Final Submittal

(Blue Paper)

FINAL JPMS

1. ADMINISTRATIVE JPMs
2. IN-PLANT JPMs
3. [✓ SIMULATOR JPMs (CONTROL ROOM)]

SEQUOYAH
2008-301

SIM JPM B.1.a

SEQUOYAH NUCLEAR PLANT
JOB PERFORMANCE MEASURE

B.1.a

JPM 57-AP2

Respond to High Containment Pressure, Place RHR Spray in Service

PREPARED/ REVISED BY: ______________________ Date/ ______

VALIDATED BY: * ______________________ Date/ ______

APPROVED BY: ______________________ Date/ ______
(Operations Training Manager)

CONCURRED: ** ______________________ Date/ ______
(Operations Representative)

* Validation not required for minor enhancements, procedure Rev changes that do not affect the JPM, or individual step changes that do not affect the flow of the JPM.
** Operations Concurrence required for new JPMs and changes that affect the flow of the JPM (if not driven by a procedure revision).

NUCLEAR TRAINING

REVISION/USAGE LOG

Revision Number	Description Of Revision	V	Date	Pages Affected	Prepared/ Revised By:
0	Initial issue Used in 2000 NRC initial exam as 57AP	Y	12/3/01	All	L. Pauley
1	Revised to latest revision of FR-Z.1	N	8/20/02	4	J P Kearney
2	Made back into simulator JPM (was set up to be run in actual MCR). Set up for current IC and procedure revision.	Y	8/4/05	All	MG Croteau
	Updated references, wrote and referenced SCENS file	N	10/20/05	3, 4	JJ Tricoglou
3	Reworded turnover information, referenced FR-Z.1 rev 17, revised instructions, added handout sheet, modified standards wording.			4,10	

V - Specify if the JPM change will require another validation (Y or N).
See cover sheet for criteria.

SEQUOYAH NUCLEAR PLANT
RO/SRO
JOB PERFORMANCE MEASURE

Task:

Respond to High Containment Pressure, Place RHR Spray in Service

Note: This JPM satisfies Simulator Manipulation "IN13".

JA/TA task # : 3110160601 (**RO**)

K/A Ratings:

022000 A3.01 (4.1 - 4.4)	022000 A4.04 (3.1 -3.20
026000 GA13 (3.6 - 3.6)	026000 GA9 (3.6 - 3.6)

Task Standard:

Attempt to establish one train of RHR spray in service per FR-Z.1.

Evaluation Method : Simulator __X____ In-Plant ________

==

Performer: ____________________________________
NAME

Start Time ________

Performance Rating : SAT _____ UNSAT _____ Performance Time _____

Finish Time _______

Evaluator: ______________________________/_________
SIGNATURE DATE

==

COMMENTS

SPECIAL INSTRUCTIONS TO EVALUATOR:

1. Sequenced steps identified by an "s"
2. Any UNSAT requires comments
3. Initialize simulator in **IC#176**. If IC 176 is not available the reset to IC #24 and complete substeps below.
   a. Activate MF # **TH01A at 35%**.
   b. Activate MFs # **CH01 A thru D at 70%** (~10.2 psid)
   c. Complete the actions of ES-1.3, Sump Swapover. Stop RCPs.
   d. Activate Override **ZDIHS6393A OPEN**, to prevent FCV-63-93 from closing.
   e. Activate Override **ZDIHS7241A CLOSE**, to prevent FCV-72-41 from opening.
4. Activate the following, as necessary, to prevent nuisance alarms:
   - AN:OVRN[96] to OFF, prevents Turbine Zero Speed alarm
   - AN:OVRN[214] to OFF, prevents Saturation Monitor alarm
   - AN:OVRN[304] to OFF, prevents MFP Lo NPSH
   - AN:OVRN[2155] to OFF, prevents SG Pressure Lo
5. Insert Remote Function RHR14 ON, places power on FCV-63-1.
6. FREEZE the simulator until the operator is ready to commence task.
7. Console operator will need to acknowledge alarms not associated with JPM.
8. Ensure operator performs the following required actions for **SELF-CHECKING;**
   a. Identifies the correct unit, train, component, etc.
   b. Reviews the intended action and expected response.
   c. Compares the actual response to the expected response.

Validation Time: CR. 8 mins **Local** ____________

Tools/Equipment/Procedures Needed:
FR-Z.1, step 13

References:

	Reference	Title	Rev No.
1.	FR-Z.1	High Containment Pressure	17

==

READ TO OPERATOR

Directions to Trainee:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. Unit 1 has experienced a reactor trip and Safety Injection in conjunction with a large break LOCA.
2. The crew has been monitoring step 13 of FR-Z.1 since FR-Z.1 was implemented.
3. 1 hour has elapsed since the accident.

INITIATING CUES:

1. The US directs you to perform FR-Z.1, Step 13 to initiate one train of RHR spray.
2. Inform the US when Step 13 has been completed.

STEP/STANDARD	SAT/UNSAT
STEP 1.: Obtain copy of appropriate procedure. ***Cue:*** ***After operator locates FR-Z.1 procedure, provide a copy of FR-Z.1 marked up as appropriate.*** STANDARD: Operator obtains a copy of FR-Z.1 (begin at Step 13). COMMENTS:	___ SAT ___ UNSAT Start Time_____
STEP 2.: [FR-Z.1, Step 13] MONITOR if RHR Spray should be placed in service. CHECK Containment press greater than 9.5 psid. STANDARD: Operator checks PDIS-30-42 through 45 and determines that pressure is greater than 9.5. COMMENTS:	___ SAT ___ UNSAT
STEP 3.: CHECK at least 1 hour has elapsed since beginning of accident. ***Cue:*** ***IF asked, 1 hour has elapsed since beginning of accident.*** STANDARD: Operator determines from initiating cues (or asks US) that 1 hour has elapsed. COMMENTS:	___ SAT ___ UNSAT
STEP 4.: CHECK RHR suction ALIGNED to containment sump. ***Cue:*** ***If asked, ES-1.3 has been completed.*** STANDARD: Operator check FCV-63-72 and 73 open AND FCV-74-3 and 21 closed. OR asks US if ES-1.3 "Transfer to RHR Containment Sump" has been completed. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 5.: CHECK at least one CCP AND one SI pump RUNNING. STANDARD: Operator ensures at least one CCP is running as indicated by red light on 1-HS-62-104A or 1-HS-62-108A LIT. **AND** Ensures at least one SI pump is running as indicated by red lights on 1-HS-63-10A or 1-HS-63-15A "LIT". COMMENTS:	___ SAT ___ UNSAT
STEP 6.: [13.b]CHECK both RHR pumps RUNNING. STANDARD: Operator checks that both RHR pumps are running as indicated by red lights on 1-HS-74-10A and 1-HS-20A "LIT". COMMENTS:	___ SAT ___ UNSAT
STEP 7.: [13.c] ESTABLISH Train B RHR spray: 1. CHECK Train B RHR pump RUNNING. STANDARD: Operator checks that 1B-B RHR pump is running as indicated by red light on 1-HS-74-20A "LIT". COMMENTS:	___ SAT ___ UNSAT
STEP 8.: [13.c.2)] ENSURE RHR crosstie FCV-74-35 CLOSED. STANDARD: Operator verifies FCV-74-35 in the CLOSE position as indicated by 1-HS-74-35A green light ON and red light off. COMMENTS:	___ SAT ___ UNSAT
STEP 9.: [13.c.3)] CLOSE RHR Injection FCV-63-94. STANDARD: Operator places handswitch 1-HS-63-94A for RHR injection FCV-63-94 in the CLOSE position. COMMENTS:	___ SAT ___ UNSAT **Critical Step**

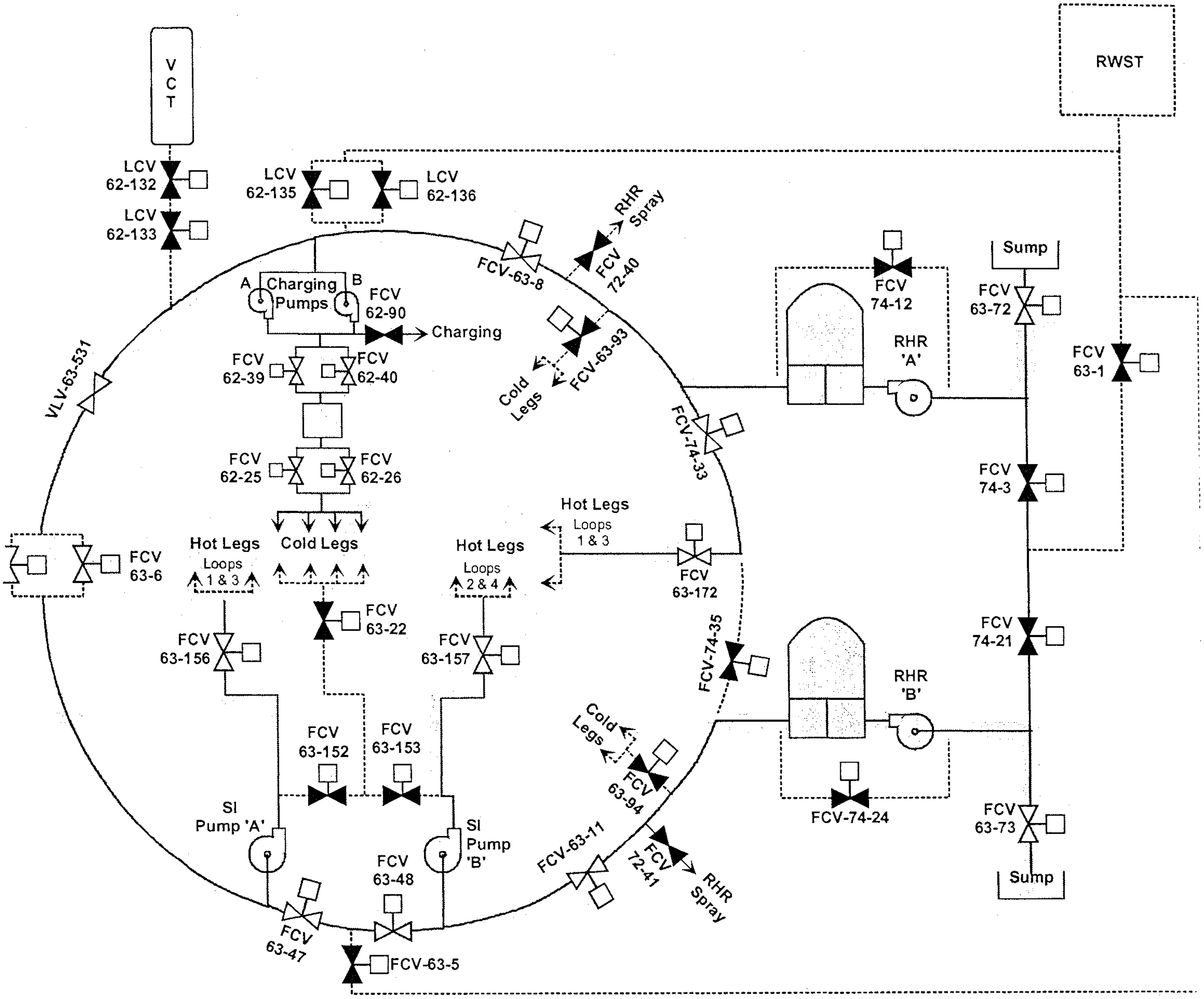
Job Performance Checklist

STEP/STANDARD	SAT/UNSAT
NOTE: **This is the alternate path.** STEP 10.: [13.c.4)] OPEN RHR Spray FCV-72-41. **NOTE:** **FCV-72-41 will NOT open the operator must go to the RNO and align the A train RHR spray.** STANDARD: Operator places handswitch1-HS-72-41A for RHR injection FCV-72-41 in the OPEN position and recognizes that the green light stays ON and the red light is OFF, goes to RNO column. COMMENTS:	___ SAT ___ UNSAT
NOTE: **The following steps are from FR-Z.1, step 13.c RNO** STEP 11.: [13.c RNO a)] ENSURE RHR Spray FCV-72-41 CLOSED. STANDARD: Operator verifies FCV-72-41 is closed as indicated by green light ON and red light OFF on 1-HS-72-41A. COMMENTS:	___ SAT ___ UNSAT
STEP 12.: [13.c RNO b)] **IF** RHR aligned for cold leg recirculation, **THEN ENSURE** FCV-63-94 OPEN. STANDARD: Operator places handswitch 1-HS-63-94A for RHR injection FCV-63-94 in the OPEN position. COMMENTS:	___ SAT ___ UNSAT **Critical Step**
STEP 13.: [13.c RNO c)] ESTABLISH Train A RHR spray: (1) ENSURE RHR crosstie FCV-74-33 CLOSED. STANDARD: Operator verifies RHR crosstie FCV-74-33 in the CLOSE position as indicated by green light LIT on handswitch 1-HS-74-33A. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 14.: [13.c RNO c)(2)] CLOSE RHR Injection FCV-63-93. STANDARD: Operator places handswitch 1-HS-63-93A for RHR injection FCV-63-93 in the CLOSE position. COMMENTS:	___ SAT ___ UNSAT **Critical Step**
STEP 15.: OPEN RHR spray FCV-72-40. STANDARD: Operator places handswitch 1-HS-72-40A for FCV-72-40 in the OPEN position. COMMENTS:	___ SAT ___ UNSAT **Critical Step**
STEP 16.: [13.d] **MONITOR** containment pressure greater than 4 psig. STANDARD: Operator checks PDIS-30-42 through 45 and determines that pressure is greater 4 psig and continues to the next step. This completes Step 13 and the JPM COMMENTS:	___ SAT ___ UNSAT
STEP 17.: Communicates with SRO and informs him RHR spray status. STANDARD: Operator informs SRO that the Train A RHR spray has been placed in service in accordance with FR-Z.1 and that FCV-72-41 failed to open. COMMENTS:	___ SAT ___ UNSAT Stop Time____

END OF JPM

ECCS Simplified Drawing



CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

DIRECTION TO TRAINEE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. **Unit 1 has experienced a reactor trip and Safety Injection in conjunction with a large break LOCA.**

2. **The crew has been monitoring step 13 of FR-Z.1 since FR-Z.1 was implemented.**

3. **1 hour has elapsed since the accident.**

INITIATING CUES:

1. **The US directs you to perform FR-Z.1, Step 13 to initiate one train of RHR spray.**

2. **Inform the US when Step 13 has been completed.**

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT

EOI PROGRAM MANUAL

FUNCTION RESTORATION PROCEDURE

FR-Z.1

HIGH CONTAINMENT PRESSURE

Revision **17**

QUALITY RELATED

PREPARED/PROOFREAD BY: D. A. PORTER

RESPONSIBLE ORGANIZATION: OPERATIONS

APPROVED BY: W. T. LEARY

EFFECTIVE DATE: 05/31/07

REVISION DESCRIPTION: Updated ES-1.3 step number reference in Step 5.c RNO.

This procedure contains a Handout Page (2 copies).

SQN	HIGH CONTAINMENT PRESSURE	FR-Z.1 Rev. 17

HANDOUT

Page 1 of 1

STEP	ACTION
1.	**MONITOR** RWST level greater than 27%.
4.d RNO	(if any S/G is faulted and air return fans are NOT running) **WHEN** 10 minutes have elapsed from Phase B actuation, **THEN ENSURE** containment air return fans running.
6.	**MONITOR** containment air return fans: • **WHEN** 10 minutes have elapsed from Phase B actuation, **THEN ENSURE** containment air return fans running.
10. RNO.	**IF** all S/Gs Faulted, **THEN CONTROL** feed flow at greater than or equal to 25 gpm to each S/G.
12.	**MONITOR** if hydrogen igniters and recombiners should be turned on:
12.a RNO	**WHEN** hydrogen analyzers have been in ANALYZE for at least 5 minutes, **THEN CHECK** if hydrogen igniters and recombiners are required.
12.d	**WHEN** ice condenser AHU breakers are open, **THEN ENERGIZE** hydrogen igniters (if hydrogen concentration less than 6%).
13.	**MONITOR** if RHR spray should be placed in service: • Containment pressure greater than 9.5 psig • **AND** at least 1 hour has elapsed since beginning of accident • **AND** RHR suction ALIGNED to containment sump • **AND** at least one CCP **AND** one SI pump RUNNING.
13.d. RNO	(if RHR spray in service) **WHEN** Containment pressure is less than 4 psig, **THEN REMOVE** RHR spray from service.
14.	**MONITOR** if containment spray should be stopped: (containment pressure less than 2.0 psig)
14.c RNO	(if containment spray suction aligned to sump) **WHEN** directed by TSC, **THEN STOP** containment spray.

SQN	HIGH CONTAINMENT PRESSURE	FR-Z.1 Rev. 17

HANDOUT

Page 1 of 1

STEP	ACTION
1.	**MONITOR** RWST level greater than 27%.
4.d RNO	(if any S/G is faulted and air return fans are NOT running) **WHEN** 10 minutes have elapsed from Phase B actuation, **THEN ENSURE** containment air return fans running.
6.	**MONITOR** containment air return fans: • **WHEN** 10 minutes have elapsed from Phase B actuation, **THEN ENSURE** containment air return fans running.
10. RNO.	**IF** all S/Gs Faulted, **THEN CONTROL** feed flow at greater than or equal to 25 gpm to each S/G.
12.	**MONITOR** if hydrogen igniters and recombiners should be turned on:
12.a RNO	**WHEN** hydrogen analyzers have been in ANALYZE for at least 5 minutes, **THEN CHECK** if hydrogen igniters and recombiners are required.
12.d	**WHEN** ice condenser AHU breakers are open, **THEN ENERGIZE** hydrogen igniters (if hydrogen concentration less than 6%).
13.	**MONITOR** if RHR spray should be placed in service: • Containment pressure greater than 9.5 psig • **AND** at least 1 hour has elapsed since beginning of accident • **AND** RHR suction ALIGNED to containment sump • **AND** at least one CCP **AND** one SI pump RUNNING.
13.d. RNO	(if RHR spray in service) **WHEN** Containment pressure is less than 4 psig, **THEN REMOVE** RHR spray from service.
14.	**MONITOR** if containment spray should be stopped: (containment pressure less than 2.0 psig)
14.c RNO	(if containment spray suction aligned to sump) **WHEN** directed by TSC, **THEN STOP** containment spray.

1.0 PURPOSE

This procedure provides actions to respond to a high containment pressure.

2.0 SYMPTOMS AND ENTRY CONDITIONS

2.1 ENTRY CONDITIONS

FR-0 Status Trees:

- F-0.5, Containment RED condition:

  Containment pressure greater than or equal to 12.0 psig.

- F-0.5, Containment ORANGE condition:

  Containment pressure less than 12.0 psig

  AND

  Containment pressure greater than or equal to 2.8 psig.

3.0 OPERATOR ACTIONS

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE	If this procedure has been entered for an orange path and performance of ECA-1.1 (Loss of RHR Sump Recirculation) is required, FR-Z.1 may be performed concurrently with ECA-1.1.	
1.	**MONITOR** RWST level greater than 27%.	**IF** ES-1.3 has NOT been entered, **THEN** **GO TO** ES-1.3, Transfer to RHR Containment Sump. →
2.	**VERIFY** Phase B valves CLOSED: • Panel 6K PHASE B GREEN • Panel 6L PHASE B GREEN.	**IF** 1-FCV-32-110 (2-FCV-32-111) is NOT closed, **THEN** **PERFORM** EA-32-3, Isolating Non-Essential Air to Containment. **IF** other valves NOT closed **AND** flow path is NOT necessary, **THEN** **CLOSE** valves.
3.	**ENSURE** RCPs STOPPED.	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4.	**DETERMINE** if this procedure should be exited:	
	a. **CHECK** for faulted S/G: • Any S/G pressure DROPPING in an uncontrolled manner **OR** • Any S/G pressure less than 140 psig.	a. **GO TO** Step 5. ⤵
	b. **CHECK** containment pressure less than 12 psig.	b. **GO TO** Step 5. ⤵
	c. **CHECK** at least one containment spray pump RUNNING and delivering flow.	c. **IF** containment pressure is greater than 2.8 psig, **THEN** **GO TO** Step 5. ⤵
	d. **CHECK** at least one containment air return fan RUNNING.	d. **WHEN** 10 minutes have elapsed from Phase B actuation, **THEN** **ENSURE** air return fans RUNNING.
	e. **RETURN** to procedure and step in effect. →	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5.	**VERIFY** containment spray operation:	
	a. **CHECK** RHR sump recirculation capability AVAILABLE.	a. **IF** ECA-1.1, Loss of RHR Sump Recirculation, is IN EFFECT, **THEN** **PERFORM** the following: 1) **OPERATE** containment spray as directed by ECA-1.1. 2) **GO TO** Step 6.
	b. **VERIFY** containment spray pumps RUNNING.	b. **IF** containment pressure is greater than 2.8 psig, **THEN** **START** containment spray pumps.
	c. **CHECK** RWST level greater than 27%.	c. **IF** any of following conditions met: • RWST level less than or equal to 8% **OR** • containment sump level greater than 56%, **THEN** **PERFORM** the following: 1) **ENSURE** cntmt spray pump suction aligned for sump recirc **USING** ES-1.3, Transfer to RHR Containment Sump, Step 21. 2) **GO TO** Substep 5.e.

(step continued on next page)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5.	d. **VERIFY** containment spray suction ALIGNED to RWST: • FCV-72-22 OPEN • FCV-72-21 OPEN.	d. **ALIGN** valves as necessary.
	e. **VERIFY** containment spray discharge valves OPEN: • FCV-72-39 • FCV-72-2.	e. **OPEN** valves for running containment spray pumps.
	f. **VERIFY** containment spray recirc valves CLOSED: • FCV-72-34 • FCV-72-13.	f. **CLOSE** valves as necessary.
	g. **VERIFY** containment spray flow greater than 4750 gpm on each train.	g. **IF** NO train of containment spray is available, **THEN** **PERFORM** the following: 1) **CONTINUE** efforts to restore at least one train of containment spray. 2) **NOTIFY** TSC to evaluate restoring normal containment cooling **USING** EA-30-4, Restoring Containment Coolers.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6.	**MONITOR** containment air return fans: • **WHEN** at least 10 minutes have elapsed from Phase B, **THEN** **ENSURE** containment air return fans RUNNING.	
7.	**VERIFY** containment ventilation dampers CLOSED: • Panel 6K CNTMT VENT GREEN • Panel 6L CNTMT VENT GREEN.	**CLOSE** dampers.
8.	**VERIFY** Phase A valves CLOSED: • Panel 6K PHASE A GREEN • Panel 6L PHASE A GREEN.	**IF** flow path NOT necessary, **THEN** **CLOSE** valves.
9.	**VERIFY** MSIVs and MSIV bypass valves CLOSED.	**CLOSE** valves. **IF** any MSIV CANNOT be closed, **THEN** **CLOSE** MSIV locally **USING** EA-1-1, Closing MSIVs Locally.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10.	**DETERMINE** if any S/G Intact:	
	a. **CHECK** at least one S/G pressure: • CONTROLLED or RISING **AND** • Greater than 140 psig.	**IF** all S/Gs Faulted, **THEN** **PERFORM** the following: 1) **CONTROL** feed flow at greater than or equal to 25 gpm to each S/G. 2) **OPEN** MD AFW pump recirc valves FCV-3-400 and -401 as necessary. 3) **GO TO** Step 12.

CAUTION **Isolating all S/Gs will result in a loss of secondary heat sink.**

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
11.	**DETERMINE** if any S/G Faulted:	
	a. **CHECK** S/G pressures: • Any S/G pressure DROPPING in an uncontrolled manner **OR** • Any S/G pressure less than 140 psig.	a. **GO TO** Step 12.
	b. **ISOLATE** feed flow to affected S/G: • MFW • AFW	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12.	**MONITOR** if hydrogen igniters and recombiners should be turned on:	
	a. **DISPATCH** personnel to open ice condenser AHU breakers **USING** EA-201-1, 480 V Board Room Breaker Alignments.	
	b. **CHECK** hydrogen concentration measurement AVAILABLE: • Hydrogen analyzers have been in ANALYZE for at least 5 minutes.	b. **PERFORM** the following: 1) **DISPATCH** operator to place hydrogen analyzers in service **USING** Appendix D. (also contained in ES-0.5) 2) **WHEN** hydrogen analyzers have been in ANALYZE for at least 5 minutes, **THEN** **PERFORM** substeps 12.c through 12.e. 3) **GO TO** Step 13.
	c. **CHECK** containment hydrogen concentration less than 6%.	c. **CONSULT** TSC. **GO TO** Step 13.
	d. **WHEN** ice condenser AHU breakers have been opened, **THEN** **ENERGIZE** hydrogen igniters **USING** Appendix D, Placing Hydrogen Analyzers and Igniters In Service.	

(Step continued on next page.)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12.	e. **CHECK** containment hydrogen concentration less than 0.5%.	e. **PLACE** hydrogen recombiners in service **USING** EA-268-1, Placing Hydrogen Recombiners in Service. **IF** hydrogen recombiners NOT available, **THEN** **CONSULT** TSC.
13.	**MONITOR** if RHR spray should be placed in service:	
	a. **CHECK** the following: • Containment pressure greater than 9.5 psig **AND** • At least 1 hour has elapsed since beginning of accident **AND** • RHR suction ALIGNED to containment sump **AND** • At least one CCP **AND** one SI pump RUNNING.	a. **GO TO** Step 14.

(Step continued on next page.)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13.	b. **CHECK** both RHR pumps RUNNING.	b. **IF** only one RHR pump running, **THEN** **PERFORM** the following: 1) **ENSURE** only one CCP RUNNING (same train as running RHR pump preferred). 2) **PLACE** non-operating CCP in PULL TO LOCK. 3) **ENSURE** only one SI pump RUNNING (same train as running RHR pump preferred). 4) **PLACE** non-operating SI pump in PULL TO LOCK.

(Step continued on next page.)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13.	c. **ESTABLISH** Train B RHR spray: 1) **CHECK** Train B RHR pump RUNNING. 2) **ENSURE** RHR crosstie FCV-74-35 CLOSED. 3) **CLOSE** RHR injection FCV-63-94. 4) **OPEN** RHR spray FCV-72-41.	c. **IF** Train B RHR spray CANNOT be established, **THEN** **PERFORM** the following: a) **ENSURE** RHR spray FCV-72-41 CLOSED. b) **IF** RHR aligned for cold leg recirculation, **THEN** **ENSURE** FCV-63-94 OPEN. c) **ESTABLISH** Train A RHR spray: (1) **ENSURE** RHR crosstie FCV-74-33 CLOSED. (2) **CLOSE** RHR injection FCV-63-93. (3) **OPEN** RHR spray FCV-72-40. **IF** Train A RHR spray CANNOT be established, **THEN** **PERFORM** the following: a) **CLOSE** RHR spray FCV-72-40. b) **IF** RHR aligned for cold leg recirculation, **THEN** **ENSURE** FCV-63-93 OPEN.

(Step continued on next page.)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13.	d. **MONITOR** containment pressure greater than 4 psig.	d. **WHEN** containment pressure is less than 4 psig, **THEN** **PERFORM** the following: 1) **ENSURE** FCV-72-40 and FCV-72-41 CLOSED. 2) **IF** RHR aligned for cold leg recirculation, **THEN** **ENSURE** FCV-63-93 and FCV-63-94 OPEN. 3) **IF** ECCS is aligned for hot leg recirculation, **THEN** **ENSURE** RHR crosstie valves FCV-74-33 and FCV-74-35 aligned as required by ES-1.4.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14.	**MONITOR** if containment spray should be stopped:	
	a. **CHECK** any containment spray pump RUNNING.	a. **GO TO** Step 15.
	b. **CHECK** containment pressure less than 2.0 psig.	b. **GO TO** Step 15.
	c. **CHECK** containment spray suction aligned to RWST.	c. **NOTIFY** TSC to determine when one or both trains of cntmt spray should be stopped. **WHEN** directed by TSC, **THEN** **PERFORM** Substeps 14.d through 14.f. **GO TO** Step 15.
	d. **RESET** Containment Spray.	
	e. **STOP** containment spray pumps and **PLACE** in A-AUTO.	
	f. **CLOSE** containment spray discharge valves: • FCV-72-39, Train A • FCV-72-2, Train B.	

15. **RETURN TO** procedure and step in effect.

→

END

Page 1 of 1

APPENDIX D

PLACING HYDROGEN ANALYZERS AND IGNITERS IN SERVICE

1. **PLACE** hydrogen analyzers in service:

   a. **ENSURE** the following switches in ANALYZE position: [M-10]

      - HS-43-200A, Cntmt H2 Analyzer Fan A ☐
      - HS-43-210A, Cntmt H2 Analyzer Fan B. ☐

   b. **RECORD** time: ____________ ☐

   c. **NOTIFY** Unit Supervisor of time that hydrogen analyzers were placed in ANALYZE. ☐

NOTE The following step is performed when directed by an EOP step (after hydrogen concentration has been verified and ice condenser AHU breakers have been opened).

2. **WHEN** directed to energize hydrogen igniters,
   THEN
   ENSURE the following switches in ON position: [M-10]

   - HS-268-73, H2 Igniters Group A ☐
   - HS-268-74, H2 Igniters Group B. ☐

END OF TEXT

SIM JPM B.1.b

SEQUOYAH NUCLEAR PLANT
JOB PERFORMANCE MEASURE

B.1.b

JPM

Respond to a #1 RCP Seal Failure

PREPARED/ REVISED BY: ______________________ Date/ ________

VALIDATED BY: * ______________________ Date/ ________

APPROVED BY: ______________________ Date/ ________
(Operations Training Manager)

CONCURRED: ** ______________________ Date/ ________
(Operations Representative)

* Validation not required for minor enhancements, procedure Rev changes that do not affect the JPM, or individual step changes that do not affect the flow of the JPM.
** Operations Concurrence required for new JPMs and changes that affect the flow of the JPM (if not driven by a procedure revision).

NUCLEAR TRAINING

REVISION/USAGE LOG

REVISION NUMBER	DESCRIPTION OF REVISION	V	DATE	PAGES AFFECTED	PREPARED/ REVISED BY:
0	New, modified from JPM 403	Y		All	

V - Specify if the JPM change will require another validation (Y or N).
See cover sheet for criteria.

SEQUOYAH NUCLEAR PLANT
RO/SRO
JOB PERFORMANCE MEASURE

Task:

Respond to an RCP Seal Failure

JA/TA task:

0000820501 (**RO**)

K/A Ratings:

003 Reactor Coolant Pump System A2.01 3.5 / 3.9

Task Standard:

1) Candidate determines the #1 RCP has a seal malfunction and enters AOP-R.04
2) Candidate trips reactor, removes the #1 RCP from service, and closes the seal return valve from the pump.

Evaluation Method : Simulator __X__ In-Plant ________

==

Performer: ____________________________________ NAME

Start Time ________

Performance Rating : SAT _____ UNSAT _____ Performance Time _____

Finish Time _______

Evaluator: ______________________________/________
SIGNATURE DATE

==

COMMENTS

SPECIAL INSTRUCTIONS TO EVALUATOR:

1. Sequenced steps identified by an "s"
2. Any UNSAT requires comments
3. This task is to be performed using the simulator in IC-10, 14% power ready to roll turbine
4. Put MODE 1 sign on simulator
5. When ready to start, insert malfunction CV17A f: 0.60
6. Ensure operator performs the following required actions for **SELF-CHECKING;**
   a. Identifies the correct unit, train, component, etc.
   b. Reviews the intended action and expected response.
   c. Compares the actual response to the expected response.

Validation Time: CR. 14 min **Local** ___________

Tools/Equipment/Procedures Needed:

AOP-R.04

References:

	Reference	Title	Rev No.
1.	AOP-R.04	Reactor Coolant Pump Malfunctions	22

==

READ TO OPERATOR

Directions to Trainee:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. Unit 1 is in MODE 1 at 14% reactor power preparing to roll the main turbine. Currently awaiting completion of maintenance activities.

INITIATING CUES:

1. You are the OATC and are to monitor the control board and respond to conditions as required.

This JPM contains Time Critical steps

STEP/STANDARD **SAT/UNSAT**

STEP 1.: Obtain the appropriate procedure.

STANDARD: Operator identifies window B-3, FS-62-11 REAC COOL PMPS SEAL LEAKOFF HIGH FLOW lit and uses 1-AR-M5-B to respond.

___ SAT

___ UNSAT

Start Time____

The following 2 steps are from 1-AR-M5-B Window B-3

STEP 2.: **[1] Verify** High Leakoff condition on affected RCP(s) with the following instruments

Pump	Leakoff Instrumentation
RCP 1	1-FR-62-24
RCP 2	1-FR-62-24
RCP 3	1-FR-62-50
RCP 4	1-FR-62-50

STANDARD: Candidate determines that #1 RCP has high Seal flow on 1-FR-62-24 or by looking at the ICS.

COMMENTS:

___ SAT

___ UNSAT

STEP 3.: **[2] GO TO** AOP-R.04, Reactor Coolant Pump Malfunctions.

