indicating close to the ± 2% tolerance.

2) Steps 5.1[46] and 5.1[47] may be performed out of sequence.

[46] **PERFORM** the following at approximately 75% reactor power:

[46.1] **IF** LEFM indication is available, **THEN**

CALCULATE Calorimetric power:

Calorimetric power= U2118 $\frac{\text{\_\_\_\_\_}}{34.55}$ = _____% ☐

[46.2] **IF** LEFM indication is NOT available, **THEN**

CALCULATE reactor power:

Calorimetric power= U1118 $\frac{\text{\_\_\_\_\_}}{34.55}$ = _____% ☐

[46.3] **VERIFY** that all NIS Power Range A channel drawers are within ± 2% of the calculated calorimetric power.

N-41	(XI-92-5005B)	YES ☐	NO ☐
N-42	(XI-92-5006B)	YES ☐	NO ☐
N-43	(XI-92-5007B)	YES ☐	NO ☐
N-44	(XI-92-5008B)	YES ☐	NO ☐

_____

[46.4] **IF** any of the above steps are checked NO, **THEN**

PERFORM 0-SI-OPS-092-078.0. _____

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

CAUTIONS

1) LCV-6-105A and/or 105B may be throttling open due to condensate system pressure being higher than #3 HDT pump discharge pressure.

2) Turbine runback will occur if #3 HDT pump flow to the condensate system drops below 5500 gpm (for greater than 10 seconds), condensate bypass valve LCV-6-105A or 105B opens, and turbine load is above 81% (Unit 1) or 82% (Unit 2).

[47] **PRIOR** to increasing turbine load above 77%:

ENSURE the following:

[47.1] _ LCV-6-106A and -106B are controlling properly. _____

[47.2] LCV-6-105A and -105B are **CLOSED.** _____

NOTE

Ramp load rate increases shall be within the limits of TI-40.

[48] **RECORD** power ascension ramp rate from TI-40. _____ ☐

NOTES

1) Operation above 75% Load with only two Hotwell Pumps in service requires further evaluation.

2) Steps 5.1[49] through 5.1[52] may be performed out of sequence.

[49] **CONTINUE** the power ascension to 90% reactor power. ☐

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

NOTE

Control rods may be used along with dilution during reactor power increase to maintain AFD within the target control band.

[50] **IF** diluting the RCS to increase T_{AVG}, **THEN**

CONTINUE dilution and increase turbine load to maintain T_{REF} with T_{AVG}. (0-SO-62-7) ☐

NOTE

Guidance on restoration of EHC Controls after a BOP runback via the valve position limiter is contained in Appendix B, *Turbine Runback Restoration*. **[C.4]**

[51] **MONITOR** the turbine load increasing and

MAINTAIN valve position limit approximately 10% above the current governor control indication as turbine load is changed. ☐

NOTE

When the turbine impulse pressure relay number is illuminated on Panel L-262, the relay is closed and Runback circuit is armed.

[52] **WHEN** greater than 77% Turbine Load, **THEN**

VERIFY [PIS-47-13RLY1] light **[1]**,'Turbine Runback From Loss of 1 MFP' is illuminated on Panel L-262. _____

[53] **WHEN** greater than 82% Turbine Load, **THEN**

VERIFY the following relay lights are illuminated on Panel L-262:

[53.1] **[PIS-47-13RLY2],** Turbine Runback From #3HDT.**[2]** ☐

[53.2] **[PIS-47-13RLY 3],** NPSH Protection VLV-6-106B closes on #3 HDT pump trip. **[3]** ☐

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

NOTES

1) Reactor power can be increased greater than 90% as long as adequate MFP suction is maintained.

2) Steps 5.1[54] through 5.1[58] may be performed out of sequence.

[54] **WHEN** approximately 85 to 90% reactor power

OR when determined by Unit SRO (if power raised above 90%), **THEN**

ENSURE third condensate booster pump in service in accordance with 1,2-SO-2/3-1. **[C.2]** _____

NOTE

A nominal CBP suction pressure of approximately 180 psig, as indicated on **[PI-2-77]**, will alleviate bypassing to the condenser at full power.

[55] **IF** condensate pressure is high resulting in #3 or #7 heater drain tank bypassing to the condenser, **OR** the normal level control valves are near full open, **THEN**

[55.1] **THROTTLE [14-550]** to attain desired condensate pressure. _____

[55.2] **IF** unable to throttle **[14-550]**, **THEN**

REFER to 1,2-SO-5-2, Section 8.0 to adjust condensate pressure. _____

OR

[55.3] **EVALUATE** removal of the condensate demineralizer booster pumps (N/A if NOT in service). ☐

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

NOTE

Two Cond DI Booster pumps must be started at the same time.

[56] **EVALUATE** starting available condensate demineralizer booster pump(s) to raise system pressure ~ 40 psig.

Pump Started YES ☐ NO ☐ _____

[57] **WHEN** reactor power is approximately 90%, **THEN**

PERFORM the following:

[57.1] **ADJUST** Power Range instrumentation in accordance with 0-SI-OPS-092-078.0. ☐

[57.2] **INITIATE** performance of 1-PI-OPS-000-020.1 or 2-PI-OPS-000-022.1, Appendix B. ☐

CAUTION

The potential exists for condensation formation in steam extraction lines when feedwater heaters are isolated.

[57.3] **ENSURE** the following level controllers are maintaining levels within normal ranges:

A. Secondary plant heaters. _____

B. MSR drain tanks. _____

CAUTION

DO NOT exceed an average of 3455.0 MWT during an 8-hour period. [C.1]

[58] **MONITOR** NIS, ΔT and calorimetrics on plant computer (pt. U2118) while increasing reactor power. ☐

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

NOTES

1) Feedwater venturi unfouling may impact U1118 indication. LEFM calorimetric power (U2118) is not affected by venturi unfouling.

2) If U1118 is being used to monitor reactor power due to LEFM unavailable, then Calorimetric Calculation should be performed prior to exceeding 97% reactor power.

3) Steps 5.1[59] through 5.1[63] may be performed out of sequence.

[59] **IF** Unit is returning to full power after a turbine load reduction to less than 50%

AND U1118 is being used to monitor power,
THEN

PERFORM the following prior to exceeding 97% power:

[59.1] **NOTIFY** Systems Engineering to perform 0-PI-SXX-000-022.2, Calorimetric Calculation, Section 8.1, if necessary. ☐

[59.2] **PERFORM** applicable sections of 0-PI-SXX-000-022.2 to adjust Feedwater Flow Constant. (N/A if NOT required)

_____
BOP Eng

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

NOTE

Ramp load rate increases shall be within the limits of TI-40.

[60] **RECORD** the following fromTI-40:

[60.1] **Power** ascension ramp rate from TI-40. _____ ☐

NOTE

N/A substep 5.1[60.2] and 5.1[60.3] if not initial startup after refueling outage.

[60.2] Intermediate power threshold setpoint_____ ☐

[60.3] Ramp Rate above the intermediate power threshold._____ ☐

[61] **CONTINUE** power ascension to 100% RTP. ☐

NOTE

Control rods may be used along with dilution during reactor power increase to maintain AFD within the target control band.

[62] **IF** diluting the RCS to increase T_{AVG}, **THEN**

CONTINUE dilution and increase turbine load to maintain T_{REF} with T_{AVG}. (0-SO-62-7) ☐

NOTE

Valve position limit and governor control meter are displayed on EHC Display panel 1,2-XX-047-2000 (M-2).

[63] **MONITOR** the turbine load increasing **AND**

MAINTAIN valve position limit approximately 10% above the current governor control indication as turbine load is changed. ☐

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

NOTE

Steps 5.1[64] through 5.1[66] may be performed out of sequence.

[64] **WHEN** reactor power approaches 100%, **THEN**

ADJUST governor valve position limiter ~ 2% above governor valve position. ☐

CAUTION

Governor valve position limit meter may NOT match the governor valve position meter; therefore, monitor the megawatt meter and valve position limit light continuously during the following step.

NOTES

1) Operation with the VALVE POS LIMIT light LIT is acceptable if unsatisfactory load swings are experienced.

2) Actions effecting reactivity are directed in the following step. All appropriate verifications and peer checks shall be utilized during performance.

[65] **IF** unsatisfactory load swings are experienced as the unit approaches full power, **THEN**

[65.1] **WITH** turbine load set for maximum of 100% power, **SLOWLY** and **CAUTIOUSLY PULSE** the governor VALVE POSITION LIMIT in LOWER direction while monitoring megawatts for a decrease and VALVE POS LIMIT light to ILLUMINATE. ☐

[65.2] **WHEN** the limiter just reaches the governor valve position,
THEN

STOP limiter adjustment. ☐

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

CAUTION

Do not raise the limiter position unless the turbine control is positively controlling the turbine (limit light NOT LIT).

NOTE

Actions effecting reactivity are directed in the following step. All appropriate verifications and peer checks shall be utilized during performance.

[66] **PERFORM** the following if the limiter prevents reactor operation at approximately 100%:

[66.1] **ADJUST** SETTER/REFERENCE controls to reduce turbine loading until the VALVE POS LIMIT light is NOT LIT. ☐

[66.2] **INCREASE** VALVE POSITION LIMIT to allow a load increase using the SETTER/REFERENCE controls, NOT to exceed 3455.00 MWT. ☐

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

NOTES

1) Full power operation is defined as 100% power operation at approximately 3455 MW_T instantaneous value, U2118 not to exceed 3455.00 MW_T average thermal power in an 8-hour period. **[C.1]**

2) Do not intentionally operate the reactor at greater than 100% power (e.g., if reactor power is less than 100% for any time period then operation at slightly greater than 100% to "make up" for "lost" power is not permissible). **[C.1]**

3) Computer point U2118 should be trended on a trend recorder in the unit horseshoe and monitored for increasing reactor power trends above 3455 MW_T. Prompt action shall be taken to decrease reactor power whenever an increasing power trend is observed. **[C.1]**

4) Do not exceed an 8-hour average value (U2126) of 3455.00 MW_T. Do not allow U2125 (one hour avg) to exceed 3455.00 MW_T (100%) for more than one hour. **[C.1]**

5) Portions of step 5.1[68] may be performed in parallel with step5.1[67] if required.