STANDARD: Candidate enters AOP-R.04

COMMENTS:

___ SAT

___ UNSAT

The following steps are from AOP-R.04

STEP 4.: **1. DIAGNOSE** the failure:

STANDARD: Candidate determines Section 2.2 is the appropriate section and goes to section 2.2

COMMENTS:

___ SAT

___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 5.: 1. MONITOR #1 seal leakoff less than 6 gpm per pump: • FR-62-24 [RCP 1 & 2] • FR-62-50 [RCP 3 & 4] STANDARD: Candidate uses 1-FR-62-24 or by looking at the ICS to determine seal flow on #1 RCP is greater than 6 gpm and goes to the RNO. COMMENTS:	___ SAT ___ UNSAT
STEP 6.: a. **MONITOR** RCP lower bearing temperature and seal temperature. **IF** RCP lower bearing temperature **OR** seal temperature are rising uncontrolled, **THEN GO TO** Section 2.1, RCP Tripped or Shutdown Required. **[C.1] [C.2]** STANDARD: Candidate uses 1-TI-62-3 and 1-TI-62-4 to determine lower bearing temperature and seal temperature are rising and goes to Section 2.1, Reactor Coolant Pump(s) Tripped or Shutdown Required COMMENTS:	___ SAT ___ UNSAT
STEP 7.: 1. **CHECK** reactor power greater than 10% STANDARD: Candidate determines reactor power is greater than 10% and continues to the next step. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 8.: 2. **TRIP** the reactor and **GO TO** E-0, Reactor Trip or Safety Injection, WHILE continuing in this procedure. ***Cue:*** ***After candidate completes the immediate actions, state that the SRO and another operator will perform E-0.*** STANDARD: Candidate trips the reactor by placing reactor trip switch to the trip position. COMMENTS:	___ SAT ___ UNSAT **Critical Step**
STEP 9.: 3. **STOP** and **LOCK OUT** affected RCP(s). STANDARD: Candidate places handswitch 1-HS-68-8A to the stop position (critical). Handswitch placed in the Pull to Lock position (non-critical). Record time pump is stopped ____________ COMMENTS:	___ SAT ___ UNSAT **Critical Step**
STEP 10.: 4. **MONITOR** RCP seal leakoff less than 8 gpm per pump: • FR-62-24 [RCP 1 & 2] • FR-62-50 [RCP 3 & 4] Evaluator Note: *Scale on recorder is 0-10 gpm* STANDARD: Candidate determines that #1 RCP seal leakoff flow on 1-FR-62-24 is greater than 8 gpm. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 11.: **WHEN** the RCP has coasted down (30 sec.), **THEN** **CLOSE** affected RCP seal return FCV: **[C.2]** • FCV-62-9 [RCP 1] • FCV-62-22 [RCP 2] • FCV-62-35 [RCP 3] • FCV-62-48 [RCP 4] STANDARD: Candidate place 1-HS-62-9 to the Close position within 5 minutes of stopping the RCP Record time FCV is closed ____________ COMMENTS:	___ SAT ___ UNSAT **Critical Step** **Time Critical Step**
STEP 12.: 5. **PULL TO DEFEAT** affected loop ΔT and T-avg: • XS-68-2D (ΔT) • XS-68-2M (T-avg) STANDARD: Candidate places 1-XS-68-2D and 1-XS-68 2M to Loop 1 position and pulls each out. COMMENTS:	___ SAT ___ UNSAT
STEP 13.: 6. **CHECK** RCPs 1 and 2 RUNNING. STANDARD: Candidate determines that #1 Reactor coolant pump is not running. COMMENTS:	___ SAT ___ UNSAT
STEP 14.: **6. RNO CLOSE** affected loop's pressurizer spray valve. STANDARD: Candidate verifies Loop 1 PZR Spray Valve 1-PIC68-340D is closed. May place the controller to manual. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 15.: 7. **IF** RCP Seal Temperatures or Bearing Temperatures are increasing uncontrolled due to loss of Seal Injection, **THEN EVALUATE** initiating RCS cooldown. ***Cue: When step addressed state "Shift Manager is evaluating the need to cooldown"*** STANDARD: Candidate addresses the need for the cooldown evaluation. COMMENTS:	___ SAT ___ UNSAT
STEP 16.: 8. **EVALUATE** EPIP-1, Emergency Plan Initiating Conditions Matrix. ***Cue: When step addressed state "Shift Manager will evaluate EPIPs"*** STANDARD: Candidate addresses the step COMMENTS:	___ SAT ___ UNSAT
STEP 17.: 9. **EVALUATE** the following Tech Specs for applicability: • 3.2.5, DNB Parameters • 3.4.1.1, Reactor Coolant Loops and Coolant Circulation - Startup and Power Operation • 3.4.1.2, Reactor Coolant System - Hot Standby • 3.4.1.3, Reactor Coolant System - Shutdown • 3.4.6.2, RCS Operational Leakage ***Cue: When step addressed state "SRO will evaluate Tech Specs"*** STANDARD: Candidate notifies SRO to evaluate Tech Spec. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 18.: 10. **GO TO** appropriate plant procedure. **END OF SECTION** ***Cue:*** ***To candidate "We will stop here"*** STANDARD: Candidate recognizes that a transition from the AOP is required.	___ SAT ___ UNSAT Stop Time____

End of JPM

CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

Directions to Trainee:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. Unit 1 is in MODE 1 at 14% reactor power preparing to roll the main turbine. Currently awaiting completion of maintenance activities.

INITIATING CUES:

1. You are the OATC and are to monitor the control board and respond to conditions as required.

This JPM contains Time Critical steps

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT

AOI PROGRAM MANUAL

ABNORMAL OPERATING PROCEDURES

AOP-R.04

REACTOR COOLANT PUMP MALFUNCTIONS

Revision **22**

QUALITY RELATED

PREPARED/PROOFREAD BY: D. A. PORTER

RESPONSIBLE ORGANIZATION: OPERATIONS

APPROVED BY: W. T. LEARY

EFFECTIVE DATE: 12/19/2005

REVISION DESCRIPTION: Revised to clarify actions if neither RCP lower bearing temperature nor RCP seal temperature indication is available (PER 93845). Corrected inconsistency between caution in Section 2.0 and Appendix B.

1.0 PURPOSE

This procedure provides the actions necessary to mitigate the effects of a Reactor Coolant Pump (RCP) trip below P-8 (35% power), excessive RCP seal leakage, and various RCP malfunctions.

2.0 OPERATOR ACTIONS

CAUTION: Exceeding the following limitations requires trip of the affected RCP, unless RCP operation is required by FR-C.1, *Inadequate Core Cooling* or FR-C.2, *Degraded Core Cooling*:

- **RCP #1 Seal ΔP less than 220 psid**
- **RCP #1 Seal Temperature greater than 225°F**
- **RCP Lower Bearing Temperature greater than 225°F**
- **RCP Upper Motor Bearing Temperature greater than 200°F**
- **RCP Lower Motor Bearing Temperature greater than 200°F**
- **RCP Motor Voltage less than 5940V or greater than 7260V**
- **RCP Motor Amps greater than 608 amps**
- **RCP Vibration greater than 20 mils on any axis (x and/or y) [C.3]**

NOTE 1: During plant startup following seal maintenance, the seal package should seat and operate normally following 24 hours of run time.

NOTE 2: RCP trip criteria is also located in Appendix B. This appendix should be referred to throughout the performance of this procedure.

1. **DIAGNOSE** the failure:

IF...	GO TO SECTION	PAGE
Reactor Coolant Pump(s) tripped or shutdown required	2.1	4
RCP #1 Seal Leakoff high flow (high flow Alarm)	2.2	7
RCP #1 Seal Leakoff low flow (low flow Alarm)	2.3	13
RCP #2 Seal Leakoff high flow (high RCP standpipe level)	2.4	17
RCP #3 Seal Leakoff high flow (low RCP standpipe level)	2.5	20
RCP Motor Stator Temperature High	2.6	23

2.1 Reactor Coolant Pump Tripped or Shutdown Required

CAUTION: A rapid drop in level and steam flow on the affected loop S/G may occur when RCP is tripped.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1.	**CHECK** reactor power greater than 10%.	**SHUT DOWN** to MODE 3 within 1 hour. **GO TO** Step 3.

NOTE: This procedure is intended to be performed concurrently with E-0, Reactor Trip or Safety Injection.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2.	**TRIP** the reactor, and **GO TO** E-0, Reactor Trip or Safety Injection, WHILE continuing in this procedure.	
3.	**STOP** and **LOCK OUT** affected RCP(s).	

2.1 Reactor Coolant Pump Tripped or Shutdown Required (cont'd)

CAUTION: If the RCP seal return flow control valve (FCV) is NOT closed within 5 minutes of stopping the RCP with excessive leakoff, seal damage may occur. [C.2]

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4.	**MONITOR** RCP seal leakoff less than 8 gpm per pump: • FR-62-24 [RCP 1 & 2] • FR-62-50 [RCP 3 & 4]	**WHEN** the RCP has coasted down (30 sec.), **THEN** **CLOSE** affected RCP seal return FCV: **[C.2]** • FCV-62-9 [RCP 1] • FCV-62-22 [RCP 2] • FCV-62-35 [RCP 3] • FCV-62-48 [RCP 4]
5.	**PULL TO DEFEAT** affected loop ΔT and T-avg: • XS-68-2D (ΔT) • XS-68-2M (T-avg)	
6.	**CHECK** RCPs 1 and 2 RUNNING.	**CLOSE** affected loop's pressurizer spray valve.

2.1 Reactor Coolant Pump Tripped or Shutdown Required (cont'd)

CAUTION: Restoring seal water injection to a hot seal package could result in failure of the RCP seals.

NOTE: The plant should be cooled down to reduce heat input into the pump seal package if RCP seal injection flow has been lost and cannot be restored prior to exceeding temperature limits.

7. **IF** RCP Seal Temperatures or Bearing Temperatures are increasing uncontrolled due to loss of Seal Injection,
   THEN
   EVALUATE initiating RCS cooldown.

8. **EVALUATE** EPIP-1, Emergency Plan Initiating Conditions Matrix.

9. **EVALUATE** the following Tech Specs for applicability:

   - 3.2.5, DNB Parameters
   - 3.4.1.1, Reactor Coolant Loops and Coolant Circulation - Startup and Power Operation
   - 3.4.1.2, Reactor Coolant System - Hot Standby
   - 3.4.1.3, Reactor Coolant System - Shutdown
   - 3.4.6.2, RCS Operational Leakage

10. **GO TO** appropriate plant procedure.

END OF SECTION

2.2 RCP #1 Seal Leakoff High Flow

- **CAUTION:** **RCP bearing damage may occur if temperature exceeds 225°F.**
- **CAUTION:** **If the RCP seal return flow control valve is NOT closed within 5 minutes of stopping the RCP with excessive leakoff, seal damage may occur. [C.2]**

1. **MONITOR** #1 seal leakoff less than 6 gpm per pump:
   - FR-62-24 [RCP 1 & 2]
   - FR-62-50 [RCP 3 & 4]

a. **MONITOR** RCP lower bearing temperature and seal temperature.

IF RCP lower bearing temperature **OR** seal temperature are rising uncontrolled,
THEN
GO TO Section 2.1, RCP Tripped or Shutdown Required. **[C.1] [C.2]**

IF lower bearing temperature **AND** seal temperature indication are NOT available for affected RCP,
THEN
GO TO Section 2.1, RCP Tripped or Shutdown Required. **[C.1]**

(Step continued on next page.)

2.2 RCP #1 Seal Leakoff High Flow (cont'd)

1. (Continued)

b. **CHECK** #1 seal leakoff flow:

IF #1 seal leakoff flow greater than 8 gpm,
THEN
PERFORM the following:

1) **INITIATE** plant shutdown at 2-5% per minute **USING** AOP-C.03, Emergency Shutdown.

2) **WHEN** reactor is tripped,
THEN
GO TO Section 2.1, RCP Tripped or Shutdown Required. **[C.1]**

IF #1 seal leakoff flow less than 8 gpm,
THEN
PERFORM the following:

1) **CONTROL** RCP seal injection flow for the affected RCP greater than or equal to 9 gpm.

2) **CONTACT** Engineering for recommendations WHILE continuing with this procedure.

(Step continued on next page.)

2.2 RCP #1 Seal Leakoff High Flow (cont'd)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1.	(Continued)	3) **IMPLEMENT** Engineering recommendations to address specific RCP seal performance conditions. **OR** **COMPLETE** normal plant shutdown within 8 hours **USING** appropriate plant procedure. 4) **WHEN** reactor is shutdown or tripped, **THEN** **GO TO** Section 2.1, RCP Tripped or Shutdown Required. **[C.1]**
2.	**MONITOR** RCP lower bearing and seal water temperatures less than 225°F.	**IF** any of the following conditions met: • RCP lower bearing temperature <u>or</u> seal water temperature greater than 225°F **OR** • seal leakoff flow greater than 6 gpm **AND** lower bearing <u>and</u> seal temp NOT available for affected RCP **THEN** **GO TO** Section 2.1, RCP Tripped or Shutdown Required. **[C.1]**

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2.2	**RCP #1 Seal Leakoff High Flow (cont'd)**	
3.	**MONITOR** RCP #1 seal ΔP greater than 220 psid: • PDI-62-8A • PDI-62-21A • PDI-62-34A • PDI-62-47A	**GO TO** Section 2.1, RCP Tripped or Shutdown Required. **[C.1]**
4.	**ENSURE** RCP seal water supply flow 6-10 gpm per pump: • FI-62-1A • FI-62-14A • FI-62-27A • FI-62-40A	**IF** seal water supply flow is less than 6 gpm **AND** CANNOT be restored, **THEN** **ENSURE** CCS supply to thermal barriers is less than 105°F: • TR-70-161 [CCS HX1A1(2A1)/1A2(2A2) Outlet Temp]
5.	**CONTACT** Engineering for recommendations WHILE continuing with this procedure.	
6.	**EVALUATE** EPIP-1, Emergency Plan Initiating Conditions Matrix.	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.2 RCP #1 Seal Leakoff High Flow (cont'd)

7. **EVALUATE** the following Tech Specs for applicability:

   - 3.2.5, DNB Parameters
   - 3.4.1.1, Reactor Coolant Loops and Coolant Circulation - Startup and Power Operation
   - 3.4.1.2, Reactor Coolant System - Hot Standby
   - 3.4.1.3, Reactor Coolant System - Shutdown
   - 3.4.6.2, RCS Operational Leakage

CAUTION: Slow and uniform temperature adjustments (approx. 50°F in one hour) will prevent thermal shock to the seals.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8.	**CHECK** VCT outlet temperature less than 130°F [TI-62-131].	**ADJUST** HIC-62-78A to reduce VCT temperature to less than 130°F.
9.	**ENSURE** VCT pressure between 17 psig and 45 psig [PI-62-122].	

2.2 RCP #1 Seal Leakoff High Flow (cont'd)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10.	**CHECK** RCP lower bearing and seal water temperature less than 180°F:	**IF** any of the following conditions met: • affected RCP lower bearing <u>or</u> seal water temperature greater than 180°F **OR** • lower bearing <u>and</u> seal water temp indication NOT available for affected RCP, **THEN** **GO TO** Step 1.
11.	**GO TO** appropriate plant procedure.	

END OF SECTION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2.3	**RCP #1 Seal Leakoff Low Flow**	
1.	**CHECK** #1 seal leakoff flow greater than 0.8 gpm per pump: • FR-62-23 [RCP 1 & 2] • FR-62-49 [RCP 3 & 4]	**GO TO** Step 4.
2.	**CHECK** #1 seal leakoff flow greater than 0.9 gpm per pump and NOT decreasing: • FR-62-23 [RCP 1 & 2] • FR-62-49 [RCP 3 & 4]	**GO TO** Step 4.
3.	**GO TO** appropriate plant procedure.	
4.	**ENSURE** RCP seal water supply flow between 6 gpm and 10 gpm per pump: • FI-62-1A • FI-62-14A • FI-62-27A • FI-62-40A	**IF** seal water supply flow is less than 6 gpm **AND** CANNOT be restored, **THEN** **ENSURE** CCS supply to thermal barriers is less than 105°F: • TR-70-161 [CCS HX 1A1(2A1)/1A2(2A2) Outlet Temp]

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.3 RCP #1 Seal Leakoff Low Flow (cont'd)

5.	**CONTACT** Engineering for recommendations WHILE continuing with this procedure.	
6.	**ENSURE** VCT pressure between 17 psig and 45 psig [PI-62-122].	
7.	**CHECK** RCP standpipe level alarms DARK [M-5B, A-2, B-2, C-2, D-2].	**MONITOR** the following: a. RCDT parameters (0-L-2 AB, el. 669) • Level, LI-77-1 • Pressure, PI-77-2 • Temperature, TI-77-21 b. Cntmt Fl. & Eq. Sump Level rate of rise (ICS pt. U0969)

2.3 RCP #1 Seal Leakoff Low Flow (cont'd)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8.	**VERIFY** RCP #2 seal leakoff less than or equal to 0.5 gpm **USING** Appendix A, RCDT Level Rate-of-Change.	**GO TO** Section 2.4, RCP #2 Seal Leakoff High Flow.
9.	**MONITOR** RCP lower bearing temperature and seal water temperature are stable and within limits (less than 225°F).	**IF** any of the following conditions met: • affected RCP lower bearing temp <u>or</u> seal water temp rising uncontrolled **OR** • affected RCP lower bearing temp <u>or</u> seal water temp greater than 225°F **OR** • affected RCP lower bearing temp <u>and</u> seal temp indication NOT available **THEN** **GO TO** Section 2.1, RCP Tripped or Shutdown Required. **[C.1]**

2.3 RCP #1 Seal Leakoff Low Flow (cont'd)

CAUTION: **If low seal leakoff compensatory actions are NOT successful, seal failure may result as indicated by a sudden increase in seal leakoff flow (greater than 8 gpm).**

NOTE: Plant shutdown may be terminated if Seal Leakoff flow stabilizes at greater than 0.8 gpm with pump Lower Bearing temperature and Seal Water Temperature remaining stable (no indications of seal failure).

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10.	**MONITOR** RCP #1 seal leakoff flow greater than 0.8 gpm: • FR-62-23 [RCP 1 & 2] • FR-62-49 [RCP 3 & 4]	**INITIATE** normal plant shutdown **USING** appropriate plant procedures **AND** **STOP** affected RCP within 8 hours. **IF** RCP #1 seal leakoff flow reverts to high leakage (greater than 8.0 gpm): • FR-62-24 [RCP 1 & 2] • FR-62-50 [RCP 3 & 4] **THEN** **GO TO** Section 2.1, RCP Tripped or Shutdown Required.
11.	**CHECK** #1 seal leakoff flow greater than 0.9 gpm per pump and NOT decreasing: • FR-62-23 [RCP 1 & 2] • FR-62-49 [RCP 3 & 4]	**GO TO** Step 1.

2.3 RCP #1 Seal Leakoff Low Flow (cont'd)

12. **EVALUATE** EPIP-1, Emergency Plan Initiating Conditions Matrix.

13. **EVALUATE** the following Tech Specs for applicability:
    - 3.2.5, DNB Parameters
    - 3.4.1.1, Reactor Coolant Loops and Coolant Circulation - Startup and Power Operation
    - 3.4.1.2, Reactor Coolant System - Hot Standby
    - 3.4.1.3, Reactor Coolant System - Shutdown
    - 3.4.6.2, RCS Operational Leakage

14. **GO TO** appropriate plant procedure.

END OF SECTION

2.4 RCP #2 Seal Leakoff High Flow

NOTE: A leakoff of greater than 0.5 gpm indicates that a seal problem exists.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1.	**NOTIFY** Engineering to consult with Westinghouse for continued RCP operation as necessary.	
2.	**CHECK** RCP standpipe level alarm(s) LIT [M-5B, A-2, B-2, C-2, D-2].	**GO TO** Step 3.
	a. **MONITOR** RCDT parameters at Radwaste Panel [Aux Bldg, 669' elev.]: • Level, LI-77-1 • Pressure, PI-77-2 • Temperature, TI-77-21	
	b. **FILL** affected RCP standpipe **USING** AR-M-5B, Annunciator Response. • RCP 1 [A-2] • RCP 2 [B-2] • RCP 3 [C-2] • RCP 4 [D-2]	
	c. **IF** RCP standpipe level alarm clears, **THEN** **GO TO** Section 2.5, RCP #3 Seal Leakoff High Flow.	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2.4	**RCP #2 Seal Leakoff High Flow (cont'd)**	
3.	**MONITOR** RCP #2 seal INTACT:	**PERFORM** the following within 8 hours:
	• **VERIFY** RCP #2 seal leakoff less than or equal to 0.5 gpm **USING** Appendix A, RCDT Level Rate-of-Change.	a. **PERFORM** normal plant shutdown **USING** appropriate plant procedure.
	• **VERIFY** RCP vibration is within limits of annunciator response 1-AR-M5-A (window D-3) VIBRATION & LOOSE PARTS MONITORING ALM.	b. **WHEN** reactor is shutdown or tripped, **THEN** **STOP** and **LOCK OUT** affected RCP.
	• **CONTACT** Engineering for recommendations.	c. **PULL TO DEFEAT** affected loop ΔT and T-avg: • XS-68-2D (ΔT) • XS-68-2M (T-avg)

2.4 RCP #2 Seal Leakoff High Flow (cont'd)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4.	**CHECK** RCPs 1 and 2 RUNNING.	**CLOSE** affected loop's pressurizer spray valve.
5.	**EVALUATE** EPIP-1, Emergency Plan Initiating Conditions Matrix.	
6.	**EVALUATE** the following Tech Specs for applicability: • 3.2.5, DNB Parameters • 3.4.1.1, Reactor Coolant Loops and Coolant Circulation - Startup and Power Operation • 3.4.1.2, Reactor Coolant System - Hot Standby • 3.4.1.3, Reactor Coolant System - Shutdown • 3.4.6.2, RCS Operational Leakage	
7.	**GO TO** appropriate plant procedure. ➡	

END OF SECTION

2.5 RCP #3 Seal Leakoff High Flow

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1.	**CHECK** RCP standpipe level alarms DARK [M-5B, A-2, B-2, C-2, D-2].	**PERFORM** the following: a. **MONITOR** Cntmt Fl. & Eq. Sump Level rise rate (ICS pt. U0969) b. **FILL** affected RCP standpipe **USING** AR-M-5B, Annunciator Response: • RCP 1 [A-2] • RCP 2 [B-2] • RCP 3 [C-2] • RCP 4 [D-2] c. **IF** RCP bearing temperature rising, **THEN** **GO TO** Section 2.4, RCP #2 Seal Leakoff High Flow, Step 1.

2.5 RCP #3 Seal Leakoff High Flow (cont'd)

NOTE: A leakoff rate of greater than 500 cc/hr indicates that a seal problem exists. The frequency and length of time filling the RCP standpipe may indicate the severity of the leak.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2.	**MONITOR** RCP #3 seal intact: • **VERIFY** RCP vibration is within limits of annunciator response 1-AR-M5-A (window D-3) VIBRATION & LOOSE PARTS MONITORING ALM. • **CONTACT** Engineering for assistance in determining acceptable leak rate for continued RCP operation.	**PERFORM** the following within 8 hours: a. **PERFORM** normal plant shutdown **USING** appropriate plant procedure. b. **WHEN** reactor is shutdown or tripped, **THEN** **STOP** and **LOCK OUT** affected RCP. c. **PULL TO DEFEAT** affected loop ΔT and T-avg: • XS-68-2D (ΔT) • XS-68-2M (T-avg)
3.	**CHECK** RCPs 1 and 2 RUNNING.	**CLOSE** affected loop's pressurizer spray valve.
4.	**EVALUATE** EPIP-1, Emergency Plan Initiating Conditions Matrix.	

2.5 RCP #3 Seal Leakoff High Flow (cont'd)

5. **EVALUATE** the following Tech Specs for applicability:

   - 3.2.5, DNB Parameters
   - 3.4.1.1, Reactor Coolant Loops and Coolant Circulation - Startup and Power Operation
   - 3.4.1.2, Reactor Coolant System - Hot Standby
   - 3.4.1.3, Reactor Coolant System - Shutdown
   - 3.4.6.2, RCS Operational Leakage

6. **GO TO** appropriate plant procedure.

   ➡

END OF SECTION

2.6 RCP Motor Stator Temperature High

CAUTION: Operating the RCP with excess winding temperature will reduce the expected life of the motor insulation.

NOTE: RCP motor winding temperature limits are as follows:

- 329°F if RCS temperature is less than 540°F.
- 311°F if RCS temperature is greater than or equal to 540°F.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1.	**MONITOR** RCP Motor Stator temperature less than applicable limit by monitoring the following computer points: • Pump 1: T0409A, 411A or 412A • Pump 2: T0429A, 431A or 432A • Pump 3: T0449A, 451A or 452A • Pump 4: T0469A, 471A or 472A	a. **IF** RCP Motor Stator temperature reaches applicable limit **AND** indication is verified valid, **THEN** **PERFORM** the following: 1) **IF** reactor power greater than 10%, **THEN** **INITIATE** a plant shutdown at 2% per minute **USING** AOP-C.03, Emergency Shutdown. 2) **WHEN** reactor power less than 10%, **THEN** **GO TO** Section 2.1, RCP Tripped or Shutdown Required. **[C.1]**

2.6 RCP Motor Stator Temperature High (continued)

2. **EVALUATE** EPIP-1, Emergency Plan Initiating Conditions Matrix.

3. **EVALUATE** the following Tech Specs for applicability:

   - 3.2.5, DNB Parameters
   - 3.4.1.1, Reactor Coolant Loops and Coolant Circulation - Startup and Power Operation
   - 3.4.1.2, Reactor Coolant System - Hot Standby
   - 3.4.1.3, Reactor Coolant System - Shutdown
   - 3.4.6.2, RCS Operational Leakage

4. **GO TO** appropriate plant procedure.

➡

END OF SECTION

3.0 SYMPTOMS AND ENTRY CONDITIONS

3.1 Symptoms

A. Any of the following annunciators may indicate a RCP malfunction:

PANEL 0-XA-55-27-B-A, COMPONENT COOLING	
D-2	RC PUMP 1 OIL COOLERS OUTLET FLOW LOW
D-3	RC PUMP 2 OIL COOLERS OUTLET FLOW LOW
D-4	RC PUMP 3 OIL COOLERS OUTLET FLOW LOW
D-5	RC PUMP 4 OIL COOLERS OUTLET FLOW LOW

PANEL 0-XA-55-27-B-E, COMPONENT COOLING/MISC	
D-2	RC PUMP 1 OIL COOLERS OUTLET FLOW LOW
D-3	RC PUMP 2 OIL COOLERS OUTLET FLOW LOW
D-4	RC PUMP 3 OIL COOLERS OUTLET FLOW LOW
D-5	RC PUMP 4 OIL COOLERS OUTLET FLOW LOW

PANEL 1(2)-XA-55-1B, AUXILIARY POWER/STATION SERVICE	
A-1	6900V UNIT BD 1(2)A TRANSFER
A-2	6900V UNIT BD 1(2)B TRANSFER
A-3	6900V UNIT BD 1(2)C TRANSFER
A-4	6900V UNIT BD 1(2)D TRANSFER
B-1	6900V UNIT BD 1(2)A FAILURE OR UNDERVOLTAGE
B-2	6900V UNIT BD 1(2)B FAILURE OR UNDERVOLTAGE
B-3	6900V UNIT BD 1(2)C FAILURE OR UNDERVOLTAGE
B-4	6900V UNIT BD 1(2)D FAILURE OR UNDERVOLTAGE
E-3	MOTOR TRIPOUT PNL 1(2)-M-1 THRU 1(2)-M-6

3.1 Symptoms (cont'd)

PANEL XA-55-5A, REACTOR COOLANT - STM - FW	
A-6	TS-68-2M/N REACTOR COOLANT LOOPS T AVG/AUCT T AVG DEVN HIGH - LOW
B-5	CNTMT FLOOR & EQUIP DRAIN SUMP HI-HI-HI
B-6	TS-68-2A/B REACTOR COOLANT LOOPS ΔT DEVN HIGH - LOW
D-3	VIBRATION & LOOSE PARTS MONITOR ALARM

PANEL XA-55-5B, CVCS SEAL WATER AND RCP	
A-2	LS-62-6A REAC COOL PMP 1 STANDPIPE LVL HIGH-LOW
A-3	FS-62-10 REAC COOL PMPS SEAL LEAKOFF LOW FLOW
A-4	PdIS-62-96 SEAL WATER INJECTION FILTER HIGH ΔP
A-5	LS-68-10A/B REAC COOL PMP 1 OIL RESERVOIR LEVEL HI-LOW
B-2	LS-62-19A REAC COOL PMP 2 STANDPIPE LVL HIGH-LOW
B-3	FS-62-11 REAC COOL PMPS SEAL LEAKOFF HIGH FLOW
B-4	PdIS-62-97 SEAL WATER INJECTION FILTER 2 HIGH ΔP
B-5	LS-68-34A/B REAC COOL PMP 2 OIL RESERVOIR LEVEL HI-LOW
C-2	LS-62-32A REAC COOL PMP 3 STANDPIPE LVL HIGH-LOW
C-3	FS-62-1 REAC COOL PMPS SEAL WATER FLOW LOW
C-5	LS-68-53A/B REAC COOL PMP 3 OIL RESERVOIR LEVEL HI-LOW
D-2	LS-62-45A REAC COOL PMP 4 STANDPIPE LVL HIGH-LOW
D-3	PdS-62-8 REAC COOL PMPS SHAFT SEAL WATER ΔP
D-5	LS-68-76A/B REAC COOL PMP 4 OIL RESERVOIR LEVEL HI-LOW
E-1	REAC COOL PMPS MOTOR STATOR TEMPERATURE HIGH
E-2	TS-62-42 REAC COOL PMPS LOWER BEARING TEMP HIGH
E-3	REACTOR COOLANT PUMPS MOTOR THRUST BEARING TEMP HIGH
E-4	TS-62-43 REAC COOL PMPS SEAL WATER TEMP HI
E-5	FIS-62-12 RCP NO 1 SEAL BYPASS FLOW LOW

3.1 Symptoms (cont'd)

PANEL XA-55-6A COMPONENT COOLING	
A-4	FS-68-6A REACTOR COOLANT LOOP 1 LOW FLOW
B-4	FS-68-29A REACTOR COOLANT LOOP 2 LOW FLOW
C-4	FS-68-48A REACTOR COOLANT LOOP 3 LOW FLOW
D-4	FS-68-71A REACTOR COOLANT LOOP 4 LOW FLOW
E-4	RCP BUS UNDERFREQUENCY / UNDERVOLTAGE

B. Deviations or unexpected indication on any of the following may indicate a RCP malfunction:

1. Erratic or abnormal RCP motor current
2. Erratic RCP motor frequency
3. Erratic or low RCS Loop Flow indications
4. Plant Computer RCP temperature alarms
5. Indication of high vibrations on a RCP
6. Low RCP #1 seal ΔP
7. High or low RCP #1 Seal leakoff flow
8. High or low RCP #1 Seal supply flow
9. Increasing RCP #1 Seal temperature
10. Increasing RCP lower bearing temperature
11. High VCT temperature
12. High VCT pressure
13. High VCT level
14. Increasing Reactor Coolant Drain Tank level
15. High Containment Floor & Equipment Sump Level rate of rise

3.1 Symptoms (cont'd)

C. Any of the following automatic actions may indicate a RCP malfunction:

1. RCP trip from motor faults
2. Reactor Trip
3. Safety Injection

3.2 Entry Conditions

None

END OF SECTION

4.0 REFERENCES

4.1 Performance

A. EPIP-1, Emergency Plan Initiating Conditions Matrix
B. E-0, Reactor Trip or Safety Injection
C. AR-M-5B, Annunciator Response

4.2 Technical Specifications

A. 3.2.5, DNB Parameters
B. 3.4.1.1, Reactor Coolant Loops and Coolant Circulation - Startup and Power Operation
C. 3.4.1.2, Reactor Coolant System - Hot Standby
D. 3.4.1.3, Reactor Coolant System - Shutdown
E. 3.4.6.2, RCS Operational Leakage

4.3 Plant Drawings

A. 47W600, Sheets 57, 60

B. 47W610-68, Sheets 1, 2, 3, 4, 6

C. 47W610-77-3

D. 47W610-62-2

E. 47W610-72-1

F. 47W610-74-1

G. 47W610-63-1

H. 47W610-67-1

I. 47W610-3-3

J. 47W610-70-1

K. 47W610-30-2

L. 47W610-47-1

M. 47W610-82-1

N. 45N765, Sheets 1, 2

O. 45N724, Sheets 1, 2, 3, 4

P. 45N751, Sheets 1, 2, 3, 4, 5, 6, 7, 8

Q. 45N732, Sheets 1, 2

4.4 10 CFR

A. 10CFR50, Appendix R

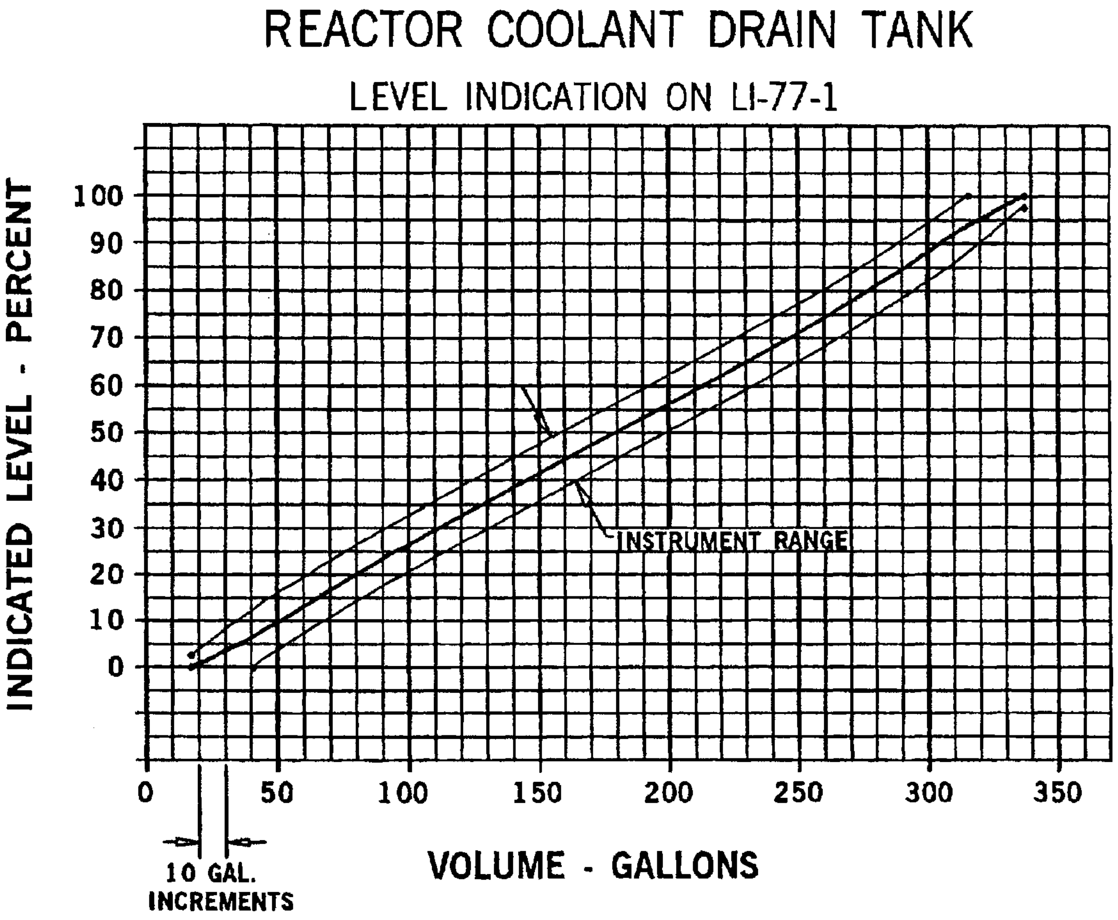
APPENDIX A

RCDT LEVEL RATE OF CHANGE

CALCULATE RCDT level rate of change to obtain RCP #2 seal leakoff flowrate.

$$\frac{\text{FINAL VOLUME (gal)} - \text{INITIAL VOLUME (gal)}}{\Delta \text{ TIME (minutes)}} = \text{LEVEL RATE OF CHANGE}\ \_\_\_\_\_\_\_\_\_\_\ \text{gpm}$$

Figure C.20
Page 1 of 1



NOTE: LEVEL TAP NOT AT TANK BOTTOM

APPENDIX B
PAGE 1 of 1
RCP TRIP CRITERIA

Exceeding the following limitations requires trip of the affected RCP, unless RCP operation is required by FR-C.1, *Inadequate Core Cooling* or FR-C.2, *Degraded Core Cooling* [C.1]:

- RCP #1 Seal ΔP less than 220 psid
- RCP #1 Seal Temperature greater than 225°F
- RCP Lower Bearing Temperature greater than 225°F
- RCP Upper Motor Bearing Temperature greater than 200°F
- RCP Lower Motor Bearing Temperature greater than 200°F
- RCP Motor Voltage less than 5940V or greater than 7260V
- RCP Motor Amps greater than 608 amps
- RCP Vibration greater than 20 mils on any axis (x and/or y) [C.3]

COMMITMENT LIST

COMMITMENT ID	SUMMARY OF COMMITMENT	COMMITMENT CORRESPONDENCE
C.1	Provide clear instructions to the operators should any seal temperature, pressure, or leakage alarms annunciate. Include conditions for continued operation or immediate shutdown.	NER 82-005 INPO SOER 81-007 INPO SOER 82-005
C.2	Update procedural guidance to conform to most recent Westinghouse recommendations on RCP shutdown with No. 1 seal leakage outside the operating limits.	NER 930512001 Westinghouse Tech Bulletin NSD-TB-93-01-R1
C.3	Update procedural guidance to include RCP vibration as a limitation.	NER 970134001 TROI INPO SER 97-002

SIM JPM B.1.c

SEQUOYAH NUCLEAR PLANT
JOB PERFORMANCE MEASURE

B.1.c
JPM

WITHDRAW SHUTDOWN BANKS

PREPARED/
REVISED BY: ______________________________ Date/ __________

VALIDATED BY: * ______________________________ Date/ __________

APPROVED BY: ______________________________ Date/ __________
(Operations Training Manager)

CONCURRED: ** ______________________________ Date/ __________
(Operations Representative)

* Validation not required for minor enhancements, procedure Rev changes that do not affect the JPM, or individual step changes that do not affect the flow of the JPM.
** Operations Concurrence required for new JPMs and changes that affect the flow of the JPM (if not driven by a procedure revision).