[67] **WHEN** the unit stabilizes at 100% reactor power,
THEN

PERFORM the following: (may be performed in any order)

[67.1] **ADJUST** Governor Valve position, rod height, and/or RCS boron concentration as necessary to establish core thermal power at desired value and Auctioneered Hi T-avg approximately equal to T-ref. ☐

[67.2] **NOTIFY** load coordinator that the power increase is complete. ☐

[67.3] **NOTIFY** RADCON that power has stabilized at 100%. ☐

(step continued on next page)

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

NOTE

Use of seal steam spillover bypass FCV-47-191 should be minimized to reduce the effect of unit trip on seal steam pressure.

[67.4] **IF** Seal Steam spillover bypass **[FCV-47-191]** is IN SERVICE, **THEN**

THROTTLE Seal Steam spillover bypass to control **[FCV-47-191]** as required to control seal steam pressure. ☐

[67.5] **IF** river temperature is less than 45°F, **THEN**

CONSULT Engineering to determine if third CCW pump should be removed from service. ☐

[67.6] **CONTACT** vibration engineer in Predictive Maintenance Group to monitor MFWP vibration. ☐

CAUTION

A bias adjustment in the upward direction (> 50%) should NOT be used unless evaluated by Systems Engineering since this could impact a MFPT's maximum speed and the ability to fully load in the event the other MFPT trips.

[67.7] **IF** feed pump vibration is above desired levels, **THEN**
CONSULT with vibration engineer and system engineer to determine which feed pump to bias to reduce vibration. ☐

[67.8] **IF** MFPT master controller output is NOT indicating 45% to 55%
THEN
CONSULT with MFPT controls system engineer to evaluate if adjustment is required per 1,2-SO-2/3-1. ☐

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

[68] **IF** startup is following refueling activities, **THEN**

ENSURE the following are performed at approximately 100% Rated Thermal Power: (may be performed in any order)

[68.1] 0-PI-SXX-000-022.2, Calorimetric Calculation.

_____
Systems Eng.

[68.2] 0-PI-SXX-000-022.1, Delta T and Tavg Update. [C.7]

_____
Systems Eng..

[68.3] 0-SI-NUC-000-126.0, Hot Channel Factor Determination.

_____ Rx Eng _____ Date

[68.4] 0-SI-NUC-000-120.0, Reactivity Balance.

_____ Rx Eng _____ Date

[68.5] 0-SI-NUC-092-079.0, Incore-Excore Axial Imbalance Comparison.

_____ Rx Eng _____ Date

[68.6] 0-PI-NUC-092-036.0, Incore-Excore Detector Calibration.

_____ Rx Eng _____ Date

[68.7] 0-PI-IXX-092-N45.0, PR NIS Calibration
(May be N/A'd if Engineering determines calibration performed at < 75% RTP is adequate.)

_____
Inst Maint

[68.8] Applicable portions of 0-RT-NUC-000-001.0 are complete for full power operations.

_____
Rx Engr

STARTUP No._____ Unit _____ Date _____

5.1 Power Ascension From 30% to 100% (continued)

NOTE
This step may be performed out of sequence if required.

[69] **IF** Steam Generator WR level recorders were re-scaled to 80% - 90% in 0-GO-2, **THEN**

NOTIFY MIG to re-scale LR-3-43A and LR-3-98A, Steam Generator Wide Range Level Recorders, to 0% - 100%. _____

[70] **IF** unit shutdown to minimum load, **THEN**

GO TO Section 5.3. _____

[71] **IF** unit is to be maintained at normal power, **THEN**

GO TO Section 5.2. _____

END OF TEXT

STARTUP No._____ **Unit _____** **Date _____**

5.2 At Power Conditions

CAUTIONS

1) **Full power operation is defined as approximately 3455 MWT NOT to exceed 3455.0 MWT averaged over an 8-hour period. [C.1]**

2) **Power should NOT exceed one hour average (U2125) of 3455.00 MWT for more than one hour.**

3) **Power shall NOT exceed an 8-hour average value (U2126) of 3455.00 MWT (readings at 0700, 1500 and 2300 hours).**

NOTES

1) Main Generator operation without Automatic Voltage control requires that Narrative Log entries be made (time, date, reason & duration) and that notification be made to Operations Duty Specialist (ODS) within twenty four (24) hours.

2) Main Generator operation outside of the Voltage Schedule in GOI-6 requires that Narrative Log entries be made (time, date, reason & duration) and that notification be made to South East Area Load Dispatcher (SELD) within one (1) hour.

3) Operation of main generator without automatic voltage control could impact grid voltage requirements. The South East Area Load Dispatcher (SELD) should be notified immediately if generator is in service without automatic voltage regulator. Also, refer to Section E of GOI 6 for MVAR limits.

4) Do not intentionally operate the reactor at greater than 100% power (e.g. if reactor power is less than 100% for any time period then operation at slightly greater than 100% to make UP for LOST power is not permissible). **[C.1]**

5) Steps in this section may be performed out of sequence.