NUCLEAR TRAINING

REVISION/USAGE LOG

REVISION NUMBER	DESCRIPTION OF REVISION	V	DATE	PAGES AFFECTED	PREPARED/ REVISED BY:
0	Modified JPM	Y		All	

V - Specify if the JPM change will require another validation (Y or N).
See cover sheet for criteria.

SEQUOYAH NUCLEAR PLANT
RO/SRO
JOB PERFORMANCE MEASURE

Task:

Withdraw Shutdown Banks

JA/TA task:

0010180101(**RO**) Withdraw shutdown Banks

K/A Ratings:

001 Control Rod Drive System
A3 Ability to monitor automatic operation of the CRDS, including: (CFR: 41.7/45.13)
A3.05 Individual vs. group rod position 3.5 / 3.5

Task Standard:

1) Initiation of withdrawal of shutdown banks is initiated starting with Shutdown Bank A.
2) Following failure of the group step counters, the reactor trip breakers are opened in accordance with Technical Requirement 3.1.3.3.

Evaluation Method : Simulator __X____ In-Plant ________

==

Performer: ________________________________
NAME

Start Time ________

Performance Rating : SAT _____ UNSAT _____ Performance Time _____

Finish Time _______

Evaluator: ____________________________/________
SIGNATURE DATE

==

COMMENTS

SPECIAL INSTRUCTIONS TO EVALUATOR:

1. Sequenced steps identified by an "s"
2. Any UNSAT requires comments
3. **Place MODE 3 sign on the simulator.**
4. This task is to be performed using the simulator in **IC 183. If not available then raise boron to 1800ppm and withdraw rods to D @ 216; Trip reactor; Close Reactor trip breakers; Reset FWI and one MFPT, Stop TD AFW pump, and Reset M/D LCVs and stabilize SG levels.**
   Place Rod Control Mode Selector Switch to the **Manual** position and rest startup switch.
5. When the candidate withdraws Shutdown bank A approximately 100 steps, insert **I/O Override / RD control rod drive system / Logical Output ZROSCSBAG1(RESET) to ON** to fail the Shutdown Bank A step counters to '0'
6. Ensure operator performs the following required actions for **SELF-CHECKING;**
   a. Identifies the correct unit, train, component, etc.
   b. Reviews the intended action and expected response.
   c. Compares the actual response to the expected response.

Validation Time: CR. 16 min **Local** ____________

Tools/Equipment/Procedures Needed:

0-GO-2
0-GO-85-1
TR 3.1.3.3
AOP-C.01
TI-28

References:

	Reference	Title	Rev No.
1.	0-GO-2	Unit startup From Hot Standby to Reactor Critical	28
2.	0-SO-85-1	Control Rod Drive System	33
3.	TR 3.1.3.3	Reactivity Control Systems, Position Indicating System – Shutdown	13
4.	AOP-C.01	Rod Control System Malfunctions	17
5.	T1-28	Curve Book	215

==

READ TO OPERATOR

Directions to Trainee:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. Unit startup in progress following a trip from 100% power due to a generator electrical relay malfunction.
2. Per TI-28, the shutdown banks fully withdrawn positon is 228 steps

INITIATING CUES:

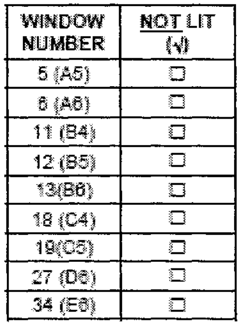
1. You are to withdraw the shutdown banks in accordance with 0-GO-2, Unit Startup From Hot Standby to Reactor Critical, Section 5.1, Step [26.2]
2. Notify the SRO when the shutdown banks are fully withdrawn.

STEP/STANDARD	SAT/UNSAT
STEP 1.: Obtain the appropriate procedure. STANDARD: Operator identifies 0-SO-85-1and goes to Section 6.3 "Manual Operation of Rod Control System Below 15 Percent Power".	___ SAT ___ UNSAT Start Time____
STEP 2.: **[1] ENSURE** Section 5.2, Reset/Close Reactor Trip Breakers has been completed. STANDARD: Candidate determines by looking at procedure that section 5.2 is complete. COMMENTS:	___ SAT ___ UNSAT
STEP 3.: **[2] IF** the shutdown and control rods were withdrawn 5 steps to prevent thermal lockup during an RCS cooldown, **THEN ENSURE** rods are fully inserted prior to withdrawal. ***Cue: If asked "Rods were not withdrawn 5 steps"*** STANDARD: Candidate N/As the step. COMMENTS:	___ SAT ___ UNSAT
STEP 4.: **[3] MOMENTARILY PLACE [SUS]**, Rod Control Startup Step Counter Reset to the **STARTUP** position to reset Control Rod Drive System. STANDARD: Candidate places Rod control Startup Step Counter Reset, 1-SUS, to startup and then releases switch. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 5.: **[4] ENSURE** all Full Length Rod step counters reset to zero. STANDARD: Candidate verifies all 14 step counters are reading '000' COMMENTS:	___ SAT ___ UNSAT
STEP 6.: **[5] VERIFY** rod control IN-OUT direction lights are **NOT LIT**. STANDARD: Candidate verifies that both the RODS IN and the RODS OUT lights are not lit on 1-M-4. COMMENTS:	___ SAT ___ UNSAT
STEP 7.: **[6] DEPRESS [RCAS]**, Rod Urgent Failure Alarm Reset. STANDARD: Candidate pushes Rod Urgent Failure Alarm Reset, 1-RCAS COMMENTS:	___ SAT ___ UNSAT
STEP 8.: [7] **RESET** Window 6 (A-6), ROD CONTROL SYSTEM URGENT FAILURE alarm on panel **[XA-55-4B]** using **[XS-55-4A]**, Annunciator RESET/ACK/TEST Switch. STANDARD: Candidate resets the ROD CONTROL SYSTEM URGENT FAILURE alarm using 1-XS-55-4A if lit. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD **SAT/UNSAT**

STEP 9.: **[8] VERIFY** the following rod control system alarms on panel **[XA-55-4B]** are **NOT LIT**:



WINDOW NUMBER	NOT LIT (√)
5 (A5)	☐
6 (A6)	☐
11 (B4)	☐
12 (B5)	☐
13(B6)	☐
18 (C4)	☐
19(C5)	☐
27 (D6)	☐
34 (E6)	☐

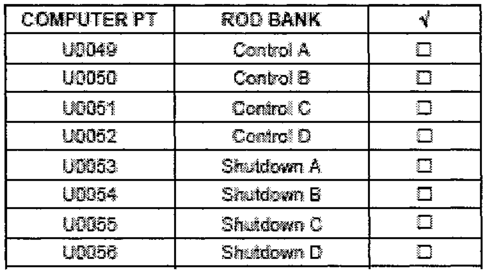
___ SAT

___ UNSAT

STANDARD: Candidate verifies listed windows on 1-M-4 overhead annunciatot 1-XA-55-4B are not lit

COMMENTS:

STEP 10.: **[9] ENSURE** Plant computer points for rod bank position are **ZERO** using the following computer points:



COMPUTER PT	ROD BANK	√
U0049	Control A	☐
U0050	Control B	☐
U0051	Control C	☐
U0052	Control D	☐
U0053	Shutdown A	☐
U0054	Shutdown B	☐
U0055	Shutdown C	☐
U0056	Shutdown D	☐

___ SAT

___ UNSAT

Cue:* *After candidate demonstrates ability to access computer points ' All listed points have been verified to be '0'.

STANDARD: Candidate verifies listed computer points are reading '0' on ICS. *There are several methods/screens to access the points*

COMMENTS:

STEP/STANDARD	SAT/UNSAT
STEP 11.: **[10] MONITOR** Control Rod position **USING** Rod Position Indicators ICS screen 30 minute trend during SD & Control Banks withdrawal to aid in detecting rod misalignment. STANDARD: Candidate locates the Rod Position Indicator RPI TREND screen on the ICS. (when on RPI screen, the RPI TREND screen can be accessed via clicking on TREND.) COMMENTS:	___ SAT ___ UNSAT
STEP 12.: **[11] IF** Individual Rod Position Indication does not indicate proper rod position during withdrawal of SD Banks, **THEN** **[a] STOP** rod withdrawal. **[b] ENSURE** subcriticality. **[c] CONTACT** MIG **AND INITIATE** troubleshooting. **[d] IF** troubleshooting does not resolve the problem, **OR** subcriticality can NOT be verified, **THEN** **INITIATE** Reactor **TRIP**. STANDARD: Candidate acknowledges the requirement of the IF/THEN step for individual RPIs. No action required.	___ SAT ___ UNSAT
STEP 13.: **[12] IF** Individual Rod Position Indication does not indicate proper rod position during withdrawal of Control Banks, **THEN** **GO TO** AOP-C.01 section 2.6 Rod Position Indicator (RPI) Malfunction - Modes 1 or 2. STANDARD: Candidate acknowledges the step, realizes it refers to control banks, and No action is required for this task of withdrawing shutdown banks COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 14.: **[13] PLACE [HS-85-5110]**, Rod Control Mode Selector to the **SBA** position. STANDARD: Candidate rotates Mode Control Mode Selector, 1-HS-85-5110, counterclockwise to the SBA position COMMENTS:	___ SAT ___ UNSAT **Critical Step**
STEP 15.: **[14] VERIFY** Rod Speed Indicator **[SI-412]**, indicates 64 Steps/minute. STANDARD: Candidate determines SI-412, Rod Speed, on 1-M-4 vertical panel is reading 64 steps/min COMMENTS:	___ SAT ___ UNSAT
STEP 16.: **[15] ENSURE** Shutdown Bank A demand position counters operational by performing the following: **[C.2]** **[a] BUMP [HS-85-5111]**, Rod Control Switch to withdraw Shutdown Bank A one-half step at a time, for one full step. **[b] CHECK** group demand position counters advance properly. **[c] BUMP [HS-85-5111]** to withdraw Shutdown Bank A one-half step at a time, for the second full step. **[d] VERIFY** group demand position counters advance properly. **[e] IF** group demand position counters do **NOT** advance properly, **THEN** A. **STOP** rod withdrawal. B. **INITIATE** WO to have counter repaired. C. **WHEN** counter is repaired, **THEN** 1. **ENSURE** Shutdown Bank A fully **INSERTED.** 2. **RETURN** to beginning of this step. STANDARD: Candidate uses Rod Control, 1-HS-85-5111, IN-OUT switch to withdraw SBA rods 2 steps in ½ step increments while checking the group step counters are operating properly. COMMENTS:	___ SAT ___ UNSAT

Job Performance Checklist

STEP/STANDARD	SAT/UNSAT
Note to evaluator: The shutdown bank full out position is stated in the initial conditions, if candidate refers to TI-28 provide a cue that the full out position is 228 steps.	
STEP 17.: **[16] WITHDRAW** Shutdown Bank A to the **FULLY WITHDRAWN** position using **[HS-85-5111]**. ***Cue: If candidate initiates use of TI-28 to determine full out position, state "The full out position is 228 steps."*** STANDARD: Candidate uses Rod Control, 1-HS-85-5111, IN-OUT switch on 1-M-4 to withdraw SBA COMMENTS:	___ SAT ___ UNSAT **Critical Step**
Note to evaluator: Malfunction to fail step counters is to be inserted when the rods reach approximately 100 steps. Candidate may refer to TR-3.1.3.3. If so the required action is to open the Reactor Trip breakers.	
STEP 18.: Open the Reactor Trip Breakers ***Cue: After the reactor trip breakers have been opened state ' We will stop here"*** STANDARD: Candidate determines the Group 1 step counter is not capable of determining the demand position for each of the Shutdown bank a rods within ± 2 steps and opens the reactor trip breakers. COMMENTS:	___ SAT ___ UNSAT **Critical Step** Stop Time____

CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

DIRECTION TO TRAINEE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. Unit startup in progress following a trip from 100% power due to a generator electrical relay malfunction.
2. Per TI-28, the shutdown banks fully withdrawn positon is 228 steps

INITIATING CUES:

1. You are to withdraw the shutdown banks in accordance with 0-GO-2, Unit Startup From Hot Standby to Reactor Critical, Section 5.1, Step [26.2]
2. Notify the SRO when the shutdown banks are fully withdrawn.

TVA

Sequoyah Nuclear Plant

Unit 0

General Operating Instructions

0-GO-2

UNIT STARTUP FROM HOT STANDBY TO REACTOR CRITICAL

Revision 0028

Quality Related

Level of Use: Continuous Use

Effective Date: 10-31-2007

Responsible Organization: OPS, Operations

Prepared By: D. A. Porter

Approved By: W. T. Leary

Current Revision Description

Revised Section 5.1 steps [28] and [29] to clarify applicability of Sect. 5.2 and 5.3. Added Sect. 5.2 step [67]. Modified title of Sect. 5.2 and 5.3. Added limitation associated with minimum temp for criticality. Provided more specific guidance on S/G level control in Sect. 4.0 Step [7].

THIS PROCEDURE IMPACTS REACTIVITY

Table of Contents

3.1 PRECAUTIONS (continued)

2. During Rod Movement

   a. Ensure RO has peer check

   b. Ensure RO is following procedure

   c. Ensure RO understands criteria for stopping rod motion (based upon number of steps and/or nuclear instrument response)

   d. Watch performance of rod manipulation while listening to audible indication of rod step

   e. Ensure peer checking meets expectations (OPDP-1)

   f. Re-verify items of initial evaluation (on previous page)

   g. Monitor plant for expected response

3.2 LIMITATIONS

A. Simultaneous reactivity addition by rod withdrawal and dilution is **NOT** allowed while in the source range.

B. If at any point during the approach to criticality, **ONE** of the two source range detectors shows an unexplained increase in count rate equal to or greater than a factor of **5**, or if **BOTH** source range detectors show an unexplained increase in count rate equal to or greater than a factor of **2**, the approach to criticality shall be **SUSPENDED IMMEDIATELY** (i.e., all rod withdrawals and/or boron dilutions shall be terminated). Further positive reactivity changes shall not be resumed until an evaluation is performed and the Shift Manager authorizes a resumption in the approach to criticality.

C. After refueling operations, the NIS indications may be inaccurate until calibration at higher power levels. The NIS calibration procedures will adjust the PRM trip set points to ensure that the excore detectors do not contribute to an overpower condition. Prior to startup, the PRM high range flux trip setpoint will be adjusted from 109 to 60%, with the rod stop (C-2) remaining at 103%. **[C.3]**

D. While in Mode 3, maintain the Reactor Coolant System boron concentration in accordance with 0-SI-NUC-000-038.0, Shutdown Margin requirements.

E. The stepping or tripping of the Control Rod during periods when coolant crud level are high should be kept to a minimum. This will limit the possibility of CRDM mis-stepping due to crud contamination of CRDM latch assemblies.

F. The lowest operating loop temperature (T-avg) shall be greater than or equal to 541°F (LCO 3.1.1.4, Minimum Temperature for Criticality).

STARTUP No. ________ **Unit** 1 **Date** 01/xx/0y

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.

3) Management oversight is required for a Reactor Startup after a non-refueling outage. A Reactor Startup after a refueling outage is a CIPTE.

[1] **ENSURE** Instruction to be used is the latest copy of effective version. WTA

[2] **REVIEW** Precautions and Limitations. ☑

[3] **INDICATE** below which instruction this GO is being entered from:

- 0-GO-1 (cold shutdown to hot standby) ☑
- 0-GO-6 (30% reactor power to hot standby) ☐
- 0-GO-7 (hot standby to cold shutdown) ☐
- 0-GO-5 (normal power operation) ☐

[4] **MAINTAIN** pressurizer pressure within the normal operating band by use of the pressurizer heaters and spray valves. ☑

[5] **MAINTAIN** pressurizer level greater than or equal to 25%. ☑

STARTUP No. ________ **Unit** 1 **Date** 01/xx/08

4.0 PREREQUISITES (continued)

> **NOTE**
>
> Due to instrument inaccuracies the steam dump or SG atmospheric relief valve setpoint of 84% or 1005 psig may be ± 1% or ± 12 psig off.

[6] **MAINTAIN** T_{AVG} stable at approximately 547°F with steam dumps in pressure mode or with SG atmospheric relief valves. ☑

> **NOTE**
>
> Minor S/G level variations which exceed the plus or minus 7% band should not be considered a procedural violation.

[7] **MAINTAIN** steady-state S/G levels at approximately 33% (plus or minus 7%) using Auxiliary Feedwater. ☑

[8] **ENSURE** all reactor coolant pumps are in operation in accordance with 1,2-SO-68-2, *Reactor Coolant Pumps*. **[C.12]** WTA

[9] **IF** the reactor vessel head has been removed,
THEN
ENSURE conditional performance of 0-SI-SXX-085-043.0, *Rod Drop Time Measurements,* has been performed to comply with SR 4.1.3.4.a. N/A

[10] **REQUEST** Periodic Test Coordinate to confirm that the following checklists have been distributed:

[10.1] Mode 3 to Mode 2, 1, *Surveillance Checklist* (NA if previously performed for this startup). ☑

[10.2] Reactor Trip Breaker Checklist (NA if previously performed for this startup). ☑

[11] **ENSURE** East Valve Vault Room Vent Chute dampers OPEN. (inside door near SPING Room, Ref. PER 03-002446-000). WTA

STARTUP No. ________ Unit 1 Date 01/xx/0Y

4.0 PREREQUISITES (continued)

[12] **NOTIFY** MIG to re-scale LR-3-43A and LR-3-98A, Steam Generator Wide Range Level Recorders, to 80% - 90%. WTA

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

Print Name	Initials	Print Name	Initials
Wilson T. Abbot	WTA		
JACK B. ANDERSON	JBA		

END OF TEXT

STARTUP No. ________ **Unit** 1 **Date** 01/xx/08

5.0 INSTRUCTIONS

5.1 Actions to be performed prior to a reactor startup

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

> **NOTE**
>
> Steps 5.1[2] through 5.1[11] may be performed in any order.

[2] **INTIATE** Appendix B, , *Mode 3 to Mode 2,1 Review And Approval* while continuing with this instruction. ☑

[3] **OBTAIN** assistance from Systems Engineering to complete Appendix B steps associated with Pressurizer Spray line bypass valves. ☑

> **NOTE**
>
> Steps for MFPT startup may be performed in parallel with other activities. The MFPT trip busses shall be energized prior to entering Mode 2 (LCO 3.3.2.1 or 3.3.2) except as allowed by LCO 3.0.4. **[C.1]**

[4] **INITIATE** applicable section(s) of 1, 2-SO-2/3-1 to prepare at least one MFP for startup, while continuing with this instruction. (N/A if no MFPT available) ☑

[5] **ENSURE** TDAFW LCVs are in **NORMAL**.

WTA JBA
1st IV

STARTUP No. ________ **Unit** 1 **Date** 01/xx/08

5.1 Actions to be performed prior to a reactor startup (continued)

CAUTION

Rapid changes in pressurizer enclosure temperature may result in pressurizer safety valve simmer.

[6] **IF** lower compartment coolers are not in service,
THEN

[6.1] **ALIGN** lower compartment coolers to maintain pressurizer enclosure temperature less than 110°F in accordance with 0-SO-30-5. N/A

[6.2] **MONITOR** Pressurizer enclosure temperature using Plant Computer pt. T1001A. / ☑

[7] **IF** control rod drive coolers are not in service,
THEN

[7.1] **ALIGN** control rod drive coolers to maintain shroud enclosure temperature less than 164°F in accordance with 0-SO-30-6. N/A

[7.2] **MONITOR** Reactor Cavity Air temperature using Plant Computer pt. T1014A. / ☑

NOTE

New analysis is not required for this startup. Routine analysis is sufficient unless there is reason to suspect chemistry has been changed.

[8] **NOTIFY** Chemistry Supervisor that mode change from 3 to 2 requires sampling in accordance with 0-SI-CEM-000-050.0, 0-SI-CEM-030-407.2, and 0-SI-CEM-030-415.0 requirements. ☑

STARTUP No. ________ **Unit** 1 **Date** 01/xx/08

5.1 Actions to be performed prior to a reactor startup (continued)

> **NOTE**
>
> To preserve the life of 20 AST and 20 ET, power must be removed from turbine trip bus A and trip bus B if unit startup is extended.

[9] **ENERGIZE** main turbine trip buses by **CLOSING** the following breakers (NA breakers not applicable):

UNIT	TRAIN	BREAKER	250V DC	POSITION	INITIALS	
1	TRAIN A	1-BKRD-47-KA/516	BATT Bd 1	CLOSED	WTA 1st	CV
	TRAIN B	1-BKRD-47-KB/516	BATT Bd 2	CLOSED	WTA 1st	CV
2	TRAIN A	2-BKRD-47-KA/519	BATT Bd 1	CLOSED	WTA 1st	CV
	TRAIN B	2-BKRD-47-KB/519	BATT Bd 2	CLOSED	WTA 1st	CV

> **NOTE**
>
> Step 5.1[10] may be marked N/A if not required.

[10] **PERFORM** 0-PI-OPS-047-723.0, *20/AST, 20/ET, 20-1/OPC, and 20-2/OPC Operability Verification* (N/A if not performed). N/A

STARTUP No. ________ **Unit** 1 **Date** 01/xx/0y

5.1 Actions to be performed prior to a reactor startup (continued)

CAUTION

Operation of the EHC pumps without the turbine being reset will result in overheating of the EHC fluid and pumps.

NOTE

Startup of EHC and turbine reset may be postponed until later in startup. (**N/A** if postponed)

[11] **ENSURE** EHC system in service in accordance with 1,2-SO-47-2 (NA if previously performed). ☑ ✓

[12] **IF** no MFPT is ready for start up per 1,2-SO-2/3-1,
THEN
GO TO Section 5.1[18]. N/A ☐

[13] **ENSURE** MFPT designated for startup has been tested and ready for start up per 1, 2-SO-2/3-1
PRIOR to proceeding with the next step.

WTA	01/xx/0y	0635
Initials	Date	Time

STARTUP No. ________ Unit 1 Date 01/xx/08

5.1 Actions to be performed prior to a reactor startup (continued)

NOTES

1) Steps for MFPT startup may be performed in parallel with other activities. The MFPT trip busses shall be energized prior to entering Mode 2 (LCO 3.3.2.1 or 3.3.2) except as allowed by LCO 3.0.4. **[C.1]**

2) Power is placed on only **ONE** MFPT trip bus in Step 5.1[14] to prevent inadvertent AFWP start.

[14] **ENSURE** power restored to **ONLY ONE** of MFPT trip busses on the applicable unit: (N/A breakers not applicable.) **[C.1]**

PUMP	BREAKER NO.	ELECTRICAL BOARD	BREAKER POSITION	INITIALS		
MFPT 1A	1-BKRD-46-KA/523	250v DC Battery Bd I	CLOSED	1st	CV	N/A
MFPT 1B	1-BKRD-46-KA/524	250v DC Battery Bd I	CLOSED	WTA 1st	[illegible] CV	
MFPT 2A	2-BKRD-46-KB/523	250v DC Battery Bd 2	CLOSED	1st	CV	N/A
MFPT 2B	2-BKRD-46-KB/524	250v DC Battery Bd 2	CLOSED	1st	CV	N/A

STARTUP No. ________ **Unit** 1 **Date** 01/xx/08

5.1 Actions to be performed prior to a reactor startup (continued)

CAUTION

Failure to reset a MFPT prior to energizing the remaining MFPT trip buss will initiate an ESF actuation.

NOTE

If SI signal or Hi/Hi steam generator level has occurred, Reactor Trip Breakers will have to be cycled.

[15] **RESET** MFPT energized in step 5.1[14] above.

N/TA 1st — 0641 Time — 01/xx/08 Date

CV — 0641 Time — 01/xx/08 Date

NOTE

IF the remaining NON-running MFPT is not available, **THEN** N/A step 5.1[16] and 5.1[17]

[16] **RESTORE** power to remaining MFPT Trip Bus on applicable unit. (N/A breakers not applicable)

N/A

PUMP	BREAKER NO.	ELECTRICAL BOARD	BREAKER POSITION	INITIALS	
MFPT 1A	1-BKRD-46-KA/523	250v DC Battery Bd I	CLOSED	______ 1st	______ CV
MFPT 1B	1-BKRD-46-KA/524	250v DC Battery Bd I	CLOSED	______ 1st	______ CV
MFPT 2A	2-BKRD-46-KB/523	250v DC Battery Bd 2	CLOSED	______ 1st	______ CV
MFPT 2B	2-BKRD-46-KB/524	250v DC Battery Bd 2	CLOSED	______ 1st	______ CV

STARTUP No. ________ **Unit** 1 **Date** 01/xx/08

5.1 Actions to be performed prior to a reactor startup (continued)

[17] **RESET** MFPT energized in step 5.1[16] above. N/A

____________ 1st ______ Time ______ Date

____________ CV ______ Time ______ Date

[18] **SELECT** one source range channel and one intermediate range channel with the highest readings to record on NR 45. ☑

[19] **ENSURE** audio count rate channel is in operation and selected for source range channel with highest reading. **[C.11]** ☑

[20] **ENSURE** all reactor first out alarms reset. ☑

> **NOTE**
>
> Refer to 1-PI-OPS-000-021.1 (Unit 1) or 2-PI-OPS-000-023.1 (Unit 2) for updating the Plant Computer.

[21] **IF** ICS is available,
THEN
ENSURE Plant Computer is reset and updating
(NA if previously performed). **[C.5]** ☑

> **NOTE**
>
> Closing of the RTB's for performance of 0-SI-OPS-085-011.0 (SR 4.1.3.3) is addressed in Licensing and NRC Telephone/Visit Report RIMs # S10 960521 800.

[22] **IF** 0-SI-OPS-085-011.0 is out-of-frequency,
THEN

[22.1] **CLOSE** RTB's provided Group Demand counters have no known deficiencies. ☑

[22.2] **PERFORM** 0-SI-OPS-085-011.0 (NA if above step cannot be performed). ☑

STARTUP No. ________ **Unit** 1 **Date** 01/xx/08

5.1 Actions to be performed prior to a reactor startup (continued)

[23] **IF** control rods were withdrawn 5 steps to prevent thermal lockup during RCS heatup,
THEN
INSERT control rods in accordance with 0-SO-85-1. N/A

[24] **ENSURE** Rod Bank Update completed by performing the following:

[24.1] **DEPRESS** NSSS and BOP button on ICS main screen. ☑

[24.2] **DEPRESS** ROD BANK UPDATE Button
AND
ENSURE all bank positions are zero. ☑

[24.3] **DEPRESS** F3 to save these rod bank positions. ☑

[25] **VERIFY** Rod Bank Update status by performing the following:

[25.1] **DEPRESS** NSSS and BOP button on ICS main screen. ☑

[25.2] **DEPRESS** ROD INSERTION **LIMIT DISPLAY** Button. ☑

[25.3] **VERIFY** Rod Bank Update Status indicates "UPDATED" in green letters. ☑

> **NOTE**
>
> TI-28 defines fully withdrawn position.

[26] **IF** shutdown rods are inserted,
THEN
PERFORM the following:

[26.1] **VERIFY** sufficient shutdown reactivity exists **USING** 0-SI-NUC-000-038.0, *Shutdown Margin.* WTA

[26.2] **WITHDRAW** Shutdown Rods to fully withdrawn position in accordance with 0-SO-85-1.

________ 1st ________ CV

STARTUP No. ________ **Unit** _______ **Date** ________

5.1 Actions to be performed prior to a reactor startup (continued)

[27] **CONDUCT** a pre-evolution briefing, stressing the following points:

- Management Expectations
- Limitations/Precautions
- Avoid activities which distract the operators *[SQ990136PER]*
- Appropriate Contingencies
- Communications
- Chain of Command
- Requirements for conservative actions and strict compliance with written procedures when repositioning control rods. **[C.11]**

____
SRO

[28] **IF** this start up is after a refueling outage
AND Low Power Physics Testing has NOT been performed,
THEN

[28.1] **VERIFY** applicable actions in Section 5.1 completed or initiated. _________

[28.2] **GO TO** Section 5.2. _________

[29] **IF** this start up is after a non-refueling outage
OR Low Power Physics Testing has already been completed,
THEN

[29.1] **VERIFY** applicable actions in Section 5.1 completed or initiated. _________

[29.2] **GO TO** Section 5.3. _________

[30] **IF** unit is to be shutdown,
THEN
GO TO 0-GO-7, *Unit Shutdown from Hot Standby to Cold shutdown.* _________

END OF TEXT

STARTUP No. ________ **Unit** _______ **Date** ________

5.2 Reactor Startup with Low Power Physics Testing

[1] **VERIFY** applicable actions in Section 5.1 completed or initiated. _________

> **NOTE**
>
> Steps 5.2[2] through 5.2[9] may be performed out of sequence.