[1] **TREND** Computer point U2118 on a trend recorder in the unit horseshoe and monitor for increasing reactor power trends above 3455 MW_T. ☐

[2] **IF** increasing power trend is observed, **THEN**

ENSURE PROMPT action is taken to decrease reactor power as necessary. **[C.1]**

1st CV

STARTUP No._____ **Unit _____** **Date _____**

5.2 At Power Conditions (continued)

CAUTION

If LEFM is lost with reactor power at 100%, core thermal power should NOT be raised to take advantage of U-1118 reading lower.

NOTE

The following restrictions apply if LEFM calorimetric power indication (U2118) is unavailable:

Applicable action of TRM 3.3.3.15 must be entered.

AFD limits in COLR and TI-28 must be made more restrictive by 1%.

Rod insertion limits in COLR must be raised by 3 steps.

[3] **IF** ICS point U2118 is unreliable or unavailable, **THEN**

PERFORM the following:

[3.1] **MONITOR** thermal power by using one of the following:

- ICS point U1118 (if available) ☐
- highest reading NIS power range channel. **[C.1]** ☐

[3.2] **RESTORE** calorimetric power indication prior to next required performance of 0-SI-OPS-092-078.0. ☐

[3.3] **IF** LEFM CANNOT be restored prior to 0-SI-OPS-092-078.0 being required, **THEN**

ENSURE power is less than or equal to 98.7% (3411 MW_T) prior to performing 0-SI-OPS-092-078.0:

- **REDUCE** turbine load as necessary. ☐
- **MAINTAIN** T_{AVG} and AFD on program using boration and/or rod insertion as necessary. ☐

STARTUP No._____ Unit _____ Date _____

5.2 At Power Conditions (continued)

[3.4] **PERFORM** 0-SI-OPS-092-078.0 using U-1118 or alternate method. ☐

[3.5] **MAINTAIN** power less than or equal to 98.7% (3411 MWT) UNTIL LEFM is restored and 0-SI-OPS-092-078.0 is re-performed using LEFM data. ☐

[4] **MAINTAIN** rod control system in automatic to allow proper plant response to load reductions and runbacks. ☐

[5] **DURING** steady state operation ≥ 85% RTP **MAINTAIN** control bank D greater than 215 steps if possible and AFD within the nominal ± 5% target band and also within the AFD limits specified in the COLR. ☐

[6] **DURING** steady state operation < 85% RTP **MAINTAIN** control bank D greater than 165 steps if possible and the axial flux difference (AFD) within the nominal ± 5% target band and also within the AFD limits specified in the COLR. ☐

[7] **OPERATE** the turbine in IMP OUT due to inherent system swings during operation in IMP IN. (Operation in IMP IN is permitted during governor valve testing.) ☐

NOTE

Valve position limiter should normally be maintained ~ 2% above governor valve position unless load swings occur.

[8] **IF** unsatisfactory load swings are observed, **THEN**

ADJUST governor valve position limiter as necessary to limit governor valve motion.

1st CV

STARTUP No._____ Unit _____ Date _____

5.2 At Power Conditions (continued)

CAUTION

Do NOT raise the limiter position unless the turbine control is positively controlling the turbine (limit light NOT LIT).

[9] **IF** governor valve motion limiting is no longer needed, **THEN**

[9.1] **ADJUST** SETTER/REFERENCE controls to reduce turbine loading until the VALVE POS LIMIT light is NOT LIT. ☐

[9.2] **INCREASE** VALVE POS LIMITER setpoint to ~ 2% above current load, ENSURING load does NOT change. ☐

[10] **IF** an axial xenon oscillation develops and requires suppression, **THEN**

[10.1] **MOVE** control bank inward when AFD is moving positive above target AFD, **OR**

[10.2] **MOVE** control bank outward when AFD is moving negative below target AFD, **AND**

HOLD AFD at target until oscillation is suppressed. ☐

[10.3] **IF** this basic first overtone control is insufficient, **THEN**

CONTACT Reactor Engineering for assistance. ☐

STARTUP No._____ Unit _____ Date _____

5.2 At Power Conditions (continued)

NOTE

Lowering load on the Main Generator will cause VARs to trend in the positive direction (toward outgoing). This will require lowering generator voltage. Conversely, raising generator load will cause VARs to trend in the negative direction and will require raising generator voltage. Refer to GOI-6 Section E for MVAR limits for generator stability. Refer precautions Q, R, and S.

[11] **PERFORM** the following as required:

[11.1] IF Automatic Voltage Control is in service,
THEN
ADJUST Main Generator VARs **USING**
[HS-57-22] Exciter Voltage Auto Adjuster as necessary during power escalation. _____

[11.2] IF Automatic Voltage Control is NOT in service,
THEN
ADJUST Main Generator VARs **USING**
[HS-57-23] Exciter Voltage Base Adjuster as necessary during power escalation. _____

NOTE

Deboration using a mixed bed demin is normally used when less than 50 ppm but may be used between 50-100 ppm if recommended by Chemistry or if required due to dilution capability NOT available.

[12] **PERFORM** the following as necessary to maintain T-avg and thermal power at desired value:

[12.1] **ADJUST** RCS boron concentration in accordance with 0-SO-62-7, Boron Concentration Control ☐

OR

[12.2] **ADJUST** control rod position in accordance with 0-SO-85-1, Control Rod Drive System ☐

OR

STARTUP No._____ **Unit _____** **Date _____**

5.2 At Power Conditions (continued)

[12.3] **ADJUST** turbine load slightly ☐

OR

[12.4] **DEBORATE** RCS periodically using a mixed bed demin in accordance with 1,2-SO-62-9 (if RCS boron less than 100 ppm) ☐

NOTE

Appendix D provides recommended power values for maintaining condensate pressure if secondary plant equipment must be removed from service for maintenance.

[13] **IF** unit shutdown or load reduction is required, **THEN**

GO TO Section 5.3 of this instruction. _____

[14] **IF** Load Follow is required, **THEN**

PERFORM Section 5.5, *Load Follow Operations.* _____

[15] **IF** at end of cycle and a power coastdown is required, **THEN**

PERFORM Section 5.4, *Power Coastdown At End Of Life.* _____

END OF TEXT

STARTUP No._____ Unit 1 Date Today

5.3 Power Reduction From 100% to 30%

NOTES

1) This section may be used to reduce power to ~30% during plant shutdown OR a portion of this section may be performed to reduce power as required by plant conditions. Steps which are not required for partial load reduction may be marked N/A with SM concurrence as specified by SPP-2.2.

2) Appendix D provides guidance on recommended power values to maintain condensate pressure if secondary plant equipment must be removed from service for maintenance.

3) Steps 5.3[2] through 5.3[6] may be performed out of sequence.

[1] **ENSURE** Section 4.0, Prerequisites complete. RHE

[2] **REVIEW** of Precautions and Limitations Section 3.0 has been completed. ☑

[3] **NOTIFY** RADCON of impending load reduction. ☑

[4] **NOTIFY** CON DI operators of load reduction and to remove beds as needed. ☑

[5] **NOTIFY** Load Dispatcher of impending load reduction. ☑

NOTE

Lowering load on the Main Generator will cause VARs to trend in the positive direction (toward outgoing). This will require lowering generator voltage. Refer to GOI-6 Section E for MVAR limits for generator stability.

[6] **PERFORM** the following as required:

[6.1] IF Automatic Voltage Control is in service,
THEN
ADJUST Main Generator VARs **USING**
[HS-57-22] Exciter Voltage Auto Adjuster as necessary during power escalation. RHE

[6.2] IF Automatic Voltage Control is NOT in service,
THEN
ADJUST Main Generator VARs **USING**
[HS-57-23] Exciter Voltage Base Adjuster as necessary during power escalation. N/A

STARTUP No._____ Unit 1 Date July

5.3 Power Reduction From 100% to 30% (continued)

NOTES

1) Guidance on restoration of EHC Controls after a BOP runback is contained in Appendix B, *Turbine Runback Restoration*. **[C.4]**

2) For core operating recommendations for situations such as end of core life coast down or unusual power maneuvers, contact Reactor Engineering for guidance. **[C.5]**

3) It is recommended that AFD be controlled within the target band.

4) The following general approach should be used during power reduction:
(a) borate RCS to reduce RCS T_{AVG} within limits of T_{REF}, (b) reduce turbine load to match T_{REF} with T_{AVG}
(c) periodically take rod control to MANUAL from AUTO and insert the bank to move AFD near the target value, (d) return rod control to AUTO when not using the bank to control AFD, and
(e) repeat the above as necessary to accomplish the load change.

5) Actions effecting reactivity are directed in the following step. 0-SO-62-7 requirements shall be adhered to for reactivity changes (i.e. reactivity balance, amounts of boric acid or water). All appropriate verifications and peer checks shall be utilized during performance.

[7] **INITIATE** a load reduction. ☐

STARTUP No._____ Unit _____ Date _____

5.3 Power Reduction From 100% to 30% (continued)

[8] **MONITOR** turbine load decreasing. ☐

CAUTION

Do NOT exceed a load change rate of plus or minus 5%/minute or a step change of 10%.

NOTE

T_{AVG} is programmed from 578.2°F at 100% power to 547°F at zero power at a rate of 0.312°F per % power.

[9] **MONITOR** the following during the load reduction:

[9.1] — T_{AVG} following TREF program. ☐

[9.2] All RPIs, group step counters for rod insertion limits and inoperable rods or rod misalignment, Loop ΔT, and NIS for correct power distribution and quadrant power tilts. ☐

[9.3] Core AFD within ± 5% control band around the power level dependent target value. ☐

NOTE

Valve position limit and governor control meter are displayed on EHC Display panel 1,2-XX-047-2000 (M-2).

[9.4] Valve position limit approximately 10% above the current governor control indication as turbine load is changed. ☐

[10] **IF** AFD remains outside the AFD target band for approximately 30 min or more, **THEN**

CONTACT Reactor Engineering as to why and when the AFD might be returned to the target band. ☐

STARTUP No._____ Unit _____ Date _____

5.3 Power Reduction From 100% to 30% (continued)

NOTES

1) Shutdown of the condensate demineralizer booster pumps should be based on header pressure, the ability of the drain tank pumps to pump forward, or System Engineering evaluation.