[2] **IF** any MFPT trip buss is NOT energized,
THEN

  [2.1] **ENSURE** requirements of LCO 3.0.4 are satisfied. _________

  [2.2] **NOTIFY** Unit SRO that LCO 3.3.2.1 (3.3.2) action 20 will apply when Mode 2 is entered. _________

[3] **ENSURE** Appendix B, *Mode 3 to Mode 2, 1 Review and Approval* has been completed to ensure all restraints to Mode 2, 1 entry have been resolved and approvals for mode change granted. _________
SM

[4] **BLOCK** the Source Range High Flux At Shutdown alarm:

  [4.1] **PLACE** both HI FLUX AT SHUTDOWN switches on panel M-13 to **BLOCK** position. _________

  [4.2] **VERIFY** annunciator XA-55-4B, window C-1,

SOURCE RANGE
HIGH SHUTDOWN
FLUX ALARM
BLOCK

is **LIT.[C.2]** ☐

[5] **VERIFY** greater than or equal to 0.5 cps on highest reading SR instrument. ☐

5.2 Reactor Startup with Low Power Physics Testing (continued)

> **NOTE**
>
> The following count rates may be used as a reference during the approach to criticality.

[6] **RECORD** SR count rates from two of the following: [C.2] (N/A instruments not used)

XI-92-5001A (N31) ________cps
XI-92-5002A (N32) ________cps

OR

XI-92-5001B (N31) ________cps
XI-92-5002B (N32) ________cps

__________________ ____________ ____________
Date Time

> **CAUTION**
>
> **After refueling, NIS indications may be inaccurate until calibration at higher power levels. Therefore, NIS calibration procedures will reduce PRM trip setpoints from 109 to 60% to ensure that excore detectors do NOT contribute to an overpower condition. (Rod Stop will remain at 103%). RCS loop ΔT indicators should be used for power indication below 30%.**

[7] **ENSURE** Power Range high flux trip setpoints reduced to 60% in accordance with following: **[C.3]**

- 1,2-SI-ICC-092-N41.1 ☐
- 1,2-SI-ICC-092-N42.2 ☐
- 1,2-SI-ICC-092-N43.3 ☐
- 1,2-SI-ICC-092-N44.4 ☐

__________________ ____________ ____________
Instrument Maintenance Time Date

STARTUP No. ________ Unit ______ Date ________

5.2 Reactor Startup with Low Power Physics Testing (continued)

[8] **ENSURE** PRM calibration values set to startup values. **[C.3]**

____________________ Reactor Engineer ________ Time ________ Date

NOTE

0-RT-NUC-000-003.0, *Low Power Physics Testing* is performed by Rx Engineering concurrently with this procedure.

[9] **RECORD** estimated critical position calculated in accordance with 0-RT-NUC-000-003.0, *Low Power Physics Testing.*

Estimated critical position: ________ steps on bank ______.

Boron concentration: ________ ppm

________________ Initials ______ Time ______ Date

[10] **VERIFY** Steps 5.2[1] through 5.2[9] completed. ________

[11] **IF** actual RCS boron concentration does NOT approximately equal estimated critical boron concentration determined in 0-RT-NUC-000-003.0, **THEN**

[11.1] **DETERMINE** the appropriate boration/dilution requirements to achieve estimated boron conc. ☐

[11.2] **DILUTE/BORATE** in accordance with 0-SO-62-7 to the estimated critical boron concentration. **[C.12]** ☐

[11.3] **OPERATE** pressurizer heaters/spray as necessary to equalize boron concentration (within 50 ppm) between reactor coolant loops and the pressurizer. **[C.12]** ☐

[11.4] **WHEN** sufficient mixing has occurred,
THEN
OBTAIN a new boron sample. ☐

[11.5] **ENSURE** actual boron concentration is approximately equal to the estimated critical boron concentration. ________

5.2 Reactor Startup with Low Power Physics Testing (continued)

[12] **RECORD** minimum and maximum rod positions corresponding to ± 1000 pcm ALLOWABLE LIMITS (Tech Spec Limit) determined by 0-SI-NUC-000-001.0, *Estimated Critical Conditions.* **[C.11]**

Minimum allowable rod position ________ steps on bank ______.

Maximum allowable rod position ________ steps on bank ______.

____________ ________ ________
Initials Time Date

[13] **VERIFY** all shutdown rods are fully withdrawn in accordance with 0-SI-OPS-000-004.0, *Surveillance Requirements Performed on Increased Frequency with no Specific Frequency*, within 15 minutes prior to withdrawing control rods. ________

__________ __________
Time Date

NOTE

SR 4.1.1.4.a required verifying lowest T-avg greater than or equal to 541°F within 15 minutes prior to achieving criticality.

[14] **IF** 0-SI-SXX-068-127.0 is NOT in progress,
THEN
INITIATE applicable sections of 0-SI-SXX-068-127.0 to satisfy SR 4.1.1.4.a., *Minimum Temperature For Criticality.* ________

STARTUP No. ________ **Unit** _______ **Date** ________

5.2 Reactor Startup with Low Power Physics Testing (continued)

[15] **NOTIFY** onsite personnel of reactor startup over P/A system. ☐

CAUTION

Avoid operations that could produce sudden changes of temperature or unplanned boron concentration changes during approach to criticality or low power.

NOTES

1) Nuclear instrumentation shall be monitored very closely for indications of unplanned reactivity rate of change. **[C.11]**
2) Activities that can distract operators and supervisors involved with reactor startup, such as shift turnover and surveillance testing during approach to criticality, SHALL BE avoided. **[C.12]**
3) ICS points N0031A, N0032A, N0035A, and N0036A may be used as an aid for monitoring NIS indications.

[16] **MONITOR** nuclear instruments during approach to criticality:

[16.1] **MONITOR** source range and intermediate range NIS to identify potential reactivity anomalies. **[C.11]** ☐

[16.2] **IF** desired to place NR-45 recorder in fast speed,
THEN
ADJUST chart speed to high. ________

STARTUP No. ________ Unit _______ Date ________

5.2 Reactor Startup with Low Power Physics Testing (continued)

CAUTION

Do NOT exceed a steady startup rate of +1 DPM.

NOTE

The unit enters Mode 2 when the control banks are first withdrawn.

[17] **INITIATE** a reactor startup by performing the following:

[17.1] **RECORD** both source range readings for ICRR base counts.

N-31______CPS N-32______CPS ________ Initials

[17.2] **RECORD** intermediate range readings.

N-35_______ % N-36_______ % ________ Initials

[17.3] **CALCULATE** initial source range count doubling value **USING** Appendix C. ________

MODE 2

[17.4] **INITIATE** withdrawal of control banks in accordance with 0-SO-85-1 to first stop point: ________

CONTROL BANK A	**128 STEPS**

[17.5] **ENSURE** Mode 2 entry is logged (log entry may be performed out of sequence later). ☐

STARTUP No. ________ **Unit** _______ **Date** ________

5.2 Reactor Startup with Low Power Physics Testing (continued)

[18] **WHEN** control bank A is at 128 steps,
THEN
PERFORM the following:

[18.1] **STOP** rod withdrawal. ________

[18.2] **WAIT** for approximately two minutes. ________

[18.3] **NOTIFY** Rx Engineering to perform ICRR calculation in accordance with 0-RT-NUC-000-003.0. **[C.11]** ________

CAUTION

Lowest loop T-avg must be verified greater than or equal to 541°F using 0-SI-SXX-068-127.0 within 15 minutes prior to achieving criticality.

NOTES

1) Approximately five to seven count doublings are expected to result in criticality. However, criticality should be anticipated at any time.
2) Proper bank overlap must be verified using 0-SO-85-1 as each successive rod bank is withdrawn.

[19] **WHEN** concurrence obtained from Rx Engineering,
THEN
INITIATE rod withdrawal to first count doubling (determined in App. C) **USING** 0-SO-85-1. ☐

5.2 Reactor Startup with Low Power Physics Testing (continued)

NOTE

Steps 5.2[20] and 5.2[21] may be repeated as necessary if rod motion is stopped prior to reaching doubling value.

[20] **WHEN** any of the following conditions are met:

- Source range count rate is approximately equal to first doubling value determined in Appendix C
  OR
- Control bank being withdrawn reaches 128 steps (requires verifying overlap in 0-SO-85-1)
  OR
- Operators or Rx Engineer determine that rod motion should be stopped

THEN
STOP outward rod motion. ☐ ☐ ☐ ☐

[21] **IF** rod motion was stopped prior to reaching doubling range **AND** Unit Supervisor concurrence is obtained to resume,
THEN
RESUME rod withdrawal to first count doubling **USING** 0-SO-85-1. ☐ ☐ ☐ ☐

[22] **IF** source range count rate has reached or exceeded first doubling,
THEN
PERFORM the following:

[22.1] **ENSURE** rod motion STOPPED. ________

[22.2] **WAIT** approximately 2-3 minutes to allow count rate to rise. ________

[22.3] **NOTIFY** Rx Engineering to perform ICRR calculations in accordance with 0-RT-NUC-000-003.0. **[C.11]** ☐

[22.4] **DETERMINE** new count doubling range **USING** Appendix C. ________

STARTUP No. ________ **Unit** ______ **Date** ________

5.2 Reactor Startup with Low Power Physics Testing (continued)

[23] **IF** ICRR plot indicates criticality will fall outside ± 1000 pcm ECC termination band,
THEN

[23.1] **NOTIFY** SM and Duty Plant Manager. ________

[23.2] **EVALUATE** if ECC should be recalculated prior to continuing startup. ________

[23.3] **IF** startup must be aborted,
THEN
PERFORM Appendix D, Actions if Reactor Startup Must Be Aborted. ☐

[24] **WHEN** concurrence obtained from Rx Engineering,
THEN
INITIATE rod withdrawal to second doubling range (determined in App. C) **USING** 0-SO-85-1. ☐

NOTE

Steps 5.2[25] and 5.2[26] may be repeated as necessary if rod motion is stopped prior to reaching doubling range.

[25] **WHEN** any of the following conditions are met:

- Source range count rate reaches or exceeds second doubling range determined in Appendix C

OR

- Control bank being withdrawn reaches 128 steps (requires verifying overlap in 0-SO-85-1)

OR

- Operators or Rx Engineer determine that rod motion should be stopped

THEN
STOP outward rod motion. ☐ ☐ ☐ ☐

5.2 Reactor Startup with Low Power Physics Testing (continued)

[26] **IF** rod motion was stopped prior to reaching doubling range
AND Unit Supervisor concurrence is obtained to resume,
THEN
RESUME rod withdrawal to second doubling range
USING 0-SO-85-1. ☐ ☐ ☐ ☐

[27] **IF** source range count rate has reached or exceeded second doubling range,
THEN
PERFORM the following:

- [27.1] **ENSURE** rod motion STOPPED. _________
- [27.2] **WAIT** approximately 2-3 minutes to allow count rate to rise. _________
- [27.3] **NOTIFY** Rx Engineering to perform ICRR calculations in accordance with 0-RT-NUC-000-003.0. **[C.11]** ☐
- [27.4] **DETERMINE** new count doubling range **USING** Appendix C. _________

[28] **IF** ICRR plot indicates criticality will fall outside ± 1000 pcm ECC termination band,
THEN

- [28.1] **NOTIFY** SM and Duty Plant Manager. _________
- [28.2] **EVALUATE** if ECC should be recalculated prior to continuing startup. _________
- [28.3] **IF** startup must be aborted,
  THEN
  PERFORM Appendix D, Actions if Reactor Startup Must Be Aborted. ☐

[29] **IF** ICRR plot trend indicates acceptable ECC,
THEN
INITIATE rod withdrawal to third doubling range (determined in App. C) **USING** 0-SO-85-1. ☐

5.2 Reactor Startup with Low Power Physics Testing (continued)

NOTE

Steps 5.2[30] and 5.2[31] may be repeated as necessary if rod motion is stopped prior to reaching doubling range.

[30] **WHEN** any of the following conditions are met:

- Source range count rate reaches or exceeds third doubling range determined in Appendix C
  OR
- Control bank being withdrawn reaches 128 steps (requires verifying overlap in 0-SO-85-1)
  OR
- Operators or Rx Engineer determine that rod motion should be stopped

THEN
STOP outward rod motion. ☐ ☐ ☐ ☐

[31] **IF** rod motion was stopped prior to reaching doubling range **AND** Unit Supervisor concurrence is obtained to resume,
THEN
RESUME rod withdrawal to third doubling range **USING** 0-SO-85-1. ☐ ☐ ☐ ☐

[32] **IF** source range count rate has reached or exceeded third doubling range,
THEN
PERFORM the following:

[32.1] **ENSURE** rod motion STOPPED. ________

[32.2] **WAIT** approximately 2-3 minutes to allow count rate to rise. ________

[32.3] **NOTIFY** Rx Engineering to perform ICRR calculations in accordance with 0-RT-NUC-000-003.0. **[C.11]** ☐

[32.4] **DETERMINE** new count doubling range **USING** Appendix C. ________

STARTUP No. ________ Unit _______ Date ________

5.2 Reactor Startup with Low Power Physics Testing (continued)

[33] **IF** ICRR plot indicates criticality will fall outside ± 1000 pcm ECC termination band,
THEN

[33.1] **NOTIFY** SM and Duty Plant Manager. _________

[33.2] **EVALUATE** if ECC should be recalculated prior to continuing startup. _________

[33.3] **IF** startup must be aborted,
THEN
PERFORM Appendix D, Actions if Reactor Startup Must Be Aborted. ☐

[34] **IF** ICRR plot trend indicates acceptable ECC,
THEN
INITIATE rod withdrawal **USING** 0-SO-85-1 to fourth doubling range (App. C) or criticality. ☐

> **NOTE**
>
> Steps 5.2[35] through 5.2[37] may be repeated as necessary if rod motion is stopped prior to reaching doubling range or criticality.

[35] **WHEN** any of the following conditions are met:

- Source range count rate reaches or exceeds fourth doubling range determined in Appendix C
OR
- Control bank being withdrawn reaches 128 steps (requires verifying overlap in 0-SO-85-1)
OR
- Bank D rods reach fully withdrawn position
OR
- Operators or Rx Engineer determine that rod motion should be stopped

THEN
STOP outward rod motion. ☐ ☐ ☐ ☐

STARTUP No. ________ **Unit** _______ **Date** ________

5.2 Reactor Startup with Low Power Physics Testing (continued)

[36] **IF** reactor is critical,
THEN
GO TO Step 5.2[59] (N/A Steps 5.2[37] through 5.2[58]). _________

[37] **IF** ALL of the following conditions are met:

- rod motion was stopped prior to reaching doubling range or criticality
- Bank D rods are below fully withdrawn position
- Unit Supervisor concurrence is obtained to resume,

THEN
RESUME rod withdrawal **USING** 0-SO-85-1
to fourth doubling range or criticality (whichever comes first). ☐ ☐ ☐ ☐

[38] **IF** source range count rate has reached or exceeded fourth doubling range,
THEN
PERFORM the following:

[38.1] **ENSURE** rod motion STOPPED. _________

[38.2] **WAIT** approximately 2-3 minutes to allow count rate to rise. _________

[38.3] **NOTIFY** Rx Engineering to perform ICRR calculations in accordance with 0-RT-NUC-000-003.0. **[C.11]** ☐

[38.4] **DETERMINE** new count doubling range **USING** Appendix C. _________

[39] **IF** reactor is subcritical with Bank D rods at fully withdrawn position,
THEN
PERFORM Appendix E, Actions if Reactor is Subcritical with Rods Fully Withdrawn. ☐

STARTUP No. ________ Unit _______ Date ________

5.2 Reactor Startup with Low Power Physics Testing (continued)

[40] **IF** ICRR plot indicates criticality will fall outside ± 1000 pcm ECC termination band,
THEN

[40.1] **NOTIFY** SM and Duty Plant Manager. ________

[40.2] **EVALUATE** if ECC should be recalculated prior to continuing startup. ________

[40.3] **IF** startup must be aborted,
THEN
PERFORM Appendix D, Actions if Reactor Startup Must Be Aborted. ☐

[41] **IF** ICRR plot trend indicates acceptable ECC,
THEN
INITIATE rod withdrawal **USING** 0-SO-85-1 to fifth doubling range (App. C) or criticality. ☐

NOTE

Steps 5.2[42] through 5.2[44] may be repeated as necessary if rod motion is stopped prior to reaching doubling range or criticality.

[42] **WHEN** any of the following conditions are met:

- Source range count rate reaches or exceeds fifth doubling range determined in Appendix C
  OR
- Bank D rods reach fully withdrawn position
  OR
- Operators or Rx Engineer determine that rod motion should be stopped

THEN
STOP outward rod motion. ☐ ☐ ☐ ☐

[43] **IF** reactor is critical,
THEN
GO TO Step 5.2[59] (N/A Steps 5.2[44] through 5.2[58]). ________

5.2 Reactor Startup with Low Power Physics Testing (continued)

[44] **IF** ALL of the following conditions are met:

- rod motion was stopped prior to reaching doubling range or criticality
- Bank D rods are below fully withdrawn position
- Unit Supervisor concurrence is obtained to resume,

THEN
RESUME rod withdrawal **USING** 0-SO-85-1
to fifth doubling range or criticality (whichever comes first). ☐ ☐ ☐ ☐

[45] **IF** source range count rate has reached or exceeded fifth doubling range,
THEN
PERFORM the following:

[45.1] **ENSURE** rod motion STOPPED. _________

[45.2] **WAIT** approximately 2-3 minutes to allow count rate to rise. _________

[45.3] **NOTIFY** Rx Engineering to perform ICRR calculations in accordance with 0-RT-NUC-000-003.0. **[C.11]** ☐

[45.4] **DETERMINE** new count doubling range **USING** Appendix C. _________

[46] **IF** reactor is subcritical with Bank D rods at fully withdrawn position,
THEN
PERFORM Appendix E, Actions if Reactor is Subcritical with Rods Fully Withdrawn. ☐

STARTUP No. ________ **Unit** _______ **Date** ________

5.2 Reactor Startup with Low Power Physics Testing (continued)

[47] **IF** ICRR plot indicates criticality will fall outside ± 1000 pcm ECC termination band,
THEN

[47.1] **NOTIFY** SM and Duty Plant Manager. _________

[47.2] **EVALUATE** if ECC should be recalculated prior to continuing startup. _________

[47.3] **IF** startup must be aborted,
THEN
PERFORM Appendix D, Actions if Reactor Startup Must Be Aborted. ☐

[48] **IF** ICRR plot trend indicates acceptable ECC,
THEN
INITIATE rod withdrawal **USING** 0-SO-85-1 to sixth doubling range (App. C) or criticality. ☐

NOTE

Steps 5.2[49] through 5.2[51] may be repeated as necessary if rod motion is stopped prior to reaching doubling range or criticality.

[49] **WHEN** any of the following conditions are met:

- Source range count rate reaches or exceeds sixth doubling range determined in Appendix C
  OR
- Bank D rods reach fully withdrawn position
  OR
- Operators or Rx Engineer determine that rod motion should be stopped

THEN
STOP outward rod motion. ☐ ☐ ☐ ☐

[50] **IF** reactor is critical,
THEN
GO TO Step 5.2[59] (N/A Steps 5.2[51]through 5.2[58]). _________

5.2 Reactor Startup with Low Power Physics Testing (continued)

[51] **IF** ALL of the following conditions are met:

- rod motion was stopped prior to reaching doubling range or criticality
- Bank D rods are below fully withdrawn position
- Unit Supervisor concurrence is obtained to resume,

THEN
RESUME rod withdrawal **USING** 0-SO-85-1
to sixth doubling range or criticality (whichever comes first). ☐ ☐ ☐ ☐

[52] **IF** source range count rate has reached or exceeded sixth doubling range,
THEN
PERFORM the following:

[52.1] **ENSURE** rod motion STOPPED. _________

[52.2] **WAIT** approximately 2-3 minutes to allow count rate to rise. _________

[52.3] **NOTIFY** Rx Engineering to perform ICRR calculations in accordance with 0-RT-NUC-000-003.0. **[C.11]** ☐

[52.4] **DETERMINE** new count doubling range **USING** Appendix C. _________

[53] **IF** reactor is subcritical with Bank D rods at fully withdrawn position,
THEN
PERFORM Appendix E, Actions if Reactor is Subcritical with Rods Fully Withdrawn. ☐

STARTUP No. ________ Unit _______ Date ________

5.2 Reactor Startup with Low Power Physics Testing (continued)

[54] **IF** ICRR plot indicates criticality will fall outside ± 1000 pcm ECC termination band,
THEN

[54.1] **NOTIFY** SM and Duty Plant Manager. _________

[54.2] **EVALUATE** if ECC should be recalculated prior to continuing startup. _________

[54.3] **IF** startup must be aborted, **THEN**
PERFORM Appendix D, Actions if Reactor Startup Must Be Aborted. ☐

[55] **IF** ICRR plot trend indicates acceptable ECC,
THEN
INITIATE rod withdrawal **USING** 0-SO-85-1 to seventh doubling range (App. C) or criticality. ☐

> **NOTE**
>
> Steps 5.2[56] through 5.2[58] may be repeated as necessary if rod motion is stopped prior to reaching doubling range or criticality.

[56] **WHEN** any of the following conditions are met:

- Source range count rate reaches or exceeds seventh doubling range determined in Appendix C
  OR
- Bank D rods reach fully withdrawn position
  OR
- Operators or Rx Engineer determine that rod motion should be stopped

THEN
STOP outward rod motion. ☐ ☐ ☐ ☐

[57] **IF** reactor is critical,
THEN
GO TO Step 5.2[59] (N/A Step 5.2[58]). _________

STARTUP No. ________ Unit _______ Date ________

5.2 Reactor Startup with Low Power Physics Testing (continued)

[58] **IF** ALL of the following conditions are met:

- rod motion was stopped prior to reaching doubling range or criticality
- Bank D rods are below fully withdrawn position
- Unit Supervisor concurrence is obtained to resume,

THEN
RESUME rod withdrawal **USING** 0-SO-85-1
to seventh doubling range or criticality (whichever comes first). ☐ ☐ ☐ ☐

[59] **IF** any of the following conditions exist:

- critical conditions cannot be achieved within the ±1000 pcm allowable limits
  OR
- critical conditions cannot be achieved above rod insertion limit
  OR
- reactor startup must be aborted for other reasons,

THEN
PERFORM the following to abort reactor startup: **[C.11]**

[59.1] **STOP** rod withdrawal. _________

[59.2] **INITIATE** insertion of control banks. _________

[59.3] **PERFORM** Appendix D, Actions if Reactor Startup Must Be Aborted. ☐

[59.4] **DO NOT CONTINUE** this section.

5.2 Reactor Startup with Low Power Physics Testing (continued)

[60] **IF** reactor is subcritical with Bank D rods
at fully withdrawn position,
THEN
PERFORM Appendix E, Actions if Reactor is Subcritical with
Rods Fully Withdrawn. ☐

[61] **IF** reactor is critical with SUR less than 0.3 DPM
AND intermediate range NIS is less than P-6 (1 X 10^{-4} %),
THEN
PERFORM the following:

[61.1] **IF** Bank D control rods are BELOW
fully withdrawn position,
THEN
OPERATE control rods to establish a positive SUR
of approximately 0.3 DPM. ________

[61.2] **IF** Bank D rods have reached fully withdrawn position
AND Rx Engineering concurs with RCS dilution,
THEN
PERFORM RCS dilution (as recommended by Rx Eng)
to establish positive SUR of approx. 0.3 DPM
USING 0-SO-62-7. ________

STARTUP No. ________ Unit _______ Date ________

5.2 Reactor Startup with Low Power Physics Testing (continued)

Start of Critical Step(s)

NOTES

1) Blocking the SRM reactor trip with **[HS-92-5001]** and **[HS-92-5002]** will disable the detector outputs and remove the audio count rate signal.
2) Step 5.2[62] may be performed at time of criticality, if required. Source range reactor trip must be BLOCKED before trip setpoints of 10^5 cps.

[62] **WHEN** annunciator XA-55-4A, window D-2

P-6
INTERMEDIATE
RANGE
PERMISSIVE

is **LIT, THEN [C.2]**

[62.1] **RECORD** both source range readings.

N-31______CPS N-32______CPS

____
Initials

[62.2] **RECORD** both intermediate range readings.

N-35______%RTP N-36______%RTP

____
Initials

[62.3] **VERIFY** a minimum of one IRM channel greater than or equal to 1 X 10^{-4} % RTP. ☐

[62.4] **BLOCK** source range reactor trip by momentarily placing **[HS-92-5001]** and **[HS-92-5002]** SRM TRIP RESET-BLOCK P-6 handswitches to BLOCK.

___________ ___________ ___________
Initials Date Time

STARTUP No. ________ **Unit** _______ **Date** ________

5.2 Reactor Startup with Low Power Physics Testing (continued)

[62.5] **VERIFY** annunciator XA-55-4A, window C-1

SOURCE RANGE TRAINS A & B TRIP BLOCK	is **LIT**.

☐

End of Critical Step(s)

[62.6] **SELECT** NR 45 to record one intermediate range channel and one power range channel. ________

[62.7] **ADJUST** NR 45 chart speed as desired. (N/A is no change needed.) ☐

[63] **ENSURE** PA announcement made to notify plant personnel when the reactor is critical. ☐

NOTE

When T-avg is less than 551°F and Tavg - Tref deviation alarm is lit, SR 4.1.1.4.b requires verifying lowest T-avg greater than or equal to 541°F at least once per 30 minutes.

[64] **IF** Tavg - Tref deviation alarm [M-5A window C-6] is LIT
AND T-avg is less than 551°F,
THEN
PERFORM 0-SI-SXX-068-127.0 to satisfy SR 4.1.1.4.b, *Minimum Temperature For Criticality.* ________

STARTUP No. ________ **Unit** _______ **Date** ________

5.2 Reactor Startup with Low Power Physics Testing (continued)

[65] **RAISE** reactor power to approximately 1 X 10^{-3}%:

[65.1] **IF** Bank D control rods are BELOW fully withdrawn position,
THEN
OPERATE control rods to establish a positive SUR of approximately 0.5 DPM (not to exceed 1 DPM). ________

[65.2] **IF** Bank D rods have reached fully withdrawn position
AND Rx Engineering concurs with RCS dilution,
THEN
PERFORM RCS dilution (as recommended by Rx Eng) to establish positive SUR of approx. 0.5 DPM
USING 0-SO-62-7. ________

[65.3] **WHEN** intermediate range NIs indicate approximately 1 X 10^{-3}%,
THEN
PERFORM the following:

[65.3.1] **STABILIZE** reactor power using control rods. ________

[65.3.2] **RECORD** critical data indicated below.

Power Level: N-35_____%RTP N-36_____%RTP

Rod Position: _______ Bank _______ Step RCS Boron concentration ______ ppm

Loop T_{AVG}: ______, 1 ______, 2 ______, 3 ______, 4

____________ Initials ____________ Date ____________ Time

[66] **MAINTAIN** reactor power stable with control banks above low insertion limit **USING** rod movement or boration/dilution to compensate for Xenon. ☐

STARTUP No. ________ Unit _______ Date ________

5.2 Reactor Startup with Low Power Physics Testing (continued)

[67] **COORDINATE** with Reactor Engineering to perform Physics Testing **USING** 0-RT-NUC-000-003.0. ☐

NOTE

If MSIVs are CLOSED, the reactor should be shut down to allow warming steam lines.

[68] **IF** startup is to be discontinued
OR reactor startup was performed with MSIVs closed,
THEN
GO TO 0-GO-6, *Power Reduction From 30% Reactor Power to Hot Standby.* ________

[69] **IF** start up is to continue with one or both MFPTs available,
THEN

[69.1] **ENSURE** Steps 5.1[13] through 5.1[15] have been completed for applicable pump(s). ________

[69.2] **VERIFY** other applicable actions Section 5.2 completed or initiated. ________

[69.3] **GO TO** 0-GO-3, *Power Ascension From Reactor Critical to Less Than 5% Reactor Power.* ________

[70] **IF** start up is to continue with NO MFPT available,
THEN

[70.1] **MARK** Steps 5.1[13] through 5.1[17] as "N/A". ________

[70.2] **VERIFY** other applicable actions in Section 5.2 completed or initiated. ________

[70.3] **GO TO** 0-GO-3, *Power Ascension From Reactor Critical to Less Than 5% Reactor Power.* ________

END OF TEXT

STARTUP No. ________ Unit _______ Date ________

5.3 Reactor Startup without Physics Testing

[1] **VERIFY** applicable actions in Section 5.1 completed or initiated. _________

> **NOTE**
>
> Steps 5.3[3] through 5.3[8] may be performed out of sequence.

[2] **IF** any MFPT trip buss is NOT energized,
THEN

[2.1] **ENSURE** requirements of LCO 3.0.4 are satisfied. _________

[2.2] **NOTIFY** Unit SRO that LCO 3.3.2.1 (3.3.2) action 20 will apply when Mode 2 is entered. _________

[3] **ENSURE** Appendix B, *Mode 3 to Mode 2, 1 Review and Approval* has been completed to ensure all restraints to Mode 2, 1 entry have been resolved and approvals for mode change granted. _________
SM

[4] **BLOCK** Source Range High Flux At Shutdown alarm:

[4.1] **PLACE** BOTH HI FLUX AT SHUTDOWN switches on M-13 to the **BLOCK** position. _________

[4.2] **VERIFY** annunciator XA-55-4B window C-1,

SOURCE RANGE
HIGH SHUTDOWN
FLUX ALARM
CLOCK

is **LIT.[C.2]**. ☐

[5] **VERIFY** greater than or equal to 0.5 cps on the highest reading SR instrument. ☐

STARTUP No. ________ **Unit** _______ **Date** ________

5.3 Reactor Startup without Physics Testing (continued)

NOTE

The following count rates may be used as a reference during the approach to criticality.

[6] **RECORD** SR count rates from two of the following: **[C.2]** (N/A instruments not used)

XI-92-5001A (N31) ________cps
XI-92-5002A (N32) ________cps

OR

XI-92-5001B (N31) ________cps
XI-92-5002B (N32) ________cps

__________________ ____________ ____________
Time Date

[7] **IF** conditions exist which could cause Power Range NIS indications to be non-conservative,
THEN
ENSURE Power Range high flux trip setpoints reduced to 60% in accordance with the following: **[C.3]**

- 1,2-SI-ICC-092-N41.1 ☐
- 1,2-SI-ICC-092-N42.2 ☐
- 1,2-SI-ICC-092-N43.3 ☐
- 1,2-SI-ICC-092-N44.4 ☐

__________________ ____________ ____________
Instrument Maintenance Date Time

STARTUP No. ________ **Unit** _______ **Date** ________

5.3 Reactor Startup without Physics Testing (continued)

[8] **VERIFY** the estimated critical position calculated in accordance with 0-SI-NUC-000-001.0, *Estimated Critical Conditions*.

Estimated critical position: ________ steps on bank ______.

Assumed boron concentration: ________ ppm

______________________ Initials ________ Time ________ Date

______________________ STA ________ Time ________ Date

[9] **VERIFY** Steps 5.3[1] through 5.3[8] completed. ________

[10] **IF** estimated critical boron concentration does NOT approximately equal actual boron concentration,
THEN

[10.1] **DETERMINE** the appropriate boration/dilution requirements to achieve criticality within acceptable limits. ☐

[10.2] **DILUTE/BORATE** in accordance with 0-SO-62-7 to the estimated critical boron concentration. **[C.12]** ☐

[10.3] **OPERATE** pressurizer heaters/spray as necessary to equalize boron concentration (within 50 ppm) between reactor coolant loops and the pressurizer. **[C.12]** ☐

[10.4] **WHEN** sufficient mixing has occurred,
THEN
OBTAIN a new boron sample. ☐

[10.5] **ENSURE** actual boron concentration is approximately equal to the estimated critical boron concentration. ________

5.3 Reactor Startup without Physics Testing (continued)

NOTE

Termination limits are associated with ± 750 pcm tolerance band. These values are within minimum and maximum rod positions corresponding to Tech Spec limit of ± 1000 pcm (Minimum and Maximum Allowable Limits). Termination limits shall be used by Reactor Engineering and Operations to determine whether approach to criticality should be terminated and a new ECC calculated. ECC must be terminated if Minimum or Maximum Allowable Limits (corresponding to Tech Spec limit of ± 1000 pcm) are approached.

[11] **RECORD** upper and lower rod position limits corresponding to ± 750 pcm Termination Band as determined by 0-SI-NUC-000-001.0, Estimated Critical Conditions.

Upper termination rod position ________ steps on bank ________

Lower termination rod position ________ steps on bank ________

________ ________ ________
Initials Time Date

[12] **RECORD** minimum and maximum rod positions corresponding to ± 1000 pcm ALLOWABLE LIMITS (Tech Spec Limit) determined by 0-SI-NUC-000-001.0, *Estimated Critical Conditions*. **[C.11]**

Minimum allowable rod position ________ steps on bank ______.

Maximum allowable rod position ________ steps on bank ______.

________ ________ ________
Initials Time Date

[13] **VERIFY** all shutdown rods are fully withdrawn in accordance with 0-SI-OPS-000-004.0, *Surveillance Requirements Performed on Increased Frequency with no Specific Frequency,* within 15 minutes prior to withdrawing control rods. ________

________ ________
Time Date

5.3 Reactor Startup without Physics Testing (continued)

NOTE

SR 4.1.1.4.a requires verifying lowest T-avg greater than or equal to 541°F within 15 minutes prior to achieving criticality.

[14] **IF** 0-SI-SXX-068-127.0 is NOT in progress,
THEN
INITIATE applicable sections of 0-SI-SXX-068-127.0 to satisfy SR 4.1.1.4.a., *Minimum Temperature For Criticality*. ________

[15] **NOTIFY** onsite personnel of reactor startup over P/A system. ☐

CAUTION

Avoid operations that could produce sudden changes of temperature or unplanned boron concentration changes during approach to criticality or low power.

NOTES

1) Nuclear instrumentation shall be monitored very closely for indications of unplanned reactivity rate of change. **[C.11]**
2) Activities that can distract operators and supervisors involved with reactor startup, such as shift turnover and surveillance testing during approach to criticality, SHALL BE avoided. **[C.12]**
3) ICS points N0031A, N0032A, N0035A, and N0036A may be used as an aid for monitoring NIS indications.

[16] **MONITOR** nuclear instruments during approach to criticality:

[16.1] **MONITOR** source range and intermediate range NIS to identify potential reactivity anomalies. **[C.11]** ☐

[16.2] **IF** desired to place NR-45 recorder in fast speed,
THEN
ADJUST chart speed to high. ________

STARTUP No. ________ **Unit** _______ **Date** ________

5.3 Reactor Startup without Physics Testing (continued)

CAUTION

Do NOT exceed a steady startup rate of +1 DPM.

NOTE

The unit enters Mode 2 when the control banks are first withdrawn.

[17] **INITIATE** a reactor startup by performing the following:

[17.1] **RECORD** both source range readings for ICRR base counts.

N-31______CPS N-32______CPS ________ Initials

[17.2] **RECORD** intermediate range readings.

N-35_______ % N-36_______ % ________ Initials

[17.3] **CALCULATE** initial source range count doubling value **USING** Appendix C. ________

MODE 2

[17.4] **INITIATE** withdrawal of control banks in accordance with 0-SO-85-1 to first stop point: ________

CONTROL BANK A	**128 STEPS**

[17.5] **ENSURE** Mode 2 entry is logged (log entry may be performed out of sequence later). ☐

STARTUP No. ________ **Unit** _______ **Date** ________

5.3 Reactor Startup without Physics Testing (continued)

[18] **WHEN** control bank A is at 128 steps,
THEN
PERFORM the following:

[18.1] **STOP** rod withdrawal. _________

[18.2] **WAIT** for approximately two minutes. _________

[18.3] **NOTIFY** Rx Engineering to perform ICRR calculation in accordance with 0-SI-NUC-000-001.0. **[C.11]** _________

CAUTION

Lowest loop T-avg must be verified greater than or equal to 541°F using 0-SI-SXX-068-127.0 within 15 minutes prior to achieving criticality.

NOTES

1) Approximately five to seven count doublings are expected to result in criticality. However, criticality should be anticipated at any time.
2) Proper bank overlap must be verified using 0-SO-85-1 as each successive rod bank is withdrawn.

[19] **WHEN** concurrence obtained from Rx Engineering,
THEN
INITIATE rod withdrawal to first count doubling (determined in App. C) **USING** 0-SO-85-1. ☐

STARTUP No. ________ **Unit** _______ **Date** ________

5.3 Reactor Startup without Physics Testing (continued)

NOTE

Steps 5.3[20] and 5.3[21] may be repeated as necessary if rod motion is stopped prior to reaching doubling value.

[20] **WHEN** any of the following conditions are met:

- Source range count rate is approximately equal to first doubling value determined in Appendix C
  OR
- Control bank being withdrawn reaches 128 steps (requires verifying overlap in 0-SO-85-1)
  OR
- Operators or Rx Engineer determine that rod motion should be stopped

THEN
STOP outward rod motion. ☐ ☐ ☐ ☐

[21] **IF** rod motion was stopped prior to reaching doubling range **AND** Unit Supervisor concurrence is obtained to resume,
THEN
RESUME rod withdrawal to first count doubling **USING** 0-SO-85-1. ☐ ☐ ☐ ☐

[22] **IF** source range count rate has reached or exceeded first doubling,
THEN
PERFORM the following:

[22.1] **ENSURE** rod motion STOPPED. _________

[22.2] **WAIT** approximately 2-3 minutes to allow count rate to rise. _________

[22.3] **NOTIFY** Rx Engineering to perform ICRR calculations in accordance with 0-SI-NUC-000-001.0. **[C.11]** ☐

[22.4] **DETERMINE** new count doubling range **USING** Appendix C. _________

STARTUP No. ________ **Unit** _______ **Date** ________

5.3 Reactor Startup without Physics Testing (continued)

[23] **IF** ICRR plot indicates criticality will fall outside ± 750 pcm ECC termination band,
THEN

[23.1] **NOTIFY** SM and Duty Plant Manager. ________

[23.2] **EVALUATE** if ECC should be recalculated prior to continuing startup. ________

[23.3] **IF** startup must be aborted,
THEN
PERFORM Appendix D, Actions if Reactor Startup Must Be Aborted. ☐

[24] **WHEN** concurrence obtained from Rx Engineering,
THEN
INITIATE rod withdrawal to second doubling range (determined in App. C) **USING** 0-SO-85-1. ☐

NOTE

Steps 5.3[25] and 5.3[26] may be repeated as necessary if rod motion is stopped prior to reaching doubling range.

[25] **WHEN** any of the following conditions are met:

- Source range count rate reaches or exceeds second doubling range determined in Appendix C

OR

- Control bank being withdrawn reaches 128 steps (requires verifying overlap in 0-SO-85-1)

OR

- Operators or Rx Engineer determine that rod motion should be stopped

THEN
STOP outward rod motion. ☐ ☐ ☐ ☐

STARTUP No. ________ Unit _______ Date ________

5.3 Reactor Startup without Physics Testing (continued)

[26] **IF** rod motion was stopped prior to reaching doubling range
AND Unit Supervisor concurrence is obtained to resume,
THEN
RESUME rod withdrawal to second doubling range
USING 0-SO-85-1. ☐ ☐ ☐ ☐

[27] **IF** source range count rate has reached or exceeded second doubling range,
THEN
PERFORM the following:

[27.1] **ENSURE** rod motion STOPPED. _________

[27.2] **WAIT** approximately 2-3 minutes to allow count rate to rise. _________

[27.3] **NOTIFY** Rx Engineering to perform ICRR calculations in accordance with 0-SI-NUC-000-001.0. **[C.11]** ☐

[27.4] **DETERMINE** new count doubling range **USING** Appendix C. _________

[28] **IF** ICRR plot indicates criticality will fall outside ± 750 pcm ECC termination band,
THEN

[28.1] **NOTIFY** SM and Duty Plant Manager. _________

[28.2] **EVALUATE** if ECC should be recalculated prior to continuing startup. _________

[28.3] **IF** startup must be aborted,
THEN
PERFORM Appendix D, Actions if Reactor Startup Must Be Aborted. ☐

[29] **IF** ICRR plot trend indicates acceptable ECC,
THEN
INITIATE rod withdrawal to third doubling range (determined in App. C) **USING** 0-SO-85-1. ☐

STARTUP No. ________ Unit _______ Date ________

5.3 Reactor Startup without Physics Testing (continued)

NOTE

Steps 5.3[30] and 5.3[31] may be repeated as necessary if rod motion is stopped prior to reaching doubling range.

[30] **WHEN** any of the following conditions are met:

- Source range count rate reaches or exceeds third doubling range determined in Appendix C
OR
- Control bank being withdrawn reaches 128 steps (requires verifying overlap in 0-SO-85-1)
OR
- Operators or Rx Engineer determine that rod motion should be stopped

THEN
STOP outward rod motion. ☐ ☐ ☐ ☐

[31] **IF** rod motion was stopped prior to reaching doubling range **AND** Unit Supervisor concurrence is obtained to resume,
THEN
RESUME rod withdrawal to third doubling range **USING** 0-SO-85-1. ☐ ☐ ☐ ☐

[32] **IF** source range count rate has reached or exceeded third doubling range,
THEN
PERFORM the following:

[32.1] **ENSURE** rod motion STOPPED. ________

[32.2] **WAIT** approximately 2-3 minutes to allow count rate to rise. ________

[32.3] **NOTIFY** Rx Engineering to perform ICRR calculations in accordance with 0-SI-NUC-000-001.0. **[C.11]** ☐

[32.4] **DETERMINE** new count doubling range **USING** Appendix C. ________

STARTUP No. ________ **Unit** _______ **Date** ________

5.3 Reactor Startup without Physics Testing (continued)

[33] **IF** ICRR plot indicates criticality will fall outside ± 750 pcm ECC termination band,
THEN

[33.1] **NOTIFY** SM and Duty Plant Manager. _________

[33.2] **EVALUATE** if ECC should be recalculated prior to continuing startup. _________

[33.3] **IF** startup must be aborted,
THEN
PERFORM Appendix D, Actions if Reactor Startup Must Be Aborted. ☐

[34] **IF** ICRR plot trend indicates acceptable ECC,
THEN
INITIATE rod withdrawal **USING** 0-SO-85-1 to fourth doubling range (App. C) or criticality. ☐

NOTE

Steps 5.3[35] through 5.3[37] may be repeated as necessary if rod motion is stopped prior to reaching doubling range or criticality.

[35] **WHEN** any of the following conditions are met:

- Source range count rate reaches or exceeds fourth doubling range determined in Appendix C
  OR
- Control bank being withdrawn reaches 128 steps (requires verifying overlap in 0-SO-85-1)
  OR
- Bank D rods reach fully withdrawn position
  OR
- Operators or Rx Engineer determine that rod motion should be stopped

THEN
STOP outward rod motion. ☐ ☐ ☐ ☐

STARTUP No. ________ **Unit** _______ **Date** ________

5.3 Reactor Startup without Physics Testing (continued)

[36] **IF** reactor is critical,
THEN
GO TO Step 5.3[59] (N/A Steps 5.3[37] through 5.3[58]). ________

[37] **IF** ALL of the following conditions are met:

- rod motion was stopped prior to reaching doubling range or criticality
- Bank D rods are below fully withdrawn position
- Unit Supervisor concurrence is obtained to resume,

THEN
RESUME rod withdrawal **USING** 0-SO-85-1
to fourth doubling range or criticality (whichever comes first). ☐ ☐ ☐ ☐

[38] **IF** source range count rate has reached or exceeded fourth doubling range,
THEN
PERFORM the following:

[38.1] **ENSURE** rod motion STOPPED. ________

[38.2] **WAIT** approximately 2-3 minutes to allow count rate to rise. ________

[38.3] **NOTIFY** Rx Engineering to perform ICRR calculations in accordance with 0-SI-NUC-000-001.0. **[C.11]** ☐

[38.4] **DETERMINE** new count doubling range **USING** Appendix C. ________

[39] **IF** reactor is subcritical with Bank D rods at fully withdrawn position,
THEN
PERFORM Appendix E, Actions if Reactor is Subcritical with Rods Fully Withdrawn. ☐

STARTUP No. ________ **Unit** _______ **Date** ________

5.3 Reactor Startup without Physics Testing (continued)

[40] **IF** ICRR plot indicates criticality will fall outside ± 750 pcm ECC termination band,
THEN

[40.1] **NOTIFY** SM and Duty Plant Manager. ________

[40.2] **EVALUATE** if ECC should be recalculated prior to continuing startup. ________

[40.3] **IF** startup must be aborted,
THEN
PERFORM Appendix D, Actions if Reactor Startup Must Be Aborted. ☐

[41] **IF** ICRR plot trend indicates acceptable ECC,
THEN
INITIATE rod withdrawal **USING** 0-SO-85-1 to fifth doubling range (App. C) or criticality. ☐

> **NOTE**
>
> Steps 5.3[42] through 5.3[44] may be repeated as necessary if rod motion is stopped prior to reaching doubling range or criticality.

[42] **WHEN** any of the following conditions are met:

- Source range count rate reaches or exceeds fifth doubling range determined in Appendix C
  OR
- Bank D rods reach fully withdrawn position
  OR
- Operators or Rx Engineer determine that rod motion should be stopped

THEN
STOP outward rod motion. ☐ ☐ ☐ ☐

[43] **IF** reactor is critical,
THEN
GO TO Step 5.3[59] (N/A Steps 5.3[44] through 5.3[58]). ________

STARTUP No. ________ **Unit** _______ **Date** ________

5.3 Reactor Startup without Physics Testing (continued)

[44] **IF** ALL of the following conditions are met:

- rod motion was stopped prior to reaching doubling range or criticality
- Bank D rods are below fully withdrawn position
- Unit Supervisor concurrence is obtained to resume,

THEN
RESUME rod withdrawal **USING** 0-SO-85-1
to fifth doubling range or criticality (whichever comes first). ☐ ☐ ☐ ☐

[45] **IF** source range count rate has reached or exceeded fifth doubling range,
THEN
PERFORM the following:

[45.1] **ENSURE** rod motion STOPPED. ________

[45.2] **WAIT** approximately 2-3 minutes to allow count rate to rise. ________

[45.3] **NOTIFY** Rx Engineering to perform ICRR calculations in accordance with 0-SI-NUC-000-001.0. **[C.11]** ☐

[45.4] **DETERMINE** new count doubling range **USING** Appendix C. ________

[46] **IF** reactor is subcritical with Bank D rods at fully withdrawn position,
THEN
PERFORM Appendix E, Actions if Reactor is Subcritical with Rods Fully Withdrawn. ☐

5.3 Reactor Startup without Physics Testing (continued)

[47] **IF** ICRR plot indicates criticality will fall outside ± 750 pcm ECC termination band,
THEN

[47.1] **NOTIFY** SM and Duty Plant Manager. ________

[47.2] **EVALUATE** if ECC should be recalculated prior to continuing startup. ________

[47.3] **IF** startup must be aborted,
THEN
PERFORM Appendix D, Actions if Reactor Startup Must Be Aborted. ☐

[48] **IF** ICRR plot trend indicates acceptable ECC,
THEN
INITIATE rod withdrawal **USING** 0-SO-85-1 to sixth doubling range (App. C) or criticality. ☐

> **NOTE**
>
> Steps 5.3[49] through 5.3[51] may be repeated as necessary if rod motion is stopped prior to reaching doubling range or criticality.

[49] **WHEN** any of the following conditions are met:

- Source range count rate reaches or exceeds sixth doubling range determined in Appendix C
  OR
- Bank D rods reach fully withdrawn position
  OR
- Operators or Rx Engineer determine that rod motion should be stopped

THEN
STOP outward rod motion. ☐ ☐ ☐ ☐

[50] **IF** reactor is critical,
THEN
GO TO Step 5.3[59] (N/A Steps 5.3[51] through 5.3[58]). ________

STARTUP No. ________ Unit _______ Date ________

5.3 Reactor Startup without Physics Testing (continued)

[51] **IF** ALL of the following conditions are met:

- rod motion was stopped prior to reaching doubling range or criticality
- Bank D rods are below fully withdrawn position
- Unit Supervisor concurrence is obtained to resume,

THEN
RESUME rod withdrawal **USING** 0-SO-85-1
to sixth doubling range or criticality (whichever comes first). ☐ ☐ ☐ ☐

[52] **IF** source range count rate has reached or exceeded sixth doubling range,
THEN
PERFORM the following:

[52.1] **ENSURE** rod motion STOPPED. ________

[52.2] **WAIT** approximately 2-3 minutes to allow count rate to rise. ________

[52.3] **NOTIFY** Rx Engineering to perform ICRR calculations in accordance with 0-SI-NUC-000-001.0. **[C.11]** ☐

[52.4] **DETERMINE** new count doubling range **USING** Appendix C. ________

[53] **IF** reactor is subcritical with Bank D rods at fully withdrawn position,
THEN
PERFORM Appendix E, Actions if Reactor is Subcritical with Rods Fully Withdrawn. ☐

5.3 Reactor Startup without Physics Testing (continued)

[54] **IF** ICRR plot indicates criticality will fall outside ± 750 pcm ECC termination band,
THEN

[54.1] **NOTIFY** SM and Duty Plant Manager. _________

[54.2] **EVALUATE** if ECC should be recalculated prior to continuing startup. _________

[54.3] **IF** startup must be aborted,
THEN
PERFORM Appendix D, Actions if Reactor Startup Must Be Aborted. ☐

[55] **IF** ICRR plot trend indicates acceptable ECC,
THEN
INITIATE rod withdrawal **USING** 0-SO-85-1 to seventh doubling range (App. C) or criticality. ☐

NOTE

Steps 5.3[56] through 5.3[58] may be repeated as necessary if rod motion is stopped prior to reaching doubling range or criticality.

[56] **WHEN** any of the following conditions are met:

- Source range count rate reaches or exceeds seventh doubling range determined in Appendix C
  OR
- Bank D rods reach fully withdrawn position
  OR
- Operators or Rx Engineer determine that rod motion should be stopped

THEN
STOP outward rod motion. ☐ ☐ ☐ ☐

[57] **IF** reactor is critical,
THEN
GO TO Step 5.3[59] (N/A Step 5.3[58]). _________

STARTUP No. ________ Unit _______ Date ________

5.3 Reactor Startup without Physics Testing (continued)

[58] **IF** ALL of the following conditions are met:

- rod motion was stopped prior to reaching doubling range or criticality
- Bank D rods are below fully withdrawn position
- Unit Supervisor concurrence is obtained to resume,

THEN
RESUME rod withdrawal **USING** 0-SO-85-1
to seventh doubling range or criticality (whichever comes first). ☐ ☐ ☐ ☐

[59] **IF** any of the following conditions exist:

- critical conditions cannot be achieved within the ±750 pcm termination band
OR
- critical conditions cannot be achieved within the ±1000 pcm allowable limits
OR
- critical conditions cannot be achieved above rod insertion limit
OR
- reactor startup must be aborted for other reasons,

THEN
PERFORM the following to abort reactor startup: **[C.11]**

[59.1] **STOP** rod withdrawal. ________

[59.2] **INITIATE** insertion of control banks. ________

[59.3] **PERFORM** Appendix D, Actions if Reactor Startup Must Be Aborted. ☐

[59.4] **DO NOT CONTINUE** this section.

STARTUP No. ________ **Unit** _______ **Date** ________

5.3 Reactor Startup without Physics Testing (continued)

[60] **IF** reactor is subcritical with Bank D rods at fully withdrawn position,
THEN
PERFORM Appendix E, Actions if Reactor is Subcritical with Rods Fully Withdrawn. ☐

[61] **IF** reactor is critical with SUR less than 0.3 DPM
AND intermediate range NIS is less than P-6 (1 X 10^{-4} %),
THEN
PERFORM the following:

[61.1] **IF** Bank D control rods are BELOW fully withdrawn position,
THEN
OPERATE control rods to establish a positive SUR of approximately 0.3 DPM. ________

[61.2] **IF** Bank D rods have reached fully withdrawn position
AND Rx Engineering concurs with RCS dilution,
THEN
PERFORM RCS dilution (as recommended by Rx Eng) to establish positive SUR of approx. 0.3 DPM
USING 0-SO-62-7. ________

5.3 Reactor Startup without Physics Testing (continued)

Start of Critical Step(s)

NOTES

3) Blocking the SRM reactor trip with **[HS-92-5001]** and **[HS-92-5002]** will disable the detector outputs and remove the audio count rate signal.

4) Step 5.3[62] may be performed at time of criticality, if required. Source range reactor trip must be BLOCKED before trip setpoint of 10^5 cps.

[62] **WHEN** annunciator XA-55-4A, window D-2

P-6 INTERMEDIATE RANGE PERMISSIVE

is **LIT, THEN [C.2]**

[62.1] **RECORD** both source range readings.

N-31______CPS N-32______CPS ________ Initials

[62.2] **RECORD** both intermediate range readings.

N-35______%RTP N-36_______%RTP ________ Initials

[62.3] **VERIFY** a minimum of one IRM channel greater than or equal to 1 X 10^{-4} % RTP. ☐

[62.4] **BLOCK** source range reactor trip by momentarily placing **[HS-92-5001]** and **[HS-92-5002]** SRM TRIP RESET-BLOCK P-6 handswitches to BLOCK.

_____________ Initials _________ Time _________ Date

STARTUP No. ________ **Unit** _______ **Date** ________

5.3 Reactor Startup without Physics Testing (continued)

[62.5] **VERIFY** annunciator XA-55-4A, window C-1

SOURCE RANGE TRAINS A & B TRIP BLOCK

is **LIT**. ☐

End of Critical Step(s)

[62.6] **SELECT** NR 45 to record one intermediate range channel and one power range channel. ☐

[62.7] **ADJUST** NR 45 chart speed as desired. (N/A if no change needed). ☐

[63] **ENSURE** PA announcement made to notify plant personnel when the reactor is critical. ☐

NOTE

When T-avg is less than 551°F and Tavg - Tref deviation alarm is lit, SR 4.1.1.4.b requires verifying lowest T-avg greater than or equal to 541°F at least once per 30 minutes.

[64] **IF** Tavg - Tref deviation alarm [M-5A window C-6] is LIT
AND T-avg is less than 551°F,
THEN
PERFORM 0-SI-SXX-068-127.0 to satisfy SR 4.1.1.4.b, *Minimum Temperature For Criticality*. ________

STARTUP No. ________ Unit _______ Date ________

5.3 Reactor Startup without Physics Testing (continued)

[65] **RAISE** reactor power to approximately 1 X 10^{-3} %:

[65.1] **IF** Bank D control rods are BELOW fully withdrawn position,
THEN
OPERATE control rods to establish a positive SUR of approximately 0.5 DPM (not to exceed 1 DPM). ________

[65.2] **IF** Bank D rods have reached fully withdrawn position
AND Rx Engineering concurs with RCS dilution,
THEN
PERFORM RCS dilution (as recommended by Rx Eng) to establish positive SUR of approx. 0.5 DPM
USING 0-SO-62-7. ________

[65.3] **WHEN** intermediate range NIS indicate approximately 1 X 10^{-3} %,
THEN
PERFORM the following:

[65.3.1] **STABILIZE** reactor power using control rods. ________

[65.3.2] **RECORD** critical data indicated below.

Power Level: N-35______%RTP N-36______%RTP

Rod Position: ________ Bank _______ Step RCS Boron concentration ________ ppm

Loop T_{AVG}: ________, 1 ________, 2 ________, 3 ________, 4

______________ Initials __________ Time __________ Date

[66] **VERIFY** control rods above rod insertion limit
USING 1,2-SI-OPS-000-002.0, *Shift Log.* ☐

[67] **MAINTAIN** reactor power stable with control banks above low insertion limit **USING** rod movement or boration/dilution to compensate for Xenon. ☐

5.3 Reactor Startup without Physics Testing (continued)

> **NOTE**
>
> If MSIVs are CLOSED, the reactor should be shut down to allow warming steam lines.

[68] **IF** startup is to be discontinued
OR reactor startup was performed with MSIVs closed,
THEN
GO TO 0-GO-6, *Power Reduction From 30% Reactor Power to Hot Standby.* _________

[69] **IF** start up is to continue with one or both MFPTs available,
THEN

[69.1] **ENSURE** Steps 5.1[13] through 5.1[15] have been completed for applicable pump(s). _________

[69.2] **VERIFY** other applicable actions in Section 5.3 completed or initiated. _________

[69.3] **GO TO** 0-GO-3, *Power Ascension From Reactor Critical to Less Than 5% Reactor Power.* _________

[70] **IF** start up is to continue with NO MFPT available,
THEN

[70.1] **MARK** Steps 5.1[13] through 5.1[17] as "**N/A**". _________

[70.2] **VERIFY** other applicable actions in Section 5.3 completed or initiated. _________

[70.3] **GO TO** 0-GO-3, *Power Ascension From Reactor Critical to Less Than 5% Reactor Power.* _________

END OF TEXT

6.0 RECORDS

Completed copies shall be transmitted to the Operations Superintendent's Secretary.

Appendix A
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DELETED

1.0 DELETED

Appendix B
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MODE 3 TO MODE 2,1 REVIEW AND APPROVAL

STARTUP No. ________ **Unit** 1 **Date** 01/xx/08

1.0 MODE 3 TO 2,1 REVIEW AND APPROVAL

NOTE

Steps in this Appendix may be performed out of sequence, except for those steps that pertain to the Operations Superintendent Hold Point.

[1] **PRIOR** to entering Mode 2, 1, an SRO shall review the following:

NOTE

Mode 3 to Mode 2, 1 Checklist and Reactor Trip Breaker Checklist are to be attached to this instruction.

A. Mode 3 to Mode 2,1 Checklists from the responsible sections and **DETERMINE** that the required surveillance testing for Mode 2 entry has been completed.

______ 0640 Time 01/xx/08 Date

B. Reactor Trip Breaker Closure Checklists from the responsible sections and **DETERMINE** that required surveillance testing for mode change has been completed.

______ 0640 Time 01/xx/08 Date

C. Active clearances for mode change restraints. **[C.10]**.

______ 0910 Time 01/xx/08 Date

D. TACF Books for outstanding alternations on systems prior to declaring a T.S. system or component operable. **[C.10]**

______ 0730 Time 01/xx/08 Date

Appendix B
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STARTUP No. ________ **Unit** 1 **Date** 01/xx/08

1.0 MODE 3 TO 2,1 REVIEW AND APPROVAL (continued)

E. 0-TI-EXX-000-001.0, Electrical Jumper Control Log to determine if any potential T. S. restriction exists which would prevent a mode change.

0813 Time 01/xx/08 Date

F. Active Procedures Book to determine equipment status that may be abnormal.

0920 Time 01/xx/08 Date

G. OPDP-4, *Annunciator Disablement Log* for alarms affecting operability of equipment required for mode change.

0920 Time 01/xx/08 Date

H. 0-PI-OPS-301-001.0 Plant Computer Point Disablement Log for alarms affecting operability of equipment required for mode change.

0920 Time 01/xx/08 Date

I. Board walkdown is completed to verify proper equipment alignment.
(Refer to appropriate CRO and OATC PIs for guidance)
[C.10]

0940 Time 01/xx/08 Date

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STARTUP No. ________ **Unit** 1 **Date** 01/xx/01

1.0 MODE 3 TO 2,1 REVIEW AND APPROVAL (continued)

NOTE

Tech Spec and TRM LCO 3.0.4 govern entering Mode 2 if any LCO requirement applicable in Mode 2 is not met. Therefore, mode change is not allowed while in a Tech Spec or TRM action UNLESS the exceptions and/or allowances stated in LCO 3.0.4 can be applied.

J. **REVIEW** all Tech Spec and TRM Actions which have been entered on the affected unit and common equipment to verify that mode change is acceptable.

SRO	Time	Date
SRO	Time	Date

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STARTUP No. ________ Unit 1 Date 01/xx/08

2.0 DEPARTMENT MANAGERS REVIEW

2.1 Periodic Test Coordinator:

[1] **ENSURE** that all surveillance requirements for mode 2 entry are updated and included within the mode change checklist.

KW Smith 0210 01/xx/08
Periodic Test Coordinator Time Date

[2] **ENSURE** that all surveillance requirements for Reactor Trip Breaker Closure Checklist are updated and included within the checklist. **[C.9]**

KW Smith 0210 01/xx/08
Periodic Test Coordinator Time Date

2.2 Instrument Maintenance:

[1] **ENSURE** Wide Range SG Level Recorders **[LR-3-43A]** and **[LR-3-98A]** are OPERABLE and **SET** to a range requested by the operator. (Recommended range between 80 and 90% of scale). **[C.6]**

0526 01/xx/08
Instrument Maintenance Time Date

2.3 Fire Ops Section:

[1] **ENSURE** limitations as stated in 0-TI-SXX-000-016.0 are not exceeded.

0118 01/xx/08
Fire Manager or Designee Time Date

Appendix B
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STARTUP No. ________ **Unit** 1 **Date** 01/xx/06

2.4 Systems Engineering Section:

[1] **REVIEW** of mode change checklist is complete and all surveillance requirements have met their acceptance criteria for Mode 2 entry.

Shift Manager ________ Time ________ Date ________

[2] **REVIEW** of Reactor Trip Breaker Closure Checklist is complete, all surveillance requirements have met their acceptance criteria, and all open items that affect mode change have been closed.

Shift Manager ________ Time ________ Date ________

> **NOTE**
>
> The evaluation made by the Systems Engineer in the next step will prevent thermal shock to the PZR spray nozzle.

[3] **ENSURE** PZR spray line bypass valves are throttled to maintain acceptable spray line temperature in accordance with 0-SO-68-3.

System Engineering ________ Time 053 Date 01/xx/06

[4] **IF** startup is following a refueling outage,
THEN

ENSURE Present Cycle Core Operating Limit Report are inserted in the unit's Technical Specification Binder. **[C.7]**

Licensing or designee ________ Time 0605 Date 01/xx/06

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STARTUP No. ________ **Unit** 1 **Date** 01/XX/07

2.5 Maintenance Section:

[1] **REVIEW** of mode change checklist is complete and all surveillance requirements have met their acceptance criteria for Mode 2 entry.

________________ Shift Manager ______ Time ______ Date

[2] **REVIEW** of Reactor Trip Breaker Closure Checklist is complete, all surveillance requirements have met their acceptance criteria, and all open items that affect mode change have been closed.

________________ Shift Manager ______ Time ______ Date

2.6 Chemistry Section:

> **NOTE**
>
> The following step does not require a new analysis to be performed for this startup. Routine analysis is sufficient unless there is reason to suspect chemistry has been changed.

[1] **ENSURE** reactor coolant chemistry within limits of Technical Requirements Manual 3.4.7 as determined by the Chemical Shift Supervisor.

________________ Chemical Shift Supervisor 0610 Time 01/xx/08 Date

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STARTUP No. ________ Unit _______ Date ________

3.0 SHIFT MANAGER (SM) HOLD POINT

[1] **ENSURE** Tech Spec and non-Tech Spec work related activities are completed or will not prohibit entry or impact continued operation in Mode 2.

_______________ __________ __________
SM Time Date

[2] **ENSURE** no open DCN/ECNs that would prohibit a mode change. (SM concurrence with the Modifications Manager or designee).

_______________ __________ __________
SM Time Date

[3] **REVIEW** all open work activities relative to the unit for the purpose of identifying maintenance activities that could affect system operability prior to mode change

_______________ __________ __________
SM Time Date

[4] **IF** any potential Tech Spec. mode constraint exists,
THEN

OBTAIN Operations Superintendent resolution prior to proceeding with the mode change

_______________ __________ __________
SM Time Date

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STARTUP No. ________ Unit _______ Date ________

3.0 SHIFT MANAGER (SM) HOLD POINT (continued)

[5] **IF** the startup follows a reactor trip or an emergency shutdown, **THEN**

A. **ENSURE** cause of the trip/shutdown has been determined and will not impact Mode 2 entry.

______________ SM ________ Time ________ Date

B. **ENSURE** Reactor trip report is complete.

(0-TI-QXX-000-001.0, *Event Critique, Post Trip Report, Equipment Root Cause and Outage Milestone PER Evaluation*)

______________ SM ________ Time ________ Date

C. **ENSURE** 0-GO-12, *Realignment of Secondary Equipment Following Reactor Trip/Turbine Trip/Emergency shutdown,* is complete.

______________ SM ________ Time ________ Date

4.0 OPERATIONS SUPERINTENDENT HOLD POINT

Operations Superintendent or his designee concurs and grants approval to proceed to Mode 2, 1.

______________________ Operations Superintendent ________ Time ________ Date

Appendix C
(Page 1 of 1)

DETERMINING SOURCE RANGE COUNT RATE DOUBLING

1.0 CALCULATING DOUBLING RANGE

NOTES

1) Source range reading shall be allowed to stabilize for approximately 3 minutes after each reactivity change prior to determining new stable count rate.
2) The highest reading channel should be used when determining stable count rate.
3) Doubling range is used to determine when rod motion should be stopped during approach to criticality. Criticality is expected in about 5 to 7 count rate doublings.
4) This appendix may be performed and IV'd by operators, STA, or Rx Engineers.

STABLE	COUNT RATE DOUBLING RANGE		INITIALS	
COUNT RATE (CR)	CR X 1.75 =	CR X 2.0 =	1st	IV
	(Lower value not used for first doubling)			

End of Section

Appendix D
(Page 1 of 1)

ACTIONS IF REACTOR STARTUP MUST BE ABORTED

STARTUP No. ________ **Unit** _______ **Date** ________

1.0 OPERATOR ACTIONS

CAUTION

If reactor trip is required, E-0 should be performed instead of this appendix.

[1] **ENSURE** all control bank rods FULLY INSERTED in accordance with 0-SO-85-1. _________

[2] **LOG** Mode **3** entry in narrative log. _________

[3] **VERIFY** adequate shutdown margin in accordance with 0-SI-NUC-000-038.0.

_______________ Initials _________ Time _________ Date

[4] **DETERMINE** and **CORRECT** cause of the discrepancy. ☐

[5] **WHEN** reactor startup is to resume,
THEN
PERFORM the following:

[5.1] **RECALCULATE** estimated critical conditions in accordance with 0-RT-NUC-000-003.0 (Startup after refueling) or 0-SI-NUC-000-001.0 (Startup after non-refueling outage). _________

[5.2] **DILUTE/BORATE** in accordance with 0-SO-62-7 to the estimated critical boron concentration. **[C.12]** _________

[5.3] **EQUALIZE** boron concentration (within 50 ppm) between reactor coolant loops and pressurizer by operating pzr heaters and spray. **[C.12]** _________

[5.4] **RE-INITIATE** 0-GO-2. _________

End of Document

Appendix E
(Page 1 of 2)

ACTIONS IF BANK D RODS REACH FULL OUT POSITION PRIOR TO CRITICALITY

1.0 OPERATOR ACTIONS

> **NOTE**
>
> Allowable upper limit for critical position may be above the fully withdrawn position on Bank D. If Reactor Engineering determines that core response is within acceptable limits, this appendix allows RCS dilution to assist in achieving criticality.