2) The following step may be marked N/A if reducing power as specified by AOP-S.04, *Condensate and Heater Drains Malfunction,* or as specified by Appendix D. In this case, all available condensate and heater drain pumps should remain in service to maintain adequate condensate pressure.

[11] **WHEN** reactor power is approximately 85 to 90%, **THEN**

PERFORM the following:

[11.1] **IF** three condensate demineralizer booster pumps are in service, **THEN**

EVALUATE removing one (1) condensate demineralizer booster pump in accordance with 1,2-SO-2/3-1. _____

[11.2] **IF** two condensate demineralizer booster pumps are in service, **THEN**

EVALUATE removing both condensate demineralizer booster pumps in accordance with 1,2-SO-2/3-1. _____

[11.3] **STOP** one (1) condensate booster pump in accordance with 1,2-SO-2/3-1. _____

STARTUP No._____ Unit _____ Date _____

5.3 Power Reduction From 100% to 30% (continued)

NOTE

0-SI-OPS-092-078.0 may be performed at the discretion of the Operator if one or more PRMs is indicating close to the ± 2% tolerance.

[12] **PERFORM** the following at approximately 80% reactor power:

[12.1] **IF** LEFM indication is available, **THEN**

CALCULATE Calorimetric power:

Calorimetric power= U2118 $\frac{\text{_____}}{34.55}$ = _____% ☐

[12.2] **IF** LEFM indication is NOT available, **THEN**

CALCULATE reactor power:

Calorimetric power= U2118 $\frac{\text{_____}}{34.55}$ = _____% ☐

[12.3] **VERIFY** that all NIS Power Range A channel drawers are within ± 2% of the calculated calorimetric power.

N-41	(XI-92-5005B)	YES ☐	NO ☐
N-42	(XI-92-5006B)	YES ☐	NO ☐
N-43	(XI-92-5007B)	YES ☐	NO ☐
N-44	(XI-92-5008B)	YES ☐	NO ☐

_____

[12.4] **IF** any of the above steps are checked NO, **THEN**

PERFORM 0-SI-OPS-092-078.0. _____

STARTUP No._____ Unit _____ Date _____

5.3 Power Reduction From 100% to 30% (continued)

NOTE

Turbine Impulse pressure relay lights are located on L-262.Relay lights are dark when relays are **NOT** armed. Relay No. 4 is a spare.

[13] **WHEN** turbine load less than 71% (Unit 1) 72% (Unit 2), **THEN**

PERFORM one of the following (N/A substep not performed):

[13.1] **VERIFY** Turbine Runback circuits are NOT armed by performing the following:

A. **ENSURE [PIS-47-13RLY1],** (Turbine runback from MFP loss) is NOT LIT. _____

B. **ENSURE [PIS-47-13RLY2],** (Turbine runback from No. 3 HDT) is NOT LIT. _____

C. **ENSURE [PIS-47-13RLY3],** (Closure of LCV-6-106B from Loss of any #3 HDTP) is NOT LIT. _____

[13.2] **VERIFY** Turbine Runback circuits are NOT armed by performing the following:

A. **ENSURE [FU2-47-13A],** (Turbine runback from MFP loss) **REMOVED** (Aux Inst Rm. R71). _____

B. **ENSURE [FU2-500-R071K3],** (Turbine runback from No. 3 HDT) **REMOVED** (Aux Inst Rm R-75). _____

C. **ENSURE** jumper between P18-1 and P18-2 in Pnl 262, (Closure of LCV-6-106B from Loss of any #3 HDTP) **REMOVED**. _____

STARTUP No._____ Unit _____ Date _____

5.3 Power Reduction From 100% to 30% (continued)

CAUTION

Valves LCV-6-106A and 106B shall be verified to be controlling properly during unit load reduction.

NOTES

1) One MFWP is normally removed from service at 45% turbine load but, if necessary, may be removed from service at power level less than 55% (Unit 1) or 65% (Unit 2) if approved by the Operations Superintendent.

2) If holding at a power level less than 60% the condensate demineralizer booster pumps may be left running.

3) Shutdown of the condensate demineralizer booster pumps and #3 heater drain pumps should be based upon header pressure and ability of the drain tank pumps to pump forward.

[14] **WHEN** between 55 to 70% turbine load, **THEN**

PERFORM the following:

[14.1] **SIMULTANEOUSLY STOP** both operating condensate demineralizer booster pumps in accordance with 1,2-SO-2/3-1 (N/A if NOT in service). _____

[14.2] **VERIFY** #3 HDT runback NOT armed by ensuring either (N/A method NOT used)

Step 5.3[13.1]B completed _____

OR

Step 5.3[13.2]B completed. _____

STARTUP No._____ Unit _____ Date _____

5.3 Power Reduction From 100% to 30% (continued)

[14.3] **STOP** one of the three #3 heater drain tank pumps in accordance with 1,2-SO-5-2. _____

[14.4] **DISPATCH** an AUO to perform one of the following to align steam seals to the unit:

A. **IF** Auxiliary Steam Header is available and other unit is greater than 55% load, **THEN**

ALIGN opposite units #3 Extraction to supply steam seals in accordance with 0-SO-12-1. ☐

B. **IF** the #3 Extraction on the opposite unit is **NOT** available **THEN**

PLACE the Auxiliary Boiler in service in accordance with 0-SO-12-1, **OR**

ENSURE steam seals are being supplied from the unit's main steam supply. ☐

NOTE

0-SI-OPS-092-078.0 may be performed at discretion of Operator if one or more PRMs is indicating close to the ± 2% tolerance.