[1] **CONSULT** Reactor Engineering to determine if core response is within acceptable limits. ☐

[2] **IF** projected critical rod position exceeds +1000 pcm limit **OR** startup will be aborted due to failing to achieve criticality, **THEN**

- [2.1] **PERFORM** Appendix D, Actions if Reactor Startup Must Be Aborted. ☐
- [2.2] **DO NOT CONTINUE** this appendix. ☐

[3] **ENSURE** control bank D inserted to less than or equal to estimated critical position determined in 0-RT-NUC-000-003.0 (Startup after refueling) or 0-SI-NUC-000-001.0 (Startup after non-refueling outage). ________

[4] **DETERMINE** dilution volume to increase core reactivity by 100 pcm OR as recommended by Rx Engineering.

____
Rx Engineer

__________ gallons

____
IV

Appendix E
(Page 2 of 2)

STARTUP No. ________ Unit _______ Date ________

1.0 OPERATOR ACTIONS (continued)

CAUTION

NIS indications should be carefully monitored during and following dilution.

[5] **PERFORM** specified dilution **USING** 0-SO-62-7. ☐

[6] **WHEN** at least 30 minutes has elapsed for RCS mixing
AND Rx Engineer concurs with resuming startup,
THEN
RETURN to appropriate step (based on number of doublings) in Sect. 5.2 (Startup after refueling) or Section 5.3 (Startup after non-refueling outage). ☐

End of Document

Source Notes

(Page 1 of 3)

Requirements Statement	Source Document	Implementing Statement
Verify MFWP trip bus energized before entry into Mode 2.	LER 328/88-014	C.1
Revise GOI-2 to require verification of intermediate range (IR) status at approximately 20 and 25 percent, verify source range (SR) status and channel check at lower power, monitor core delta Ts at low-power levels and during power escalation and compare with NIS response, and verify that the IR rod stop and trip bistables come in at the appropriate power level during power ascension.	NCO 890118002 LER 328/89006 S53 890531 844 JRB to NRC	C.2
Following refueling operations relocation of NIS or modifications affecting the NIS response, provide adequate reductions of trip setpoint and limitations of reactor power until accuracy of the NIS is verified. Also, provide alternate indications of power independent of calorimetric calculations during power ascensions.	SOER-90-003 NCO 900107009 NER 1187001 LER 327/90011R1	C.3
Decommitted 3/12/99		C.4
Assurance that TSC computer is reset prior to startup; defines "reset" and "updating". (Modified C.5 permitting relaxing requirement.)	Verbal commitment to NRC at SNP Meeting 10/04/90	C.5
Provisions to ensure that enhanced steam generator level recorders are operable in the main control room prior to entering mode 2.	NCO 890097004 L44 890505 805	C.6

Source Notes
(Page 2 of 3)

Requirements Statement	Source Document	Implementing Statement
Based upon the requirements of the May 6, 1991 PORC meeting this verification has been added to implement the referenced Technical Specification change for the Core Operating Limits Report.	PORC Minutes #50880 5/06/91T/S 91-08	**C.7**
Consult Reactor Engineering for guidance during evolutions of unusual power maneuvers at end of core life.	NER 89 0794 OER 89 3497	**C.8**
Provide reactor trip breaker closure checklists to ensure all surveillance requirements for reactor trip breaker closure are satisfied.	U1C5 Outage Critique item	**C.9**
Revise GOI-2 to include a step signoff with the TACF review, hold order review etc. section of GOI, for the Duty SOS to ensure a board walkdown to verify proper alignment is performed by a designated SRO prior to mode change.	II S-92-045	**C.10**
Operations startup procedures should: 1) Stress conservative actions and compliance with written procedures when repositioning control rods, 2) Guidance on actions when criticality will be achieved outside the ECC tolerance band, 3) Avoid activities which distract the operators, 4) Directions to use pertinent instrumentation to monitor approach to criticality, 5) Periodic pauses during rod withdrawal.	SOER 88-02 NER 88047400	**C.11**

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT

SYSTEM OPERATING INSTRUCTION

0-SO-85-1

CONTROL ROD DRIVE SYSTEM

Revision 32

QUALITY RELATED

PREPARED BY: JENNIFER REGAN

RESPONSIBLE ORGANIZATION: OPERATIONS

APPROVED BY: W. T. LEARY

EFFECTIVE DATE: 12/11/2006

LEVEL OF USE: **CONTINUOUS USE**

REVISION DESCRIPTION: Revised to incorporate the new reactor breaker close control switch, 2-HS-99-7, per DCN D21843A.

PERFORMANCE OF THIS PROCEDURE COULD IMPACT REACTIVITY

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Section Title **Page**

1.0 INTRODUCTION

1.1 Purpose

This instruction provides the steps necessary for the operation of the Control Rod Drive System.

1.2 Scope

This instruction provides detailed steps for the following operations:

Placing Control Rod Drive MG Sets in Service

Removing Control Rod Drive MG Sets from Service

Parallel Operation of Control Rod Drive MG Sets

Manual Operation of the Control Rod Drive System

Transferring Rod Control from Manual to Auto

Transferring Rod Control from Auto to Manual

2.0 REFERENCES

2.1 Performance References

A. Procedures
  1. 0-SI-NUC-000-038.0, Shutdown Margin
  2. 1,2-PI-IFT-099-0P4.0, Verification of P4 Contacts

B. Tech Specs
  1. 3.4.1.2

C. Westinghouse Tech. Bulletin
NSD-TB-92-05R0

2.2 Developmental References

A. Tech Specs
  1. 3.1.3.1
  2. 3.1.3.2
  3. 3.1.3.4
  4. 3.1.3.5
  5. 3.1.3.6

2.0 REFERENCES (Continued)

B. Technical Requirements Manual

1. TR 3.1.3.3

C. FSAR

1. 7.7.1.2.1

D. TVA Drawings

1. 45N699-1
2. 45N777-3
3. 45N703-1, 2, 3, 4
4. 45N1646-4
5. 45N2646-4
6. 45N1624-1, 2, 3, 4, 5, 8
7. 45N2624-1, 2, 3, 4, 5, 8
8. 617F619

3.0 PRECAUTIONS AND LIMITATIONS

A. Rod thermal lock-up is **NOT** a concern when the reactor trip breakers are OPEN. If reactor trip breakers are CLOSED and an RCS cooldown of greater than 50°F is planned, the shutdown and control banks should be withdrawn at least 5 steps each. This will limit the possibility of "thermal lock-up" of the rods. This does not apply if performing sections 8.5 or 8.6.

B. If both MG sets are to be shutdown, the control rods and shutdown rods shall be inserted in the core and the reactor trip breakers OPEN prior to shutting down the MG sets.

C. Reactor Trip Breakers shall **NOT** be closed while in Mode 3 unless in compliance with LCO 3.4.1.2.

D. Failure to perform 1,2-PI-IFT-099-0P4.0, Verification of P4 Contacts could result in the prevention of AUTO SI if required.

E. Under normal conditions, the control rod banks must be withdrawn and inserted in the prescribed sequence. For withdrawal the sequence is Shutdown Bank A, Shutdown Bank B, Shutdown Bank C, Shutdown Bank D, Control Bank A, Control Bank B, Control Bank C, and Control Bank D. The insertion sequence is the reverse of the withdrawal sequence.

F. For manual bank sequencing, the prescribed withdrawal and insertion sequence should be followed. Rod motion of the correct bank should be monitored by observing the group step counters and the rod position indicators.

G. During Control Rod withdrawal, the Control Banks should be monitored for bank overlap.

H. The control banks must be maintained above their respective insertion limits (Low-Low Alarm to ensure adequate shutdown in the event of a reactor trip, to ensure that maximum possible ejected rod reactivity limits are maintained and to ensure acceptable core power distributions.

I. Before withdrawing any rod bank from the fully inserted position, the group step counters and the rod position indicators for that bank must be at zero steps.

3.0 PRECAUTIONS AND LIMITATIONS (Continued)

J. Deleted

K. The Control Rods shall **NOT** be stepped or tripped unless the RCS pressure is at least 100 psig.

L. RPIs and step counters shall be maintained within limits per TS 3.1.3.1 and 3.1.3.2.

M. Continuous rod motion shall comply with these restrictions:

CRDM OUTLET TEMPERATURE	ROD MOTION LIMITS	
≤ 190°F	10 minutes ON	20 minutes OFF
≤ 200°F	6 minutes ON	24 minutes OFF

Time limitations are due to a lower air flow rate of 48,000 cfm across the shroud combined with a higher temperature (Reference TSIR-97-BOP-30-636 and Westinghouse Letters RIM's #B38931005806, B38930920800, and B38931005803).

N. The following failures will render the rod control system incapable of automatic and / or manual motion without any annunciation or indication: 1) Hand switch failure; 2) relay failure, and 3) failure of both 100v DC power supplies (PS3 and PS6) simultaneously.

O. Defeating or restoring Tavg/Delta T or NIS channel may cause step change in input to rod control. A delay of at least 3 minutes prior to returning rod control to automatic will allow lead/lag signal to decay off.

3.0 PRECAUTIONS AND LIMITATIONS (Continued)

P. Directional Overcurrent Relay Targets are reset by depressing the Relay Target Reset Pushbutton on the panel to break the target coil seal in circuit and then lifting the mechanical reset at the bottom of the relay cover.

Q. US / SRO Oversight for control rod manipulation shall include:

1. Prior to Rod Movement
   - a. Ensure RPI's within T.S. range (+ or - 12 steps)
   - b. Ensure delta flux will not be adversely affected
   - c. Ensure Tavg and Rx Thermal power will not be adversely affected
   - d. Verify on target with Rx Eng reactivity balance sheet
   - e. Verify power change will not exceed hourly rate
   - f. Ensure no simultaneous reactivity manipulations in progress (i.e.: borations, dilutions or turbine load changes)
2. During Rod Movement
   - a. Ensure RO has peer check
   - b. Ensure RO is following procedure
   - c. Ensure RO understands how many steps they are moving rods
   - d. Ensure RO has checked all the above mentioned items
   - e. Watch performance of rod manipulation while listening to audible indication of rod step
   - f. Ensure peer check is doing their job
   - g. Re-verify steps a - d of initial evaluation
   - h. Ensure procedure is followed placing rods back to auto (Tavg - Tref mismatch)
   - i. Monitor plant for expected response

Unit 1 Date 01/XX/08

4.0 PREREQUISITE ACTIONS

NOTE Throughout this instruction where an **IF/THEN** statement occurs, the step may be **N/A** if the condition does <u>**NOT**</u> exist.

[1] **ENSURE** the instruction to be used is a copy of the effective version. WTA

[2] **ENSURE** Precautions and Limitations, Section 3.0 has been reviewed. WTA

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

Print Name	Initials
Wilson T. Abbot	WTA

[4] **INDICATE** below which performance section of this instruction will be used and the reason for this performance:

☐ 5.0 STARTUP/STANDBY READINESS
☑ 6.0 NORMAL OPERATION
☐ 7.0 SHUTDOWN
☐ 8.0 INFREQUENT OPERATION

Reason: WITHDRAW SHUTDOWN BANK PRIOR TO REACTOR STARTUP

Unit_______________ Date_________

5.0 STARTUP/STANDBY READINESS

5.1 Placing MG Set(s) in Standby Readiness

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

[2] **ENSURE** [HS-85-5110], Rod Control Mode Selector Switch is in the **MANUAL** position. ☐

[3] **IF** performance is on Unit 1, **THEN**
ENSURE Power Checklist 1-85-1.01 is complete. ☐

[4] **IF** performance is on Unit 2, **THEN**
ENSURE Power Checklist 2-85-1.01 is complete. ☐

NOTE Green targets on the breaker handswitches can be obtained by rotating the operating switch to the TRIP position and releasing to the NEUTRAL position.

[5] **ENSURE** the following breakers are in the required position:

BREAKER	REQUIRED POSITION	TARGET COLOR	INITIALS
CRD MG Set A Motor Bkr 52A (480V Unit Bd)	OPEN	GREEN	_________
CRD MG Set B Motor Bkr 52B (480V Unit Bd)	OPEN	GREEN	_________
MG Set A Load (Generator) Bkr 52-1	OPEN	GREEN	_________
MG Set B Load (Generator) Bkr 52-2	OPEN	GREEN	_________

[6] **VERIFY** [XA-55-4B-A5], ROD CONTROL MG SETS TRIPPED OR GROUNDED, alarm is **NOT LIT**. _________

UNIT______________ Date_________

5.1 Placing MG Set(s) in Standby Readiness (Continued)

[7] **TURN** Generator No. 1 Westinghouse Thyrex Voltage Regulator (Reg) potentiometer to the **FULL COUNTER-CLOCKWISE** position and **RETURN** to the **9 0'CLOCK** position. _________

[8] **TURN** Generator No. 2 Westinghouse Thyrex Voltage Regulator (WTV Reg) potentiometer to the **FULL COUNTER-CLOCKWISE** position and **RETURN** to the **9 0'CLOCK** position. _________

[9] **ENSURE** the following MG Set handswitches are in the required position:

SWITCH	REQUIRED POSITION	INITIALS
MG Set A Ammeter Selector Switch	A	_________
MG Set B Ammeter Selector Switch	A	_________
MG Set A Voltmeter Selector Switch	AB	_________
MG Set B Voltmeter Selector Switch	AB	_________
Generator No. 1 Synchronize Sel Sw	OFF	_________
Generator No. 2 Synchronize Sel Sw	OFF	_________

[10] **ENSURE** [1KS], Three Pole Grounding Switch (located inside L-115 cabinet) is in the **OPEN** position. _________

[11] **ENSURE** all relays and targets (located on L-115) for the MG Set breakers are **RESET**. _________

End of Section 5.1

Unit_____________ Date_________

5.1.1 Placing MG Set A In Service With MG Set B Not Operating

[1] **ENSURE** MG Set A is in Standby Readiness. ☐

[2] **START** CRD MG Set A by placing [HS-85-1A] MOTOR Breaker 52A Circuit Control in the **CLOSE** position. ☐

NOTE Allow 15 seconds for the MG set to obtain full rated speed.

[3] **VERIFY** generator speed increasing. ☐

- [a] **WHEN** generator has increased to full speed, **THEN**
- [b] **DEPRESS AND HOLD** Gen Field Flash pushbutton. ☐
- [c] **WHEN** voltage is > 250 volts, **THEN** **RELEASE** Gen Field Flash pushbutton. ☐

[4] **IF** Line Voltage of the MG set is NOT between 255 and 270 volts (260 volts is nominal), **THEN** **ADJUST** voltage with WTV Reg to a nominal 260 volts. ☐

NOTE Voltage may vary slightly between phases.

[5] **CHECK** equal voltage on all phases using voltmeter selector switch. ☐

NOTE Both MG Set Load Breakers must be **RACKED IN** prior to closing the running MG Set Load Breaker.

[6] **ENSURE** MG Set A Load (GENERATOR) Breaker 52-1 [BCTF-85-12] is **RACKED IN**. __________

Unit_____________ Date_________

5.1.1 Placing MG Set A In Service With MG Set B Not Operating (Continued)

[7] **ENSURE** MG Set B Load (GENERATOR) Breaker 52-2 [BCTF-85-22] is **RACKED IN**. __________

[8] **ENSURE** CRDM MG Set A Directional Overcurrent Relay Target Coils are **RESET** (Panel Pushbutton). (N/A other Unit)

Relay	INITIALS
[1-RLY-085-DE/4D/A] (67A)	________
[1-RLY-085-DE/4D/C] (67C)	________
[2-RLY-085-DG/4D/A] (67A)	________
[2-RLY-085-DG/4D/C] (67C)	________

[9] **ENSURE** targets for CRDM MG Set A Directional Overcurrent Relays **RESET** (Mechanical Linkage on relay). (N/A other Unit) __________

Relay	INITIALS
[1-RLY-085-DE/4D/A] (67A)	________
[1-RLY-085-DE/4D/C] (67C)	________
[2-RLY-085-DG/4D/A] (67A)	________
[2-RLY-085-DG/4D/C] (67C)	________

NOTE: Generator voltage will drop slightly as the electrical load increases.

[10] **CLOSE** MG Set A Load (GENERATOR) Breaker 52-1 **USING** [HS-85-12]. ☐

[11] **IF** MG Set A Load breaker 52-1 trips due to Directional Overcurrent Relay operation, **THEN**

[a] **RESET** Directional Overcurrent Relays with Relay Target Reset Button on Relay panel. __________

[b] **RESET** Directional Overcurrent Relay Targets. __________

[c] **RECLOSE** MG Set A load Breaker 52-1 **USING** [HS-85-12]. ☐

Unit____________ Date_________

5.1.1 Placing MG Set A In Service With MG Set B Not Operating (Continued)

[d] IF another trip of breaker 52-1 occurs, **REPEAT** substeps **[a], [b]** and **[c].**

[e] IF breaker 52-1 trips the third time, **THEN**

NOTIFY SM and System Engineering for assistance. ☐

[12] WHEN placing the MG Sets in service initially **OR** Reactor Trip Breakers are to be reset, **THEN**

GO TO Section 5.2, Resetting Reactor Trip Breakers. ☐

End of Section 5.1.1

Unit_______________ Date_________

5.1.2 Placing MG Set B In Service With MG Set A Not Operating

[1] **ENSURE** MG Set B is in Standby Readiness. ☐

[2] **START** CRD MG Set B by placing **[HS-85-1B]** MOTOR Breaker 52B Circuit Control in the **CLOSE** position. ☐

NOTE Allow 15 seconds for the MG set to obtain full rated speed.

[3] **VERIFY** generator speed increasing. ☐

[4] **WHEN** generator has increased to full speed, **THEN**

  [a] **DEPRESS AND HOLD** Gen Field Flash pushbutton. ☐

  [b] **WHEN** voltage is > 250 volts, **THEN**
  RELEASE Gen Field Flash pushbutton. ☐

[5] **IF** Line Voltage of the MG set is **NOT** between 255 and 270 volts (260 volts is nominal), **THEN**
ADJUST voltage with WTV Reg to a nominal 260 volts. ☐

NOTE Voltage may vary slightly between phases.

[6] **CHECK** equal voltage on all phases using voltmeter selector switch. ☐

NOTE Both MG Set Load Breakers must be **RACKED IN** prior to closing the running MG Set Load Breaker.

[7] **ENSURE** MG Set A Load (GENERATOR) Breaker 52-1 is **RACKED IN**. ____________

Unit________________ Date__________

5.1.2 Placing MG Set B In Service With MG Set A Not Operating (Continued)

[8] **ENSURE** MG Set B Load (GENERATOR) Breaker 52-2 is **RACKED IN**. __________

[9] **ENSURE** CRDM MG Set B Directional Overcurrent Relay Target Coils are **RESET** (Panel Pushbutton). (N/A other Unit)

Relay	INITIALS
[1-RLY-085-DF/3B/A] (67A)	__________
[1-RLY-085-DF/3B/C] (67C)	__________
[2-RLY-085-DH/3B/A] (67A)	__________
[2-RLY-085-DH/3B/C] (67C)	__________

[10] **ENSURE** targets for CRDM MG Set B Directional Overcurrent Relays are **RESET** (Mechanical Linkage on relay). (N/A other Unit)

Relay	INITIALS
[1-RLY-085-DF/3B/A] (67A)	__________
[1-RLY-085-DF/3B/C] (67C)	__________
[2-RLY-085-DH/3B/A] (67A)	__________
[2-RLY-085-DH/3B/C] (67C)	__________

NOTE Generator voltage will drop slightly as the electrical load increases.

[11] **CLOSE** MG Set B Load (GENERATOR) Breaker 52-2 **USING [HS-85-22]**. __________

[12] **IF** MG Set B Load breaker 52-2 trips due to Directional Overcurrent Relay operation, **THEN**

[a] **RESET** Directional Overcurrent Relays with Relay Target Reset Button on Relay panel. __________

[b] **RESET** Directional Overcurrent Relay Targets. __________

[c] **RECLOSE** MG Set B load Breaker 52-2 **USING [HS-85-22]**. ☐

Unit________________ Date__________

5.1.2 Placing MG Set B In Service With MG Set A Not Operating (Continued)

[d] **IF** another trip of breaker 52-2 occurs, **REPEAT** substeps **[a]**, **[b]** and **[c]**.

[e] **IF** breaker 52-2 trips the third time, **THEN**

NOTIFY SM and system engineering for assistance. ☐

[13] **WHEN** placing the MG Sets in service initially **OR** Reactor Trip Breakers are to be reset, **THEN**

GO TO Section 5.2, Resetting Reactor Trip Breakers. ☐

End of Section 5.1.2

Unit 1 Date 01/xx/08

5.2 Reset/Close Reactor Trip Breakers

[1] **ENSURE** desired MG Set is In Service. ☑

[2] **ENSURE** [1CB], Auxiliary 150-VAC Supply to Rod Drive System is **CLOSED**. (located in Panel L-115). WTA

[3] **ENSURE** lift coil disconnect switches, for Control Rods and Shutdown Rods are in the **CONNECTED** position (located on M-8). WTA

[4] **ENSURE** all Control Rods and Shutdown Rods are inserted:

ROD BANK	FULLY INSERTED (√)
Shutdown Bank A	☑
Shutdown Bank B	☑
Shutdown Bank C	☑
Shutdown Bank D	☑
Control Bank A	☑
Control Bank B	☑
Control Bank C	☑
Control Bank D	☑

WTA

CAUTION **ROD CONTROL STARTUP STEP COUNTER RESET (SUS on M-4) should never be held in STARTUP position for any extended period of time. Holding this switch in STARTUP position may cause damage to the counters.**

[5] **MOMENTARILY PLACE** [SUS], Rod Control Startup Step Counter Reset to the **STARTUP** position to reset Control Rod Drive System, **AND**

VERIFY RPIs and group step counters are at zero steps. WTA

Unit 1 Date 01/xx/08

5.2 Reset/Close Reactor Trip Breakers (Continued)

[6] **ENSURE** Reactor Trip Bypass breakers BYA and BYB are **OPEN** and **RACKED OUT**.

BYPASS BREAKER	OPEN (√)	RACKED OUT (√)
BYA	☑	☑
BYB	☑	☑

WTA

[7] **ENSURE** Reactor Trip breakers are **RACKED IN**:

TRIP BREAKER	RACKED IN (√)
RTA	☑
RTB	☑

WTA

[8] **ENSURE** control power is **ON** by GREEN indicating lights on M-4:

BREAKER POSITION INDICATION	GREEN LIGHT	INITIALS
RTA	ON	WTA
RTB	ON	WTA

[9] **ENSURE** Rod Control switch **[HS-85-5111]** is in **MID** position. ☑

[10] **IF** unit is in Mode 3,**THEN**

ENSURE requirements of Tech Spec 3.4.1.2 are met. WTA

[11] **DEPRESS and HOLD** FW Isol Reset pushbuttons **[HS-3-99A]** and **[HS-3-99B]**. **[C.1]** ☑

Unit 1 Date 01/xx/08

5.2 Reset/Close Reactor Trip Breakers (Continued)

[12] **IF** resetting Unit 1 Reactor Trip Breakers, **THEN**

CLOSE Rx Trip Breakers by placing **[1-RT-1]**, in **CLOSE** position. ☑

[13] **IF** resetting Unit 2 Reactor Trip Breakers, **THEN**

CLOSE Rx Trip Breakers by placing **[2-HS-99-7]**, in **CLOSE** position. ☐ N/A

[14] **VERIFY** Reactor Trip Breakers **CLOSED** by RED indicating lights on M-4:

BREAKER POSITION INDICATION	RED LIGHT	INITIALS
RTA	ON	WTA
RTB	ON	WTA

[15] **RELEASE** FW Isol Reset pushbuttons **[HS-3-99A]** and **[HS-3-99B]**. **[C.1]** ☑

[16] **NOTIFY** IMs to perform 1,2-PI-IFT-099-0P4.0, Verification of P4 Contacts. WTA

[17] **IF** Shutdown or Control Rods will be withdrawn, **THEN**

GO TO Section 6.3, Manual Operation of Rod Control System Below 15 Percent Power. WTA

End of Section 5.2

Unit______________ Date_________

6.0 NORMAL OPERATION

6.1 Placing MG Set A In Service With MG Set B Operating

[1] **ENSURE** MG Set B is In Service. _________

[2] **ENSURE** MG Set A is in Standby Readiness. ☐

[3] **ENSURE** Reactor Trip Breakers are **CLOSED**. _________

[4] **START** CRD MG Set A by placing **[HS-85-1A]** MOTOR Breaker 52A Circuit Control in the **CLOSE** position. ☐

[5] **VERIFY** generator speed increasing. ☐

[6] **WHEN** generator has increased to full speed, **THEN**

  [a] **DEPRESS AND HOLD** Gen Field Flash pushbutton. ☐

  [b] **WHEN** voltage is > 250 volts, **THEN** **RELEASE** Gen Field Flash pushbutton. ☐

NOTE Digital voltmeters are much more accurate than panel meters and are the preferred instrumentation when synchronizing the generators. The panel meters should only be used in the event of an emergency.

[7] **REQUEST** the SM/SRO to determine which of the following types of meters should be used to synchronize and balance the MG Sets:

MG Set panel meters. ☐

Digital meters. ☐

____
US/SRO

6.1 Placing MG Set A In Service With MG Set B Operating (Continued)

NOTE The auto synchronizing circuit has a low voltage cutout circuit which will **NOT** allow the second MG Set to synchronize if voltage on the loaded MG Set is less than 254 volts. Minimum voltage for placing the second generator in parallel is 260 volts.

[8] **IF** using the MG Set panel voltmeters for voltage adjustment, T**HEN**

[a] **ENSURE** MG Set B voltage is **ADJUSTED** with Westinghouse Thyrex voltage (WTV) regulator potentiometer to 260 volts (within plus or minus 1.0 volts) on panel meter. ___________

[b] **ENSURE** MG Set A voltage is **ADJUSTED** with WTV regulator potentiometer to match MG Set B voltage. __________

CAUTION **Do NOT jar MG set panel doors when they are being opened or closed. There is a potential for inadvertent relay operation.**

[9] **IF** using digital meters for voltage adjustment, **THEN**

[a] **ENSURE** qualified electrical maintenance personnel have **OBTAINED** 2 Fluke 8840A (or equivalent) digital voltmeters and 2 Keithley 197 (or equivalent) digital voltmeters to be used for synchronization and balancing of the MG Sets. __________

[b] **ENSURE** Keithley (or equivalent) digital voltmeters (DVM) are **CONNECTED** to the terminals on the panel *voltmeters* for both MG Set B and MG Set A. This DVM voltage is proportional to generator voltage. __________

[c] **ENSURE** Fluke (or equivalent) digital voltmeters (DVM) are **CONNECTED** to the terminals on the panel *ammeters* for both MG Set B and MG Set A. This DVM voltage is proportional to generator amps. __________

(Step continued on Next Page)

Unit______________ Date__________

6.1 Placing MG Set A In Service With MG Set B Operating (Continued)

[9] (Continued)

[d] **ENSURE** MG Set B voltage is **ADJUSTED** with WTV regulator potentiometer to 108 volts (260 volts on panel meter) as indicated on the digital voltmeter, to be within plus or minus 1.0 volt (digital voltmeter). __________

[e] **ENSURE** MG Set A voltage is **ADJUSTED** with WTV regulator potentiometer to match MG Set B voltage, to be within 0.5 volts (digital voltmeter). __________

[10] **ENSURE** CRDM MG Set A Directional Overcurrent Relay Target Coils **RESET** (Panel Pushbutton). (N/A other Unit)

Relay	INITIALS
[1-RLY-085-DE/4D/A] (67A)	________
[1-RLY-085-DE/4D/C] (67C)	________
[2-RLY-085-DG/4D/A] (67A)	________
[2-RLY-085-DG/4D/C] (67C)	________

[11] **ENSURE** targets for CRDM MG Set A Directional Overcurrent Relays **RESET** (Mechanical Linkage on relay). (N/A other Unit)

Relay	INITIALS
[1-RLY-085-DE/4D/A] (67A)	________
[1-RLY-085-DE/4D/C] (67C)	________
[2-RLY-085-DG/4D/A] (67A)	________
[2-RLY-085-DG/4D/C] (67C)	________

NOTE The following step should close the generator load breaker if paralleling is successful.

[12] **PLACE** **[HS-85-12B]** Gen No. 1 SYNCHRONIZE Switch in the **ON** position. __________

Unit________________ Date__________

6.1 Placing MG Set A In Service With MG Set B Operating (Continued)

NOTE MG Set A should parallel within 17 seconds.

[13] IF MG Sets are paralleled, **THEN**

[a] PLACE [HS-85-12B] Gen No. 1 SYNCHRONIZE Switch in the **OFF** position. __________

[14] IF DVMs are being utilized to balance generator amps (loading), **THEN**

PERFORM the following to balance MG set A & B currents:

[a] RECORD “as found” voltage and current readings:

NOTE With MG sets paralleled, the voltmeters are reading the same electrical point. Therefore, data is only required from one MG set in sub- steps 1 -6.

1. **ENSURE** MG Set A and B Voltmeter Selector Switches are selected for “AB”. __________
2. **RECORD** one MG Set Output voltage as indicated by the Keithley (or equivalent) DVM connected to the panel volt meters for:

   MG Set A **OR** MG Set B _____________ volts __________
3. **ENSURE** MG Set A and B Voltmeter Selector Switches are selected for “BC”. __________
4. **RECORD** one MG Set Output voltage as indicated by the Keithley (or equivalent) DVM connected to the panel volt meters for:

   MG Set A **OR** MG Set B _____________ volts __________
5. **ENSURE** MG Set A and B Voltmeter Selector Switches are selected for “CA”. __________
6. **RECORD** one MG Set Output voltage as indicated by the Keithley (or equivalent) DVM connected to the panel volt meters for:

   MG Set A **OR** MG Set B _____________ volts __________

Unit_______________ Date_________

6.1 Placing MG Set A In Service With MG Set B Operating (Continued)

[14] (Continued)

[a] (Continued)

NOTE With MG sets paralleled, the ammeters are NOT reading the same electrical point. Therefore, data is required from BOTH MG sets in sub- steps 7 - 12.

7. **ENSURE** MG Set A and B Ammeter Selector Switches are selected for "A". _________

8. **RECORD** output current as indicated by the Fluke (or equivalent) DVM connected to the panel amp meters for:

   MG Set A _____________ mV

   MG Set B _____________ mV _________

9. **ENSURE** MG Set A and B Ammeter Selector Switches are selected for "B". _________

10. **RECORD** output current as indicated by the Fluke (or equivalent) DVM connected to the panel amp meters for:

    MG Set A _____________ mV

    MG Set B _____________ mV _________

11. **ENSURE** MG Set A and B Voltmeter Selector Switches are selected for "C". _________

12. **RECORD** output current as indicated by the Fluke (or equivalent) DVM connected to the panel amp meters for:

    MG Set A _____________ mV

    MG Set B _____________ mV _________

[b] **EVALUATE** 'as found" data from Step **[14][a]** and the position of the directional contacts on the Directional Overcurrent Relays (DOR) associated with both MG sets to determine if any adjustment is necessary.

Unit______________ Date_________

6.1 Placing MG Set A In Service With MG Set B Operating (Continued)

[14] (Continued)

NOTE There are two methods by which balanced MG Set currents can be achieved using the WTV Voltage Potentiometers.

The preferred method is to balance the Directional Overcurrent Relays directional contacts to the far right and as steady as achievable while maintaining 108 ± 1 volts on the Fluke (or equivalent) DVMs connected to the MG Set voltmeters. This method will NOT usually result in currents balanced to within 1 mV (as read on the Keithley (or equivalent)).

The secondary method is to balance the Keithley (or equivalent) DVMs connected to the panel ammeters to within 1 mV while maintaining 108 ± 1 volts as indicated by the Fluke (or equivalent) DVM connected to the generator voltmeter.

[c] **IF** adjustment is determined to be necessary by Cognizant Craft or Engineer, **THEN**

ADJUST WTV voltage regulator potentiometers on MG Sets A & B to balance generator currents. _________

[d] **IF** an adjustment was made, **THEN**

RECORD "as left" voltage and current readings:

NOTE With MG sets paralleled, the voltmeters are reading the same electrical point. Therefore, data is only required from one MG set in sub- steps 1 -6.

1. **ENSURE** MG Set A and B Voltmeter Selector Switches are selected for "AB". _________
2. **RECORD** one MG Set Output voltage as indicated by the Keithley (or equivalent) DVM connected to the panel volt meters for:

   MG Set A **OR** MG Set B ____________ volts _________
3. **ENSURE** MG Set A and B Voltmeter Selector Switches are selected for "BC". _________

Unit_______________ Date_________

6.1 Placing MG Set A In Service With MG Set B Operating (Continued)

[14] (Continued)

[d] (Continued)

4. **RECORD** one MG Set Output voltage as indicated by the Keithley (or equivalent) DVM connected to the panel volt meters for:

MG Set A **OR** MG Set B _____________ volts __________

5. **ENSURE** MG Set A and B Voltmeter Selector Switches are selected for "CA". __________

6. **RECORD** one MG Set Output voltage as indicated by the Keithley (or equivalent) DVM connected to the panel volt meters for:

MG Set A **OR** MG Set B _____________ volts __________

NOTE With MG sets paralleled, the ammeters are NOT reading the same electrical point. Therefore, data is required from BOTH MG sets in sub- steps 7 - 12.

7. **ENSURE** MG Set A and B Ammeter Selector Switches are selected for "A". __________

8. **RECORD** output current as indicated by the Fluke (or equivalent) DVM connected to the panel amp meters for:

MG Set A _____________ mV

MG Set B _____________ mV __________

9. **ENSURE** MG Set A and B Ammeter Selector Switches are selected for "B". __________

10. **RECORD** output current as indicated by the Fluke (or equivalent) DVM connected to the panel amp meters for:

MG Set A _____________ mV

MG Set B _____________ mV __________

Unit_______________ Date_________

6.1 Placing MG Set A In Service With MG Set B Operating (Continued)

[14] (Continued)

[d] (Continued)

11. **ENSURE** MG Set A and B Voltmeter Selector Switches are selected for "C". _________

12. **RECORD** output current as indicated by the Fluke (or equivalent) DVM connected to the panel amp meters for:

MG Set A _____________ mV

MG Set B _____________ mV _________

[e] **IF** digital meters were installed in step **[9]**, **THEN**

1. **ENSURE** all digital meters are removed. _____ / _____ 1st CV

2. **ENSURE** the MG Set panel doors are closed. _____ / _____ 1st CV

[15] **IF** MG Set A load breaker 52-1 closes but subsequently trips due to Directional Overcurrent Relay operation, **THEN**

[a] **PLACE** **[HS-85-12B]** Gen No. 1 SYNCHRONIZE Switch in the **OFF** position. _________

[b] **ENSURE** CRDM MG Set A Directional Overcurrent Relay Target Coils are **RESET** (Panel Pushbutton). (N/A other Unit)

Relay	INITIALS
[1-RLY-085-DE/4D/A] (67A)	_________
[1-RLY-085-DE/4D/C] (67C)	_________
[2-RLY-085-DG/4D/A] (67A)	_________
[2-RLY-085-DG/4D/C] (67C)	_________

Unit_______________ Date_________

6.1 Placing MG Set A In Service With MG Set B Operating (Continued)

[c] **ENSURE** targets for CRDM MG Set A Directional Overcurrent Relays **RESET** (Mechanical Linkage on relay). (N/A other Unit)

Relay	INITIALS
[1-RLY-085-DE/4D/A] (67A)	________
[1-RLY-085-DE/4D/C] (67C)	________
[2-RLY-085-DG/4D/A] (67A)	________
[2-RLY-085-DG/4D/C] (67C)	________

[d] **IF** 1st attempt to synchronize, **RETURN** to step **[12]**. ☐

[e] **IF** 2nd attempt to synchronize was unsuccessful, **THEN** **INITIATE** a WO to troubleshoot the problem. ☐

[16] **IF** MG Set A does **NOT** parallel within 17 seconds, **THEN**

[a] **CHECK** MG Set voltages. ☐

[b] **IF** voltages appear to have drifted apart **AND/OR** another adjustment is desired, **THEN**

1. **PLACE** **[HS-85-12B]** Gen No. 1 SYNCHRONIZE Switch in the **OFF** position. ☐
2. **RETURN** to step **[7]**. ☐

[17] **IF** Alternate Method of Paralleling MG Set A is desired, **THEN**

GO TO Section 8.1. _________

[18] **ENSURE** target for CRD MG Set A Load (GENERATOR) Bkr 52-1 is RED by placing **[HS-85-12]** GENERATOR breaker circuit control in the **CLOSE** position. ☐

End of Section 6.1

Unit______________ Date__________

6.2 Placing MG Set B In Service With MG Set A Operating

[1] **ENSURE** MG Set A is In Service. ☐

[2] **ENSURE** MG Set B is in Standby Readiness. ☐

[3] **ENSURE** Reactor Trip Breakers are **CLOSED**. ☐

[4] **START** CRD MG Set B by placing **[HS-85-1B]** MOTOR Breaker 52B Circuit Control in the **CLOSE** position. ☐

[5] **VERIFY** generator speed increasing. ☐

[6] **WHEN** generator has increased to full speed, **THEN**

  [a] **DEPRESS AND HOLD** Gen Field Flash pushbutton. ☐

  [b] **WHEN** voltage is greater than 250 volts, **THEN** **RELEASE** Gen Field Flash pushbutton. ☐

NOTE Digital voltmeters are much more accurate than panel meters and are the preferred instrumentation when synchronizing the generators. The panel meters should only be used in the event of an emergency.

[7] **REQUEST** the SM/SRO to determine which of the following types of meters should be used to synchronize and balance the MG Sets:

  MG Set panel meters. ☐

  Digital meters. ☐

____
SM/SRO

Unit________________ Date_________

6.2 Placing MG Set B In Service With MG Set A Operating (Continued)

NOTE The auto synchronizing circuit has a low voltage cutout circuit which will **NOT** allow the second MG Set to synchronize if voltage on the loaded MG Set is less than 254 volts. Minimum voltage for placing the second generator in parallel is 260 volts.

[8] **IF** using the MG Set panel voltmeters for voltage adjustment, **THEN**

[a] **ENSURE** MG Set A voltage is **ADJUSTED** with Westinghouse Thyrex voltage (WTV) regulator potentiometer to 260 volts (within plus or minus 1.0 volts) on panel meter. __________

[b] **ENSURE** MG Set B voltage is **ADJUSTED** with WTV regulator potentiometer to match MG Set A voltage. __________

CAUTION **Do NOT jar MG set panel doors when they are being opened or closed. There is a potential for inadvertent relay operation.**

[9] **IF** using digital meters for voltage adjustment, **THEN**

[a] **ENSURE** qualified electrical maintenance personnel have **OBTAINED** 2 Fluke 8840A (or equivalent) digital voltmeters and 2 Keithley 197 (or equivalent) digital voltmeters to be used for synchronization and balancing of the MG Sets. __________

[b] **ENSURE** Keithley (or equivalent) digital voltmeters (DVM) are **CONNECTED** to the terminals on the panel *voltmeters* for both MG Set B and MG Set A. This DVM voltage is proportional to generator voltage. __________

[c] **ENSURE** Fluke (or equivalent) digital voltmeters (DVM) are **CONNECTED** to the terminals on the panel *ammeters* for both MG Set B and MG Set A. This DVM voltage is proportional to generator amps. __________

(Step continued on Next Page)

6.2 **Placing MG Set B In Service With MG Set A Operating** (Continued)

[d] **ENSURE** MG Set A voltage is **ADJUSTED** with WTV regulator potentiometer to 108 volts (260 volts on panel meter) as indicated on the digital voltmeter, to be within plus or minus 1.0 volt (DVM). _________

[e] **ENSURE** MG Set B voltage is **ADJUSTED** with WTV regulator potentiometer to match MG Set A voltage, to be within 0.5 volts (DVM). _________

[10] **ENSURE** CRDM MG Set B Directional Overcurrent Relay Target Coils are **RESET** (Panel Pushbutton). (N/A other Unit)

Relay	INITIALS
[1-RLY-085-DF/3B/A] (67A)	_________
[1-RLY-085-DF/3B/C] (67C)	_________
[2-RLY-085-DH/3B/A] (67A)	_________
[2-RLY-085-DH/3B/C] (67C)	_________

[11] **ENSURE** targets for CRDM MG Set B Directional Overcurrent Relays are **RESET** (Mechanical Linkage on relay). (N/A other Unit)

Relay	INITIALS
[1-RLY-085-DF/3B/A] (67A)	_________
[1-RLY-085-DF/3B/C] (67C)	_________
[2-RLY-085-DH/3B/A] (67A)	_________
[2-RLY-085-DH/3B/C] (67C)	_________

NOTE The following step should close the generator load breaker if paralleling is successful.

[12] **PLACE** **[HS-85-22B]** Gen No. 2 SYNCHRONIZE Switch in the **ON** position. _________

NOTE MG Set B should parallel within 17 seconds.

[13] **IF** MG Sets are paralleled, **THEN**

[a] **PLACE** **[HS-85-22B]** Gen No. 2 SYNCHRONIZE Switch in the **OFF** position. _________

Unit______________ Date__________

6.2 Placing MG Set B In Service With MG Set A Operating (Continued)

[14] IF DVMs are being utilized to balance generator amps (loading), **THEN**

PERFORM the following to balance MG set A & B currents:

[a] RECORD "as found" voltage and current readings:

NOTE With MG sets paralleled, the voltmeters are reading the same electrical point. Therefore, data is only required from one MG set in sub- steps 1 -6.

1. **ENSURE** MG Set A and B Voltmeter Selector Switches are selected for "AB". __________

2. **RECORD** one MG Set Output voltage as indicated by the Keithley (or equivalent) DVM connected to the panel volt meters for:

   MG Set A **OR** MG Set B _____________ volts __________

3. **ENSURE** MG Set A and B Voltmeter Selector Switches are selected for "BC". __________

4. **RECORD** one MG Set Output voltage as indicated by the Keithley (or equivalent) DVM connected to the panel volt meters for:

   MG Set A **OR** MG Set B _____________ volts __________

5. **ENSURE** MG Set A and B Voltmeter Selector Switches are selected for "CA". __________

6. **RECORD** one MG Set Output voltage as indicated by the Keithley (or equivalent) DVM connected to the panel volt meters for:

   MG Set A **OR** MG Set B _____________ volts __________

NOTE With MG sets paralleled, the ammeters are NOT reading the same electrical point. Therefore, data is required from BOTH MG sets in sub- steps 7 - 12.

7. **ENSURE** MG Set A and B Ammeter Selector Switches are selected for "A". __________

6.2 Placing MG Set B In Service With MG Set A Operating (Continued)

[14] (Continued)

[a] (Continued)

8. **RECORD** output current as indicated by the Fluke (or equivalent) DVM connected to the panel amp meters for:

MG Set A _____________ mV

MG Set B _____________ mV _________

9. **ENSURE** MG Set A and B Ammeter Selector Switches are selected for “B”. _________

10. **RECORD** output current as indicated by the Fluke (or equivalent) DVM connected to the panel amp meters for:

MG Set A _____________ mV

MG Set B _____________ mV _________

11. **ENSURE** MG Set A and B Ammeter Selector Switches are selected for “C”. _________

12. **RECORD** output current as indicated by the Fluke (or equivalent) DVM connected to the panel amp meters for:

MG Set A _____________ mV

MG Set B _____________ mV _________

[b] **EVALUATE** ‘as found” data from Step **[14][a]** and the position of the directional contacts on the Directional Overcurrent Relays (DOR) associated with both MG sets to determine if any adjustment is necessary.

6.2 Placing MG Set B In Service With MG Set A Operating (Continued)

[14] (Continued)

NOTE There are two methods by which balanced MG Set currents can be achieved using the WTV Voltage Potentiometers.

The preferred method is to balance the Directional Overcurrent Relays directional contacts to the far right and as steady as achievable while maintaining 108 ± 2 volts on the Fluke (or equivalent) DVMs connected to the MG Set voltmeters. This method will NOT usually result in currents balanced to within 1 mV (as read on the Keithley (or equivalent)).

The secondary method is to balance the Keithley (or equivalent) DVMs connected to the panel ammeters to within 1 mV while maintaining 108 ± 1 volts as indicated by the Fluke (or equivalent) DVM connected to the generator voltmeter.

[c] **IF** adjustment is determined to be necessary by Cognizant Craft or Engineer, **THEN**

ADJUST WTV voltage regulator potentiometers on MG Sets A & B to balance generator currents. __________

[d] **IF** an adjustment was made, **THEN**

RECORD “as left” voltage and current readings:

NOTE With MG sets paralleled, the voltmeters are reading the same electrical point. Therefore, data is only required from one MG set in sub- steps 1 -6.

1. **ENSURE** MG Set A and B Voltmeter Selector Switches are selected for “AB”. __________

2. **RECORD** one MG Set Output voltage as indicated by the Keithley (or equivalent) DVM connected to the panel volt meters for:

   MG Set A **OR** MG Set B _____________ volts __________

3. **ENSURE** MG Set A and B Voltmeter Selector Switches are selected for “BC”. __________

Unit_____________ Date_________

6.2 Placing MG Set B In Service With MG Set A Operating (Continued)

[14] (Continued)

[d] (Continued)

4. **RECORD** one MG Set Output voltage as indicated by the Keithley (or equivalent) DVM connected to the panel volt meters for:

MG Set A **OR** MG Set B ____________ volts __________

5. **ENSURE** MG Set A and B Voltmeter Selector Switches are selected for "CA". __________

6. **RECORD** one MG Set Output voltage as indicated by the Keithley (or equivalent) DVM connected to the panel volt meters for:

MG Set A **OR** MG Set B ____________ volts __________

NOTE With MG sets paralleled, the ammeters are NOT reading the same electrical point. Therefore, data is required from BOTH MG sets in sub- steps 7 - 12.

7. **ENSURE** MG Set A and B Ammeter Selector Switches are selected for "A". __________

8. **RECORD** output current as indicated by the Fluke (or equivalent) DVM connected to the panel amp meters for:

MG Set A ____________ mV

MG Set B ____________ mV __________

9. **ENSURE** MG Set A and B Ammeter Selector Switches are selected for "B". __________

10. **RECORD** output current as indicated by the Fluke (or equivalent) DVM connected to the panel amp meters for:

MG Set A ____________ mV

MG Set B ____________ mV __________

6.2 Placing MG Set B In Service With MG Set A Operating (Continued)

[14] (Continued)

[d] (Continued)

11. **ENSURE** MG Set A and B Voltmeter Selector Switches are selected for "C". _________

12. **RECORD** output current as indicated by the Fluke (or equivalent) DVM connected to the panel amp meters for:

MG Set A _____________ mV

MG Set B _____________ mV _________

[e] **IF** digital meters were installed in step **[9]**, **THEN**

1. **ENSURE** all digital meters are removed. _____ / _____ 1st CV

2. **ENSURE** the MG Set panel doors are closed. _____ / _____ 1st CV

[15] **IF** MG Set B load breaker 52-2 closes but subsequently trips due to Directional Overcurrent Relay operation, **THEN**

[a] **PLACE** **[HS-85-22B]** Gen No. 2 SYNCHRONIZE Switch in the **OFF** position. _________

[b] **ENSURE** CRDM MG Set B Directional Overcurrent Relay Target Coils are **RESET** (Panel Pushbutton). (N/A other Unit)

Relay	INITIALS
[1-RLY-085-DF/3B/A] (67A)	_________
[1-RLY-085-DF/3B/C] (67C)	_________
[2-RLY-085-DH/3B/A] (67A)	_________
[2-RLY-085-DH/3B/C] (67C)	_________

Unit______________ Date_________

6.2 Placing MG Set B In Service With MG Set A Operating (Continued)

[c] **ENSURE** targets for CRDM MG Set B Directional Overcurrent Relays are **RESET** (Mechanical Linkage on relay). (N/A other Unit)

Relay	INITIALS
[1-RLY-085-DF/3B/A] (67A)	________
[1-RLY-085-DF/3B/C] (67C)	________
[2-RLY-085-DH/3B/A] (67A)	________
[2-RLY-085-DH/3B/C] (67C)	________

[d] **IF** 1st attempt to synchronize, **RETURN** to step **[12]**. ☐

[e] **IF** 2nd attempt to re-synchronize was unsuccessful, **THEN** **INITIATE** a WO to troubleshoot the problem. ☐

[16] **IF** MG Set B does NOT parallel within 17 seconds, **THEN**

[a] **CHECK** MG Set voltages. ☐

[b] **IF** voltages appear to have drifted apart **AND/OR** another adjustment is desired, **THEN**

1. **PLACE** **[HS-85-22B]** Gen No. 2 SYNCHRONIZE Switch in the **OFF** position. ☐
2. **RETURN** to step **[7]**. ☐

[17] **IF** Alternate Method of Paralleling MG Set B is desired, **THEN**

GO TO Section 8.2. ☐

[18] **ENSURE** target for CRD MG Set B Load (GENERATOR) Bkr 52-2 is RED by placing **[HS-85-22]** GENERATOR breaker circuit control in the **CLOSE** position. ☐

End of Section 6.2

Unit________________ Date__________

6.3 Manual Operation of Rod Control System Below 15 Percent Power

CAUTION **If reactor trip breakers are CLOSED and an RCS cooldown of greater than 50°F is planned, the shutdown and control banks should be withdrawn at least 5 steps each. This will limit the possibility of "thermal lock-up" of the rods. Thermal lock-up is NOT a concern during unit heatup.**

NOTE Continuous rod motion shall comply with these restrictions:

CRDM OUTLET TEMPERATURE	ROD MOTION LIMITS	
≤190°F	10 minutes ON	20 minutes OFF
≤200°F	6 minutes ON	24 minutes OFF

[1] **ENSURE** Section 5.2, Reset/Close Reactor Trip Breakers has been completed. ☐

[2] **IF** the shutdown and control rods were withdrawn 5 steps to prevent thermal lockup during an RCS cooldown,
THEN
ENSURE rods are fully inserted prior to withdrawal. _____ / _____
1st CV

NOTE ROD CONTROL STARTUP STEP COUNTER RESET (SUS on M-4) Resets:

A. All GROUP STEP COUNTERS on the Control Board.
B. The master cycler reversible counter.
C. All slave cycler counters.
D. The bank overlap counter.
E. All internal memory and alarm circuits.
F. All pulse-to-analog converters in the Rod Position Indication System.

CAUTION **ROD CONTROL STARTUP STEP COUNTER RESET (SUS on M-4) should never be held in STARTUP position for any extended period of time. Holding this switch in STARTUP position may cause damage to the counters.**

[3] **MOMENTARILY PLACE [SUS]**, Rod Control Startup Step Counter Reset to the **STARTUP** position to reset Control Rod Drive System. ☐

Unit______________ Date_________

6.3 Manual Operation of Rod Control System Below 15 Percent Power (Continued)

CAUTION Before withdrawing any rod from the fully inserted position, all Group Step Counters and all Rod Position indicators must be at zero steps.

[4] **ENSURE** all Full Length Rod step counters reset to zero. _________

[5] **VERIFY** rod control IN-OUT direction lights are NOT LIT. _________

[6] **DEPRESS** [RCAS], Rod Urgent Failure Alarm Reset. ☐

[7] **RESET** Window 6 (A-6), ROD CONTROL SYSTEM URGENT FAILURE alarm on panel [XA-55-4B] using [XS-55-4A], Annunciator RESET/ACK/TEST Switch. _________

[8] **VERIFY** the following rod control system alarms on panel [XA-55-4B] are NOT LIT:

WINDOW NUMBER	NOT LIT (√)
5 (A5)	☐
6 (A6)	☐
11 (B4)	☐
12 (B5)	☐
13(B6)	☐
18 (C4)	☐
19(C5)	☐
27 (D6)	☐
34 (E6)	☐

____

Unit________________ Date__________

6.3 Manual Operation of Rod Control System Below 15 Percent Power (Continued)

[9] **ENSURE** Plant computer points for rod bank position are **ZERO** using the following computer points:

COMPUTER PT	ROD BANK	√
U0049	Control A	☐
U0050	Control B	☐
U0051	Control C	☐
U0052	Control D	☐
U0053	Shutdown A	☐
U0054	Shutdown B	☐
U0055	Shutdown C	☐
U0056	Shutdown D	☐

____

[10] **MONITOR** Control Rod position **USING** Rod Position Indicators ICS screen 30 minute trend during SD & Control Banks withdrawal to aid in detecting rod misalignment. ☐

[11] **IF** Individual Rod Position Indication does not indicate proper rod position during withdrawal of SD Banks, **THEN**

- [a] **STOP** rod withdrawal. ☐
- [b] **ENSURE** subcriticality. ☐
- [c] **CONTACT** MIG
  AND
  INITIATE troubleshooting. ☐
- [d] **IF** troubleshooting does not resolve the problem,
  OR
  subcriticality can NOT be verified,
  THEN
  INITIATE Reactor **TRIP**. ☐

[12] **IF** Individual Rod Position Indication does not indicate proper rod position during withdrawal of Control Banks, **THEN** **GO TO** AOP-C.01 section 2.6 Rod Position Indicator (RPI) Malfunction - Modes 1 or 2. ☐

6.3 Manual Operation of Rod Control System Below 15 Percent Power (Continued)

CAUTION **Under normal conditions control rod banks must be withdrawn and inserted in the prescribed sequence. For withdrawal, the sequence is Shutdown Bank A, Shutdown Bank B, Shutdown Bank C, Shutdown Bank D, Control Bank A, Control Bank B, Control Bank C, Control Bank D. The insertion sequence is the reverse of the withdrawal sequence.**

NOTE 1 Startup rate, Source range, Intermediate range, Nuclear Instrumentation recorders, Group Step Counters and the Rod Position Indicators should be monitored during each bank withdrawal.

NOTE 2 The following failures will render the rod control system incapable of automatic and / or manual motion without any annunciation or indication: 1) Hand switch failure; 2) relay failure, and 3) simultaneous failure of both 100v DC power supplies (PS3 and PS6)

[13] **PLACE** **[HS-85-5110]**, Rod Control Mode Selector to the **SBA** position.

_____ / _____
1st CV

[14] **VERIFY** Rod Speed Indicator **[SI-412]**, indicates 64 Steps/minute.

_____ / _____
1st CV

Unit________________ Date__________

6.3 Manual Operation of Rod Control System Below 15 Percent Power (Continued)

NOTE Monitor Group Step Counters, Rod Position Indicator and the "IN-OUT" status lights to ensure anticipated motion as each bank is being withdrawn. Rod speed indicator should be reading 64 steps per minute.

[15] **ENSURE** Shutdown Bank A demand position counters operational by performing the following: **[C.2]**

[a] **BUMP** **[HS-85-5111]**, Rod Control Switch to withdraw Shutdown Bank A one-half step at a time, for one full step.

_____ / _____
1st CV

[b] **CHECK** group demand position counters advance properly. ☐

[c] **BUMP** **[HS-85-5111]** to withdraw Shutdown Bank A one-half step at a time, for the second full step.

_____ / _____
1st CV

[d] **VERIFY** group demand position counters advance properly. ☐

[e] **IF** group demand position counters do **NOT** advance properly, **THEN**

A. **STOP** rod withdrawal. ☐

B. **INITIATE** WO to have counter repaired. ☐

C. **WHEN** counter is repaired, **THEN**

1. **ENSURE** Shutdown Bank A fully **INSERTED.** ☐
2. **RETURN** to beginning of this step. ☐

NOTE The fully withdrawn position for shutdown and control rods is defined by TI-28, Att. 6.

[16] **WITHDRAW** Shutdown Bank A to the **FULLY WITHDRAWN** position using **[HS-85-5111]**.

_____ / _____
1st CV

Unit__________ Date________

6.3 Manual Operation of Rod Control System Below 15 Percent Power (Continued)

[17] PLACE [HS-85-5110], Rod Control Mode Selector to the **SBB** position.

____ / ____
1st CV

[18] VERIFY Rod Speed Indicator **[SI-412]**, indicates 64 Steps/minute.

____ / ____
1st CV

NOTE The following failures will render the rod control system incapable of automatic and / or manual motion without any annunciation or indication: 1) Hand switch failure; 2) relay failure, and 3) simultaneous failure of both 100v DC power supplies (PS3 and PS6).

[19] ENSURE Shutdown Bank B demand position counters operational by performing the following: **[C.2]**

[a] BUMP [HS-85-5111], Rod Control Switch to withdraw Shutdown Bank B one-half step at a time, for one full step.

____ / ____
1st CV

[b] CHECK group demand position counters advance properly. ☐

[c] BUMP [HS-85-5111] to withdraw Shutdown Bank B one-half step at a time, for the second full step.

____ / ____
1st CV

[d] VERIFY group demand position counters advance properly. ☐

[e] IF group demand position counters do <u>NOT</u> advance properly, **THEN**

A. **STOP** rod withdrawal. ☐

B. **INITIATE** WO to have counter repaired. ☐

C. **WHEN** counter is repaired, **THEN**

1. **ENSURE** Shutdown Bank B fully **INSERTED** and ☐

2. **RETURN** to beginning of this step. ☐

[20] WITHDRAW Shutdown Bank B to the **FULLY WITHDRAWN** position using **[HS-85-5111]**.

____ / ____
1st CV

Unit_______________ Date_________

6.3 Manual Operation of Rod Control System Below 15 Percent Power (Continued)

[21] **PLACE** **[HS-85-5110]**, Rod Control Mode Selector to the **SBC** position. _____ / _____ 1st CV

[22] **VERIFY** Rod Speed Indicator **[SI-412]**, indicates 0 Steps/minute. _____ / _____ 1st CV

NOTE The following failures will render the rod control system incapable of automatic and / or manual motion without any annunciation or indication: 1) Hand switch failure; 2) relay failure, and 3) simultaneous failure of both 100v DC power supplies (PS3 and PS6).

[23] **ENSURE** Shutdown Bank C demand position counters operational by performing the following: **[C.2]**

[a] **BUMP** **[HS-85-5111]**, Rod Control Switch to withdraw Shutdown Bank C one full step. _____ / _____ 1st CV

[b] **CHECK** group demand position counter advances properly. ☐

[c] **BUMP** **[HS-85-5111]** to withdraw Shutdown Bank C a second full step. _____ / _____ 1st CV

[d] **VERIFY** group demand position counter advanced properly. ☐

[e] **IF** group demand position counters do **NOT** advance properly, **THEN**

A. **STOP** rod withdrawal. ☐

B. **INITIATE** WO to have counter repaired. ☐

C. **WHEN** counter is repaired, **THEN**

1. **ENSURE** Shutdown Bank C fully **INSERTED** and ☐

2. **RETURN** to beginning of this step. ☐

[24] **WITHDRAW** Shutdown Bank C to the **FULLY WITHDRAWN** position using **[HS-85-5111]**. _____ / _____ 1st CV

Unit_______________ Date__________

6.3 Manual Operation of Rod Control System Below 15 Percent Power (Continued)

[25] **PLACE** **[HS-85-5110]**, Rod Control Mode Selector to the **SBD** position. _____ / _____
1st CV

[26] **VERIFY** Rod Speed Indicator **[SI-412]**, indicates 0 Steps/minute. _____ / _____
1st CV

NOTE The following failures will render the rod control system incapable of automatic and / or manual motion without any annunciation or indication: 1) Hand switch failure; 2) relay failure, and 3) simultaneous failure of both 100v DC power supplies (PS3 and PS6).

[27] **ENSURE** Shutdown Bank D demand position counters operational by performing the following: **[C.2]**

[a] **BUMP** **[HS-85-5111]**, Rod Control Switch to withdraw Shutdown Bank D one full step. _____ / _____
1st CV

[b] **CHECK** group demand position counter advances properly. ☐

[c] **BUMP** **[HS-85-5111]** to withdraw Shutdown Bank D a second full step. _____ / _____
1st CV

[d] **VERIFY** group demand position counter advanced properly. ☐

[e] **IF** group demand position counters do **NOT** advance properly, **THEN**

A. **STOP** rod withdrawal. ☐

B. **INITIATE** WO to have counter repaired. ☐

C. **WHEN** counter is repaired, **THEN**

1. **ENSURE** Shutdown Bank D fully **INSERTED** and ☐

2. **RETURN** to beginning of this step. ☐

[28] **WITHDRAW** Shutdown Bank D to the **FULLY WITHDRAWN** position using **[HS-85-5111]**. _____ / _____
1st CV

Unit________________ Date__________

6.3 Manual Operation of Rod Control System Below 15 Percent Power (Continued)

NOTE Remainder of this section performed in conjunction with 0-GO-2 or 0-RT-NUC-000-003.0.

[29] PLACE [HS-85-5110], Rod Control Mode Selector to the **MANUAL** position. _____ / _____ 1st CV

[30] VERIFY Rod Speed Indicator [SI-412], indicates 48 Steps/minute. _____ / _____ 1st CV

NOTE The following failures will render the rod control system incapable of automatic and / or manual motion without any annunciation or indication: 1) Hand switch failure; 2) relay failure, and 3) simultaneous failure of both 100v DC power supplies (PS3 and PS6).

[31] ENSURE Control Bank A demand position counters operational by performing the following: **[C.2]**

- **[a] BUMP** [HS-85-5111], Rod Control Switch to withdraw Control Bank A one-half step at a time, for one full step. _____ / _____ 1st CV
- **[b] CHECK** group demand position counters advance properly. ☐
- **[c] BUMP** [HS-85-5111] to withdraw Control Bank A one-half step at a time, for the second full step. _____ / _____ 1st CV
- **[d] VERIFY** group demand position counters advance properly. ☐
- **[e] IF** group demand position counters do <u>NOT</u> advance properly, **THEN**
  - A. **STOP** rod withdrawal. ☐
  - B. **INITIATE** WO to have counter repaired. ☐
  - C. **WHEN** counter is repaired, **THEN**
    - 1. **ENSURE** Control Bank A fully **INSERTED** and ☐
    - 2. **RETURN** to beginning of this step. ☐

6.3 **Manual Operation of Rod Control System Below 15 Percent Power** (Continued)

[32] **CONTINUE** withdrawal of Control Bank A using [HS-85-5111], Rod Control Switch to 128 steps or next doubling. _________

NOTE When Control Bank A is above 20 steps, alarm FULL LENGTH RODS AT BOTTOM light on [XA-55-4B] should clear. When Control Bank A gets above 20 steps and rods are driven back in, the alarm will come back in. When Control Banks B, C, and D get above 35 steps, then drop below 20 steps, the alarm will come back in.

[33] **WHEN** Control Bank A is above 20 steps, **THEN**

ENSURE Window 28 (D-7), FULL LENGTH RODS RODS AT BOTTOM alarm on panel [XA-55-4B] **CLEARS**. _________

Unit________________ Date__________

6.3 Manual Operation of Rod Control System Below 15 Percent Power (Continued)

CAUTION **When Control Bank A is reaches 128 steps, Control Bank B should begin to move. Each successive bank should begin to move when the previous bank reaches 128 steps.**

[34] **WHEN** Control Bank A is withdrawn to 128 steps, **THEN**

ENSURE Control Bank B demand position counters operational by performing the following: **[C.2]**

[a] **BUMP** [HS-85-5111], Rod Control Switch to withdraw Control Bank B one-half step at a time, for one full step. _____ / _____ 1st CV

[b] **CHECK** group demand position counters advance properly. ☐

[c] **BUMP** [HS-85-5111] to withdraw Control Bank B one-half step at a time, for the second full step. _____ / _____ 1st CV

[d] **VERIFY** group demand position counters advance properly. ☐

[e] **IF** group demand position counters do NOT advance properly, **THEN**

A. **STOP** rod withdrawal. ☐

B. **INITIATE** WO to have counter repaired. ☐

C. **WHEN** counter is repaired, **THEN**

1. **ENSURE** Control Bank B fully **INSERTED** and ☐

2. **RETURN** to beginning of this step. ☐

[35] **CONTINUE** withdrawal of Control Bank B using [HS-85-5111] to 128 steps or next doubling. __________

Unit______________ Date_________

6.3 Manual Operation of Rod Control System Below 15 Percent Power (Continued)

[36] WHEN Control Bank B is withdrawn to 128 steps, **THEN**

ENSURE Control Bank C demand position counters operational by performing the following: **[C.2]**

[a] BUMP [HS-85-5111], Rod Control Switch to withdraw Control Bank C one-half step at a time, for one full step. _____ / _____
1st CV

[b] CHECK group demand position counters advance properly. ☐

[c] BUMP [HS-85-5111] to withdraw Control Bank C one-half step at a time, for the second full step. _____ / _____
1st CV

[d] VERIFY group demand position counters advance properly. ☐

[e] IF group demand position counters do <u>NOT</u> advance properly, **THEN**

A. **STOP** rod withdrawal. ☐

B. **INITIATE** WO to have counter repaired. ☐

C. **WHEN** counter is repaired, **THEN**

1. **ENSURE** Control Bank C fully **INSERTED** and ☐
2. **RETURN** to beginning of this step. ☐

[37] CONTINUE withdrawal of Control Bank C using [HS-85-5111] to 128 steps or next doubling. __________

NOTE Three steps are added to the low-low insertion limit (110 steps @ zero power) until LEFM is available.

[38] WHEN Control Bank C is ≈ 113 Steps, **THEN** **ENSURE** Window 14 (B-7), ROD CONTROL BANKS LIMIT LOW-LOW alarm on panel [XA-55-4B] **CLEARS**. __________

Unit_______________ Date__________

6.3 Manual Operation of Rod Control System Below 15 Percent Power (Continued)

NOTE Three steps are added to the low insertion limit (120 steps @ zero power) until LEFM is available.