[15] **PERFORM** the following at approximately 60% reactor power:

[15.1] **IF** LEFM indication is available, **THEN**

CALCULATE Calorimetric power:

Calorimetric power= U2118 _____ / 34.55 = _____% ☐ 34.55

[15.2] **IF** LEFM indication is NOT available, **THEN**

CALCULATE reactor power:

Calorimetric power= U1118 _____ / 34.55 = _____% ☐ 34.55

STARTUP No._____ Unit _____ Date _____

5.3 Power Reduction From 100% to 30% (continued)

[15.3] **VERIFY** that all NIS Power Range A channel drawers are within ± 2% of the calculated calorimetric power.

N-41	(XI-92-5005B)	YES ☐	NO ☐
N-42	(XI-92-5006B)	YES ☐	NO ☐
N-43	(XI-92-5007B)	YES ☐	NO ☐
N-44	(XI-92-5008B)	YES ☐	NO ☐

_____

[15.4] **IF** any of the above steps are checked NO, **THEN**

PERFORM 0-SI-OPS-092-078.0. _____

STARTUP No._____ Unit _____ Date _____

5.3 Power Reduction From 100% to 30% (continued)

NOTE

Steps 5.3[16] through 5.3[18] may be performed out of sequence.

[16] **WHEN** between 40% and 65% turbine load, **THEN**

STOP one of the two #7 heater drain tank pumps in accordance with 1,2-SO-5-3. _____

[17] **WHEN** reactor power is approximately 50%, **THEN**

VERIFY annunciator XA-55-4A, window E-4:

P-9 LOW POWER TURB TRIP-REAC TRIP BLOCK

is **LIT**. ☐

[18] **WHEN** approximately 45% turbine load, **THEN**

PERFORM the following:

[18.1] **IF** operating with two main feedwater pumps in service, **THEN**

SHUTDOWN one main feedwater pump in accordance with 1,2-SO-2/3-1. _____

[18.2] **STOP** the second #7 heater drain tank pump in accordance with 1,2-SO-5-3. _____

STARTUP No._____ Unit _____ Date _____

5.3 Power Reduction From 100% to 30% (continued)

NOTE

0-SI-OPS-092-078.0 may be performed at the discretion of the Operator if one or more PRMs is indicating close to the ± 2% tolerance.

[19] **PERFORM** the following at approximately 40% reactor power:

[19.1] **IF** LEFM indication is available,
THEN

CALCULATE Calorimetric power:

Calorimetric power= U2118 $\frac{\text{\_\_\_\_\_}}{34.55}$ = _____% ☐

[19.2] **IF** LEFM indication is NOT available,
THEN

CALCULATE reactor power:

Calorimetric power= U2118 $\frac{\text{\_\_\_\_\_}}{34.55}$ = _____% ☐

[19.3] **VERIFY** that all NIS Power Range A channel drawers are within ± 2% of the calculated calorimetric power.

N-41 (XI-92-5005B) YES ☐ NO ☐

N-42 (XI-92-5006B) YES ☐ NO ☐

N-43 (XI-92-5007B) YES ☐ NO ☐

N-44 (XI-92-5008B) YES ☐ NO ☐

_____

[19.4] **IF** any of the above steps are checked NO,
THEN

PERFORM 0-SI-OPS-092-078.0. _____

STARTUP No._____ Unit _____ Date _____

5.3 Power Reduction From 100% to 30% (continued)

NOTE

AMSAC is blocked when less than 40% turbine load for greater than 360 seconds (time delay).

[20] **WHEN** less than 40% turbine load, **THEN**

VERIFY annunciator XA-55-4A, window E-7:

C-20 AMSAC ARMED

is **DARK**. ☐

[21] **WHEN** approximately 35% reactor power, **THEN**

VERIFY annunciator XA-55-4A, window C-5:

P-8 LOW POWER LOW FLOW TRIP BLOCK

is **LIT**. ☐

[22] **WHEN** approximately 30% turbine load, **THEN**

[22.1] **STOP** the two operating #3 heater drain pumps in accordance with 1,2-SO-5-2. _____

[22.2] **STOP** one of the two operating condensate booster pumps in accordance with 1,2-SO-2/3-1. _____

[22.3] **STOP** one of the three operating hotwell pumps in accordance with 1,2-SO-2/3-1. _____

STARTUP No._____ Unit _____ Date _____

5.3 Power Reduction From 100% to 30% (continued)

[23] **STABILIZE** the plant at approximately 30% reactor power with reliable steam flow/feed flow indications. ☐

[24] **IF** further load reduction is required, **THEN**
GO TO 0-GO-6, *Power Reduction from 30% Reactor Power To Hot Standby.* _____

[25] **IF** main turbine shutdown is desired while holding reactor power at approximately 30%, **THEN**

GO TO 0-GO-11, *Turbine Shutdown Without Reactor Shutdown.* _____

[26] **IF** reactor shutdown and turbine shutdown is required **THEN**

GO TO 0-GO-6, *Power Reduction from 30% Reactor Power To Hot Standby.* _____

[27] **IF** unit is to return to 100% power operation, **THEN**

GO TO Section 5.0 of this instruction. _____

END OF TEXT

STARTUP No._____ **Unit _____** **Date _____**

5.4 Power Coastdown at End of Life

CAUTION

Do NOT exceed the positive Axial Flux Difference (AFD) limit of TI-28 during power coastdown.

NOTES

1) The power level of the reactor and turbine slowly coastdown from full power approximately 0.8% per day with T_{AVG} and T_{REF} maintained on program. The core cycle may be extended for 30 days or more. The coastdown enables the plant to reach the refueling date with a core burnup within the prescribed burnup window if the normal cycle length is insufficient for the calendar refueling date.

2) For core operating recommendations during coastdown or unusual power maneuvers, contact Reactor Engineering for guidance. **[C.5]**

[1] **ENSURE** Precautions and Limitations have been reviewed. ☐

[2] **ENSURE** RCS boron concentration is less than 50 ppm, **OR** at a higher level acceptable to chemistry. _____

[3] **ENSURE** HUTs have sufficient capacity to hold excess water from the dilution process. _____

NOTE

T_{AVG} is programmed from 578.2°F at 100% power to 547°F at zero power at a rate of 0.312°F per % power.

[4] **MONITOR** T_{AVG} on program with T_{REF} within ± 1.5°F. ☐

STARTUP No._____ Unit _____ Date _____

5.4 Power Coastdown at End of Life (continued)

NOTE

Lowering load on the Main Generator will cause VARs to trend in the positive direction (toward outgoing). This will require lowering generator voltage. Refer to GOI-6 Section E for MVAR limits for generator stability. Refer to precautions Q, R, and S.

[5] **PERFORM** the following as required:

[5.1] IF Automatic Voltage Control is in service,
THEN
ADJUST Main Generator VARs **USING**
[HS-57-22] Exciter Voltage Auto Adjuster as necessary during power escalation. _____

[5.2] IF Automatic Voltage Control is NOT in service,
THEN
ADJUST Main Generator VARs **USING**
[HS-57-23] Exciter Voltage Base Adjuster as necessary during power escalation. _____

[6] **WHEN** RCS boron is less than or equal to approximately 40 ppm **OR** when recommended by Chemistry, **THEN**

DE-BORATE RCS periodically as necessary to maintain T_{AVG} on program using 1,2-SO-62-9 (Placing Mixed Bed Demin in service). ☐

[7] **IF** de-boration using Mixed Bed Demineralizer or dilution becomes ineffective for maintaining T_{AVG} on program with T_{REF},
THEN
WITHDRAW control rods to maintain T_{AVG} on program **USING** 0-SO-85-1. _____

STARTUP No._____ **Unit** _____ **Date** _____

5.4 Power Coastdown at End of Life (continued)

[8] **IF** an axial xenon oscillation develops and requires suppression, **THEN**

[8.1] **MOVE** control bank inward when AFD is moving positive above target AFD,

1st CV

OR

[8.2] **MOVE** control bank outward when AFD is moving negative below target **AFD**,

1st CV

AND

HOLD AFD at target until oscillation is suppressed. ☐

[8.3] **IF** this basic first overtone control is insufficient, **THEN**

CONTACT Reactor Engineering for assistance. ☐

STARTUP No._____ Unit _____ Date _____

5.4 Power Coastdown at End of Life (continued)

NOTE

The annunciator for Bank D Rod Withdrawal Limit High (XA-55-4B, window 21) will be illuminated when rods are withdrawn to ≥ 220 steps on D control rod bank.

[9] **WHEN** control rods have been withdrawn to the fully withdrawn position, **THEN**

[9.1] **DECREASE** turbine load slowly (less than 1% per hour) as necessary to maintain TAVG on program with T_{REF}. ☐

[9.2] **MAINTAIN** valve position limit approximately 10% above the current governor control indication as turbine load is changed. ☐

CAUTION

The governor valve position limit meter may NOT match the governor valve position meter; therefore, monitor the megawatt meter and valve position limit light continuously during the following adjustment.

NOTE

Operation with the VALVE POS LIMIT light LIT is acceptable if unsatisfactory load swings are experienced.

[10] **IF** unsatisfactory load swings are experienced as the turbine load is decreased, **THEN**

[10.1] **SLOWLY** and **CAUTIOUSLY** PULSE the governor VALVE POSITION LIMIT in the LOWER direction while monitoring megawatts for a decrease and the VALVE POS LIMIT light to ILLUMINATE.

1st CV

[10.2] **WHEN** the limiter just reaches the governor valve position (Valve Pos Limit light should be lit), **THEN**

STOP limiter adjustment. ☐