[39] WHEN Control Bank C is ≈ 123 steps, **THEN**

ENSURE Window 7 (A-7), ROD CONTROL BANKS LIMIT LOW alarm on panel **[XA-55-4B] CLEARS**. __________

[40] WHEN Control Bank C is withdrawn to 128 steps, **THEN**

ENSURE Control Bank D demand position counters operational by performing the following: **[C.2]**

[a] BUMP [HS-85-5111], Rod Control Switch to withdraw Control Bank D one-half step at a time, for one full step. _____ / _____ 1st CV

[b] CHECK group demand position counters advance properly. ☐

[c] BUMP [HS-85-5111] to withdraw Control Bank D one-half step at a time, for the second full step. _____ / _____ 1st CV

[d] VERIFY group demand position counters advance properly. ☐

[e] IF group demand position counters do **NOT** advance properly, **THEN**

A. **STOP** rod withdrawal. ☐

B. **INITIATE** WO to have counter repaired. ☐

C. **WHEN** counter is repaired, **THEN**

1. **ENSURE** Control Bank D fully **INSERTED** and ☐
2. **RETURN** to beginning of this step. ☐

[41] CONTINUE withdrawal of Control Bank D using **[HS-85-5111]** to next doubling or criticality. __________

End of Section 6.3

Unit____________ Date__________

6.4 Transferring from Manual to Auto Rod Control

NOTE 1 A laminated copy of this section can be maintained in the Unit Control Room for repetitive use for routine rod manipulations.

NOTE 2 Defeating or restoring Tavg/Delta T or NIS channel may cause step change in input to rod control. A delay of at least 3 minutes prior to returning rod control to automatic will allow lead/lag signal to decay off.

NOTE 3 This Section may be N/A if Rod Control is being returned to AUTO in response to a transient (runback) condition.

[1] **ENSURE** turbine power is greater than 15 percent. __________

[2] **ENSURE** Window 31 (E-3), LOW TURB IMPULSE PRESS ROD WITHDRAWAL BLOCKED C-5, Permissive light on panel **[XA-55-4A]** is **NOT LIT**. __________

[3] **ENSURE** less than 1 degree Tavg/Tref mismatch. __________

[4] **PLACE [HS-85-5110]**, Rod Control Mode Selector in the **AUTO** position. _____ / _____
1st CV

[5] **VERIFY** Rod Speed Indicator **[SI-412]**, indicates 8 Steps/minute. _____ / _____
1st CV

End of Section 6.4

Unit______________ Date__________

6.5 Transferring from Auto to Manual Rod Control

NOTE 1 A laminated copy of this section can be maintained in the Unit Control Room for repetitive use for routine rod manipulations.

NOTE 2 Manual rod withdrawal is inhibited by any of the following signals:

A. C-1, High Flux Intermediate Range Monitor

B. C-2, High Flux Power Range Monitor

C. C-3, Overtemperature Delta-T

D. C-4, Overpower Delta-T

[1] **PLACE** [HS-85-5110], Rod Control Mode Selector in the **MANUAL** position.

_____ / _____
1st CV

[2] **VERIFY** Rod Speed Indicator [SI-412], indicates 48 Steps/minute.

_____ / _____
1st CV

[3] **IF** control rod movement is required, **THEN**

ADJUST position using [HS-85-5111], Rod Control Switch.

_____ / _____
1st CV

[4] **IF** it is desired to leave [HS-85-5110], Rod Control Mode Selector in Manual for an extended period of time, **THEN**

PLACE this Section in the Active Procedures Book. __________

[5] **WHEN** it is desired to place [HS-85-5110], Rod Control Mode Selector to Automatic, **THEN**

GO TO Section 6.4. __________

End of Section 6.5

Unit______________ Date_________

7.0 SHUTDOWN

7.1 Removing the MG Set A From Service

[1] **IF** MG Set **B** has been removed from service, **THEN**

[a] **ENSURE** the control rods and shutdown rods are fully inserted into the core. ___________

NOTE: The MG set Load Breakers may trip open when the reactor trip breakers are opened due to the vibration problem on the Directional Overcurrent Relay contacts.

[b] **IF** the reactor trip breakers are **CLOSED THEN**

1. **DEPRESS AND HOLD** Feedwater Isolation Reset Pushbuttons [HS-3-99A] and [HS-3-99B] ___________
2. **OPEN** the reactor trip breakers. ___________
3. **RELEASE** Feedwater Isolation Reset Pushbuttons [HS-3-99A] and [HS-3-99B] ___________

CAUTION **Opening GENERATOR or MOTOR breaker of an MG Set that is to remain in service will result in a reactor trip.**

[2] **OPEN** MG Set **A** Load (GENERATOR) Breaker **52-1** **USING** [HS-85-12]. ☐

NOTE Voltage will be maintained for a short time after opening the motor circuit breaker due to an intended time delay.

[3] **STOP** CRD MG Set **A** by placing MOTOR Breaker **52A** Circuit Control in the **TRIP** position **USING** [HS-85-1A]. ☐

[4] **VERIFY** MG Set A speed decreases. _________

End of Section 7.1

Unit____________ Date_________

7.2 Removing the MG Set B From Service

[1] **IF** MG Set **A** has been removed from service, **THEN**

[a] **ENSURE** the control rods and shutdown rods are fully inserted into the core. __________

NOTE: The MG set Load Breakers may trip open when the reactor trip breakers are opened due to the vibration problem on the Directional Overcurrent Relay contacts.

[b] **IF** the reactor trip breakers are **CLOSED THEN**

1. **DEPRESS AND HOLD** Feedwater Isolation Reset Pushbuttons [HS-3-99A] and [HS-3-99B] __________
2. **OPEN** the reactor trip breakers. __________
3. **RELEASE** Feedwater Isolation Reset pushbuttons [HS-3-99A] and [HS-3-99B]. __________

CAUTION **Opening GENERATOR or MOTOR breaker of an MG Set that is to remain in service will result in a reactor trip.**

[2] **OPEN** MG Set **B** Load (GENERATOR) Breaker **52-2** **USING** [HS-85-22]. ☐

NOTE Voltage will be maintained for a short time after opening the motor circuit breaker due to an intended time delay.

[3] **STOP** CRD MG Set B by placing MOTOR Breaker **52B** Circuit Control in the **TRIP** position **USING** [HS-85-1B]. ☐

[4] **VERIFY** MG Set B speed decreases. __________

End of Section 7.2

Unit____________ Date_________

8.0 INFREQUENT OPERATION

8.1 Alternate Method of Paralleling MG Set A

CAUTION **This method should only be used if one unit is on line and providing for a load that may cause too great a speed difference to synchronize, and parallel operation is deemed necessary.**

[1] **OBTAIN** Shift Manager's approval to perform this method of paralleling MG Set A.

______________ / ______ / ______
SM/SRO Date Time

[2] **ENSURE** Section 6.1 has been completed. ☐

[3] **ENSURE** CRDM MG Set A Directional Overcurrent Relay Target Coils are **RESET** (Panel Pushbutton). (N/A other Unit)

Relay	INITIALS
[1-RLY-085-DE/4D/A] (67A)	________
[1-RLY-085-DE/4D/C] (67C)	________
[2-RLY-085-DG/4D/A] (67A)	________
[2-RLY-085-DG/4D/C] (67C)	________

[4] **ENSURE** targets for CRDM MG Set A Directional Overcurrent Relays are **RESET** (Mechanical Linkage on relay). (N/A other Unit)

Relay	INITIALS
[1-RLY-085-DE/4D/A] (67A)	________
[1-RLY-085-DE/4D/C] (67C)	________
[2-RLY-085-DG/4D/A] (67A)	________
[2-RLY-085-DG/4D/C] (67C)	________

[5] **PLACE** CRD MG Set A MOTOR Breaker 52A Circuit Control **[HS-85-1A]** in the **TRIP** position. ☐

[6] **VERIFY** MG Set A speed decreases. ☐

Unit______________ Date__________

8.1 Alternate Method of Paralleling MG Set A (Continued)

[7] **IF** MG Sets are paralleled, **THEN**

- [a] **PLACE** Gen No. 1 SYNCHRONIZE Switch **[HS-85-12B]** in the **OFF** position. ☐
- [b] **ENSURE** target for CRD MG Set A Mtr Bkr 52A is RED by placing the MOTOR breaker circuit control **[HS-85-1A]** in the **CLOSE** position. ☐
- [c] **IF** digital meters were used in Section 6.1, **THEN**
  - A. **ENSURE** all digital meters are removed. _____ / _____ 1st CV
  - B. **ENSURE** the MG Set panel doors are closed. _____ / _____ 1st CV
- [d] **ENSURE** target for CRD MG Set A Load (GENERATOR) Bkr 52-1 is RED by placing the GENERATOR breaker circuit control in the **CLOSE** position. ☐

[8] **IF** MG Set A does **NOT** parallel, **THEN**

REPEAT Section 6.1 as required to synchronize MG Sets . __________

[9] **CHECK** all Power, Logic, and Hold cabinets for alarm lights. ☐

End of Section 8.1

Unit_______________ Date__________

8.2 Alternate Method of Paralleling MG Set B

CAUTION **This method should only be used if one unit is on line and providing for a load that may cause too great a speed difference to synch, and parallel operation is deemed necessary.**

[1] **OBTAIN** Shift Manager's approval to perform this method of paralleling MG Set B.

_________________ / ______ / ______
SM/SRO Date Time

[2] **ENSURE** Section 6.2 has been completed. ☐

[3] **ENSURE** CRDM MG Set B Directional Overcurrent Relay Target Coils are **RESET** (Panel Pushbutton). (N/A other Unit)

Relay	INITIALS
[1-RLY-085-DF/3B/A] (67A)	________
[1-RLY-085-DF/3B/C] (67C)	________
[2-RLY-085-DH/3B/A] (67A)	________
[2-RLY-085-DH/3B/C] (67C)	________

[4] **ENSURE** targets for CRDM MG Set B Directional Overcurrent Relays are **RESET** (Mechanical Linkage on relay). (N/A other Unit)

Relay	INITIALS
[1-RLY-085-DF/3B/A] (67A)	________
[1-RLY-085-DF/3B/C] (67C)	________
[2-RLY-085-DH/3B/A] (67A)	________
[2-RLY-085-DH/3B/C] (67C)	________

[5] **PLACE** CRD MG Set B MOTOR Breaker 52B Circuit Control **[HS-85-1B]** in the **TRIP** position. ☐

[6] **VERIFY** MG Set B speed decreases. ☐

Unit________________ Date__________

8.2 Alternate Method of Paralleling MG Set B (Continued)

[7] **IF** MG Sets are paralleled, **THEN**

[a] **PLACE** **[HS-85-22B]** Gen No. 2 SYNCHRONIZE Switch in the **OFF** position. ☐

[b] **ENSURE** target for CRD MG Set B Mtr Bkr 52B is RED by placing the MOTOR breaker circuit control **[HS-85-1B]** in the **CLOSE** position. ☐

[c] **IF** digital meters were used in section 6.2, **THEN**

1. **ENSURE** all digital meters are removed. _____ / _____ 1st CV

2. **ENSURE** the MG Set panel doors are closed. _____ / _____ 1st CV

[d] **ENSURE** target for CRD MG Set B Load (GENERATOR) Bkr 52-2 is RED by placing the GENERATOR breaker circuit control in the **CLOSE** position. ☐

[8] **IF** MG Set B does NOT parallel, **THEN**

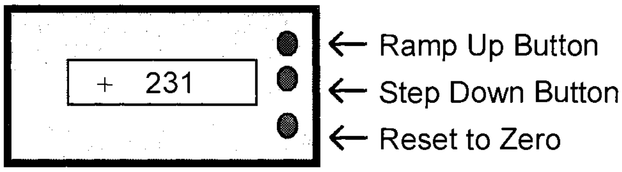
REPEAT Section 6.2 as required to synchronize MG Sets . __________

[9] **CHECK** all Power, Logic, and Hold cabinets for alarm lights. ☐

End of Section 8.2

Unit__________ Date__________

8.3 Resetting Step Counters After Withdrawing Rods Above 231 Steps



LCD Step Counter

[1] **DEPRESS** the affected group step counter "Step Down Button" to obtain 231 on display. _______

[2] **IF** the affected bank is a control bank, **THEN**

NOTIFY IMs to:

- [a] **UPDATE** the Pulse-to-Analog converter. ☐
- [b] **CHECK** the bank overlap unit in the logic cabinet. ☐
- [c] **CHECK** Master Cycler and **UPDATE** as needed. ☐

____

[3] **ENSURE** Plant computer points for rod bank position are **UPDATED** using the following computer points:

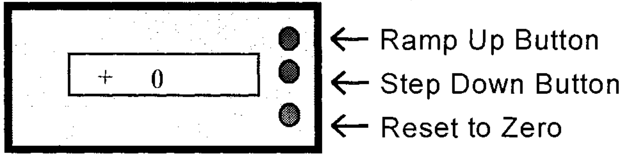
COMPUTER PT	ROD BANK	√
U0049	Control A	☐
U0050	Control B	☐
U0051	Control C	☐
U0052	Control D	☐
U0053	Shutdown A	☐
U0054	Shutdown B	☐
U0055	Shutdown C	☐
U0056	Shutdown D	☐

____

End of Section 8.3

Unit__________ Date__________

8.4 Resetting Step Counters After Inserting Rods Below 0 Steps



LCD Step Counter

NOTE Depressing the "Ramp Up Button" will cause a rapid change in the display.

[1] **MOMENTARILY DEPRESS** the affected group step counter "Ramp Up Button" to obtain 0 on display. __________

[2] **IF** the affected bank is a control bank, **THEN**

NOTIFY IMs to:

- **[a]** **UPDATE** the Pulse-to-Analog converter. ☐
- **[b]** **CHECK** the bank overlap unit in the logic cabinet. ☐
- **[c]** **CHECK** Master Cycler and **UPDATE** as needed. ☐

____

[3] **ENSURE** Plant computer points for rod bank position are **UPDATED** using the following computer points:

COMPUTER PT	ROD BANK	√
U0049	Control A	☐
U0050	Control B	☐
U0051	Control C	☐
U0052	Control D	☐
U0053	Shutdown A	☐
U0054	Shutdown B	☐
U0055	Shutdown C	☐
U0056	Shutdown D	☐

____

End of Section 8.4

Unit____________ Date__________

8.5 Placing MG Set A In Service for Maintenance

[1] **ENSURE** clearance in place to isolate power to Rod Control coils on reactor head **AND** **RECORD** Hold Order Number. ______________ ___________

[2] **START** CRD MG Set A by placing **[HS-85-1A]** MOTOR Breaker 52A Circuit Control in the **CLOSE** position. ___________

NOTE Allow 15 seconds for the MG set to obtain full rated speed.

[3] **VERIFY** generator speed increasing. ___________

[4] **WHEN** generator has increased to full speed, **THEN**

[a] **DEPRESS AND HOLD** Gen Field Flash pushbutton. ___________

[b] **WHEN** voltage is > 250 volts, **THEN** **RELEASE** Gen Field Flash pushbutton. ___________

[5] **IF** Line Voltage of the MG set is **NOT** between 255 and 270 volts (260 volts is nominal), **THEN**

ADJUST voltage with WTV Reg to a nominal 260 volts. ___________

NOTE Voltage may vary slightly between phases.

[6] **CHECK** voltage approximately equal on all phases using voltmeter selector switch. ___________

Unit_____________ Date_________

8.5 Placing MG Set A In Service for Maintenance(Continued)

[7] **WHEN** Maintenance requires MG Set A Load Breaker to be closed, **THEN** **PERFORM** the following:

NOTE Both MG Set Load Breakers must be **RACKED IN** prior to closing the running MG Set Load Breaker.

[a] **ENSURE** MG Set A Load (GENERATOR) Breaker 52-1 [BCTF-85-12] is **RACKED IN**. _________

[b] **ENSURE** MG Set B Load (GENERATOR) Breaker 52-2 [BCTF-85-22] is **RACKED IN**. _________

[c] **ENSURE** CRDM MG Set A Directional Overcurrent Relay Target Coils are **RESET** (Panel Pushbutton). (N/A other Unit)

Relay	INITIALS
[1-RLY-085-DE/4D/A] (67A)	_________
[1-RLY-085-DE/4D/C] (67C)	_________
[2-RLY-085-DG/4D/A] (67A)	_________
[2-RLY-085-DG/4D/C] (67C)	_________

[d] **ENSURE** targets for CRDM MG Set A Directional Overcurrent Relays are **RESET** (Mechanical Linkage on relay). (N/A other Unit)

Relay	INITIALS
[1-RLY-085-DE/4D/A] (67A)	_________
[1-RLY-085-DE/4D/C] (67C)	_________
[2-RLY-085-DG/4D/A] (67A)	_________
[2-RLY-085-DG/4D/C] (67C)	_________

Unit_____________ Date_________

8.5 Placing MG Set A In Service for Maintenance(Continued)

NOTE Generator voltage will drop slightly as the electrical load increases.

[e] **CLOSE** MG Set A Load (GENERATOR) Breaker 52-1 **USING** **[HS-85-12]**. __________

[f] **IF** MG Set A Load breaker 52-1 trips due to Directional Overcurrent Relay operation, **THEN**

- **[1]** **RESET** Directional Overcurrent Relays with Relay Target Reset Button on Relay panel. __________
- **[2]** **RESET** Directional Overcurrent Relay Targets. __________
- **[3]** **RECLOSE** MG Set A load Breaker 52-1 **USING [HS-85-12]**. __________
- **[4]** **IF** another trip of breaker 52-1 occurs, **THEN** **REPEAT** substeps **[a], [b]** and **[c].** __________
- **[5]** **IF** breaker 52-1 trips the third time, **THEN** **NOTIFY** SM and System Engineering for assistance. __________

[8] **WHEN** MAINTENANCE requires reactor trip/bypass breakers to be closed, **THEN** **PERFORM** the following:

[a] **ENSURE** **[1CB]**, Auxiliary 150-VAC Supply to Rod Drive System is **CLOSED**. (located in Panel L-115). __________

[b] **ENSURE** lift coil disconnect switches, for Control Rods and Shutdown Rods are in the **CONNECTED** position (located on M-8). __________

Unit______________ Date__________

8.5 Placing MG Set A In Service for Maintenance(Continued)

CAUTION **ROD CONTROL STARTUP STEP COUNTER RESET (SUS on M-4) should never be held in STARTUP position for any extended period of time. Holding this switch in STARTUP position may cause damage to the counters.**

[c] **MOMENTARILY PLACE [SUS]**, Rod Control Startup Step Counter Reset to the **STARTUP** position to reset Control Rod Drive System, **AND**
VERIFY group step counters are at zero steps. ___________

[d] **ENSURE** Reactor Trip Bypass breakers are in required alignment per Maintenance Procedure:

BYPASS BREAKER	RACKED IN (√)	RACKED OUT (√)
BYA	☐	☐
BYB	☐	☐

____

[e] **ENSURE** Reactor Trip breakers are in required alignment per Maintenance Procedure:

TRIP BREAKER	RACKED IN (√)	RACKED OUT (√)
RTA	☐	☐
RTB	☐	☐

____

[f] **ENSURE** control power is **ON** by GREEN indicating lights on M-4: (NA breakers not racked in)

BREAKER	GREEN LIGHT	INITIALS
RTA	ON	________
RTB	ON	________
BYA	ON	________
BYB	ON	________

Unit______________ Date_________

8.5 Placing MG Set A In Service for Maintenance(Continued)

[g] **ENSURE** Rod Control switch [HS-85-5111] is in **MID** position. __________

[h] **IF** unit is in Mode 3,**THEN**
ENSURE requirements of Tech Spec 3.4.1.2 are met. __________

[i] **DEPRESS** and **HOLD** FW Isol Reset pushbuttons [HS-3-99A] and [HS-3-99B].**[C.1]** __________

[j] **IF** maintenance being performed on Unit 1, **THEN**
CLOSE Rx Trip Breakers by placing [1-RT-1],
to **CLOSE** position. _________

[k] **IF** maintenance being performed on Unit 2, **THEN**
CLOSE Rx Trip Breakers by placing [2-HS-99-7],
to **CLOSE** position. _________

[l] **VERIFY** Reactor Trip Breakers/Reactor Trip Bypass breakers **CLOSED** by RED indicating lights on M-4:
(NA breakers not closed)

BREAKER	RED LIGHT	INITIALS
RTA	ON	________
RTB	ON	________
BYA	ON	________
BYB	ON	________

[m] **RELEASE** FW Isol Reset pushbuttons [HS-3-99A] and [HS-3-99B].**[C.1]** _________

[n] **NOTIFY** IMs to perform 1,2-PI-IFT-099-0P4.0, Verification of P4 Contacts. _________

Unit______________ Date_________

8.5 Placing MG Set A In Service for Maintenance(Continued)

[9] **WHEN** desired to shutdown MG Set A, **THEN PERFORM** the following:

NOTE The MG set Load Breakers may trip open when the reactor trip breakers are opened due to the vibration problem on the Directional Overcurrent Relay contacts.

[a] **IF** the reactor trip breakers are **CLOSED, THEN**

1. **DEPRESS AND HOLD** Feedwater Isolation Reset Pushbuttons [HS-3-99A] and [HS-3-99B]. ___________
2. **OPEN** the reactor trip breakers. ___________
3. **RELEASE** Feedwater Isolation Reset Pushbuttons [HS-3-99A] and [HS-3-99B]. ___________

[b] **OPEN** MG Set **A** Load (GENERATOR) Breaker **52-1** **USING** [HS-85-12]. ___________

NOTE Voltage will be maintained for a short time after opening the motor circuit breaker due to an intended time delay.

[c] **STOP** CRD MG Set **A** by placing MOTOR Breaker **52A** Circuit Control in the **TRIP** position **USING** [HS-85-1A]. ___________

[d] **VERIFY** MG Set A speed decreases. ___________

Unit______________ Date__________

8.5 Placing MG Set A In Service for Maintenance(Continued)

NOTE The following step maybe NA if returned to normal by the clearance process.

[10] **WHEN** maintenance complete, **AND** Reactor Trip and Bypass breakers ready to return to normal, **THEN**

PERFORM the following:

[a] **ENSURE** Reactor Trip Bypass breakers BYA and BYB are **OPEN** and **RACKED OUT**.

BYPASS BREAKER	OPEN (√)	RACKED OUT (√)
BYA	☐	☐
BYB	☐	☐

____

[b] **ENSURE** Reactor Trip breakers are **RACKED IN**:

TRIP BREAKER	RACKED IN (√)
RTA	☐
RTB	☐

____

[c] **NOTIFY** IMs to perform 1,2-PI-IFT-099-0P4.0, Verification of P4 Contacts. __________

End of Section 8.5

Unit_______________ Date__________

8.6 Placing MG Set B In Service for Maintenance

[1] **ENSURE** clearance in place to isolate power to Rod Control coils on reactor head **AND** **RECORD** Hold Order Number. _______________ ____________

[2] **START** CRD MG Set B by placing **[HS-85-1B]** MOTOR Breaker 52B Circuit Control in the **CLOSE** position. ☐

NOTE Allow 15 seconds for the MG set to obtain full rated speed.

[3] **VERIFY** generator speed increasing. ____________

[4] **WHEN** generator has increased to full speed, **THEN**

  [a] **DEPRESS AND HOLD** Gen Field Flash pushbutton. ____________

  [b] **WHEN** voltage is > 250 volts, **THEN** **RELEASE** Gen Field Flash pushbutton. ____________

[5] **IF** Line Voltage of the MG set is **NOT** between 255 and 270 volts (260 volts is nominal), **THEN**

ADJUST voltage with WTV Reg to a nominal 260 volts. ____________

NOTE Voltage may vary slightly between phases.

[6] **CHECK** voltage approximately equal on all phases using voltmeter selector switch. ____________

Unit_______________ Date__________

8.6 Placing MG Set B In Service for Maintenance

[7] **WHEN** Maintenance requires MG Set B Load Breaker to be closed **THEN PERFORM** the following:

NOTE Both MG Set Load Breakers must be **RACKED IN** prior to closing the running MG Set Load Breaker.

[a] **ENSURE** MG Set A Load (GENERATOR) Breaker 52-1 **[BCTF-85-12]** is **RACKED IN**. ________

[b] **ENSURE** MG Set B Load (GENERATOR) Breaker 52-2 **[BCTF-85-22]** is **RACKED IN**. ________

[c] **ENSURE** CRDM MG Set B Directional Overcurrent Relay Target Coils for are **RESET** (Panel Pushbutton). (N/A other Unit)

Relay	INITIALS
[1-RLY-085-DF/3B/A] (67A)	________
[1-RLY-085-DF/3B/C] (67C)	________
[2-RLY-085-DH/3B/A] (67A)	________
[2-RLY-085-DH/3B/C] (67C)	________

[d] **ENSURE** targets for CRDM MG Set B Directional Overcurrent Relays are **RESET** (Mechanical Linkage on relay). (N/A other Unit)

Relay	INITIALS
[1-RLY-085-DF/3B/A] (67A)	________
[1-RLY-085-DF/3B/C] (67C)	________
[2-RLY-085-DH/3B/A] (67A)	________
[2-RLY-085-DH/3B/C] (67C)	________

Unit________________ Date__________

8.6 Placing MG Set B In Service for Maintenance

NOTE Generator voltage will drop slightly as the electrical load increases.

[e] **CLOSE** MG Set B Load (GENERATOR) Breaker 52-2 **USING** [HS-85-22]. ___________

[f] **IF** MG Set B Load breaker 52-2 trips due to Directional Overcurrent Relay operation, **THEN**

[1] **RESET** Directional Overcurrent Relays with Relay Target Reset Button on Relay panel. ___________

[2] **RESET** Directional Overcurrent Relay Targets. ___________

[3] **RECLOSE** MG Set A load Breaker 52-2. ___________

[4] **IF** another trip of breaker 52-2 occurs, **THEN REPEAT** substeps **[a], [b]** and **[c].** ___________

[5] **IF** breaker 52-2 trips the third time, **THEN NOTIFY** SM and System Engineering for assistance. ___________

[8] **WHEN** MAINTENANCE requires reactor trip/bypass breakers to be closed, **THEN**

PERFORM the following:

[a] **ENSURE** [1CB], Auxiliary 150-VAC Supply to Rod Drive System is **CLOSED**. (located in Panel L-115). ___________

[b] **ENSURE** lift coil disconnect switches, for Control Rods and Shutdown Rods are in the **CONNECTED** position (located on M-8). ___________

Unit_______________ Date__________

8.6 Placing MG Set B In Service for Maintenance

CAUTION ROD CONTROL STARTUP STEP COUNTER RESET (SUS on M-4) should never be held in STARTUP position for any extended period of time. Holding this switch in STARTUP position may cause damage to the counters.

[c] **MOMENTARILY PLACE [SUS]**, Rod Control Startup Step Counter Reset to the **STARTUP** position to reset Control Rod Drive System, **AND**
VERIFY group step counters are at zero steps. __________

[d] **ENSURE** Reactor Trip Bypass breakers are in required alignment per maintenance procedure.

BYPASS BREAKER	RACKED IN (√)	RACKED OUT (√)
BYA	☐	☐
BYB	☐	☐

____

[e] **ENSURE** Reactor Trip breakers are in required alignment per maintenance procedure.

TRIP BREAKER	RACKED IN (√)	RACKED OUT (√)
RTA	☐	☐
RTB	☐	☐

____

[f] **ENSURE** control power is **ON** by GREEN indicating lights on M-4: (NA breakers not racked in)

BREAKER	GREEN LIGHT	INITIALS
RTA	ON	________
RTB	ON	________
BYA	ON	________
BYB	ON	________

[g] **ENSURE** Rod Control switch **[HS-85-5111]** is in **MID** position. __________

Unit_____________ Date_________

8.6 Placing MG Set B In Service for Maintenance

[h] **IF** unit is in Mode 3,**THEN**
ENSURE requirements of Tech Spec 3.4.1.2 are met. _________

[i] **DEPRESS** and **HOLD** FW Isol Reset pushbuttons
[HS-3-99A] and **[HS-3-99B]**.**[C.1]** _________

[j] **IF** maintenance being performed on Unit 1, **THEN**
CLOSE Rx Trip Breakers by placing **[1-RT-1]**,
to **CLOSE** position. _________

[k] **IF** maintenance being performed on Unit 2, **THEN**
CLOSE Rx Trip Breakers by placing **[2-HS-99-7]**,
to **CLOSE** position. _________

[l] **VERIFY** Reactor Trip Breakers/Reactor Trip Bypass breakers **CLOSED** by RED indicating lights on M-4: (NA breakers not closed)

BREAKER	RED LIGHT	INITIALS
RTA	ON	_________
RTB	ON	_________
BYA	ON	_________
BYB	ON	_________

[m] **RELEASE** FW Isol Reset pushbuttons **[HS-3-99A]** and
[HS-3-99B].**[C.1]** _________

[n] **NOTIFY** IMs to perform 1,2-PI-IFT-099-0P4.0, Verification of P4 Contacts. _________

Unit_____________ Date_________

8.6 Placing MG Set B In Service for Maintenance

[9] **WHEN** desired to shutdown MG Set B, **THEN** **PERFORM** the following:

NOTE The MG set Load Breakers may trip open when the reactor trip breakers are opened due to the vibration problem on the Directional Overcurrent Relay contacts.

[a] **IF** the reactor trip breakers are **CLOSED, THEN**

1. **DEPRESS AND HOLD** Feedwater Isolation Reset Pushbuttons **[HS-3-99A]** and **[HS-3-99B]** __________
2. **OPEN** the reactor trip breakers. __________
3. **RELEASE** Feedwater Isolation Reset Pushbuttons **[HS-3-99A]** and **[HS-3-99B]** __________

[b] **OPEN** MG Set B Load (GENERATOR) Breaker **52-2** **USING** **[HS-85-22]**. __________

NOTE Voltage will be maintained for a short time after opening the motor circuit breaker due to an intended time delay.

[c] **STOP** CRD MG Set B by placing MOTOR Breaker **52B** Circuit Control in the **TRIP** position. **USING** **[HS-85-1B]**. __________

[d] **VERIFY** MG Set B speed decreases. __________

Unit_______________ Date__________

8.6 Placing MG Set B In Service for Maintenance

NOTE The following step maybe NA if returned to normal by the clearance process.

[10] **WHEN** maintenance complete **AND** Reactor Trip and Bypass breakers ready to return to normal, **THEN PERFORM** the following:

[a] **ENSURE** Reactor Trip Bypass breakers BYA and BYB are **OPEN** and **RACKED OUT**.

BYPASS BREAKER	OPEN (√)	RACKED OUT (√)
BYA	☐	☐
BYB	☐	☐

____

[b] **ENSURE** Reactor Trip breakers are **RACKED IN**:

TRIP BREAKER	RACKED IN (√)
RTA	☐
RTB	☐

____

[c] **NOTIFY** IMs to perform 1,2-PI-IFT-099-0P4.0, Verification of P4 Contacts. ___________

End of Section 8.6

9.0 RECORDS

A. Completed copies of sections shall be transmitted to the Operations Superintendent's Secretary.

SOURCE NOTES

Page 1 of 1

IMPLEMENTING STATEMENT	REQUIREMENTS DOCUMENT	REQUIREMENTS STATEMENT
[C.1]	NCO0940183003 SQ94026311 LER327/94005	Revised procedure to require feedwater isolation reset buttons to be held during closure of reactor trip breakers.
[C.2]	LER328/94008	Revised procedure to operate the thrust switch in a more conservative method to minimize the possibility of step deviations greater than two steps during initial rod movement.

SIM JPM B.1.d

SEQUOYAH NUCLEAR PLANT
JOB PERFORMANCE MEASURE

B.1.d
JPM

FILLING AND VENTING EXCESS LETDOWN

**PREPARED/
REVISED BY:** ______________________ Date/ ________

VALIDATED BY: * ______________________ Date/ ________

APPROVED BY: ______________________ Date/ ________
(Operations Training Manager)

CONCURRED: ** ______________________ Date/ ________
(Operations Representative)

* Validation not required for minor enhancements, procedure Rev changes that do not affect the JPM, or individual step changes that do not affect the flow of the JPM.
** Operations Concurrence required for new JPMs and changes that affect the flow of the JPM (if not driven by a procedure revision).

NUCLEAR TRAINING

REVISION/USAGE LOG

REVISION NUMBER	DESCRIPTION OF REVISION	V	DATE	PAGES AFFECTED	PREPARED/ REVISED BY:
0	New	Y		All	

V - Specify if the JPM change will require another validation (Y or N).
See cover sheet for criteria.

SEQUOYAH NUCLEAR PLANT
RO/SRO
JOB PERFORMANCE MEASURE

Task:

Filling and Venting Excess Letdown

JA/TA task:

\# 0040160101(**RO**) Place Excess Letdown in Service

K/A Ratings:

004 Chemical And Volume Control System
A4 Ability to manually operate and/or monitor in the control room (CFR 41.7 / 45.5 to 45.8)
A4.06 Letdown isolation and flow control valves 3.6 / 3.1

Task Standard:

1) Excess letdown is filled and vented in accordance with 1-SO-62-6, Excess Letdown, section 8.1

Evaluation Method : Simulator __X__ In-Plant ________

==

Performer: __________________________________ Start Time ________
NAME

Performance Rating : SAT _____ UNSAT _____ Performance Time _____ Finish Time _______

Evaluator: ______________________________/________
SIGNATURE DATE

==

COMMENTS

____

____

____

____

____

____

____

____

SPECIAL INSTRUCTIONS TO EVALUATOR:

1. Sequenced steps identified by an "s"
2. Any UNSAT requires comments
3. This task is to be performed using the simulator in IC 6.
4. Ensure operator performs the following required actions for **SELF-CHECKING;**
   a. Identifies the correct unit, train, component, etc.
   b. Reviews the intended action and expected response.
   c. Compares the actual response to the expected response.

Validation Time: CR. 9 min **Local** ___________

Tools/Equipment/Procedures Needed:

1-SO-62-6

References:

	Reference	Title	Rev No.
1.	1-SO-62-6	Excess Letdown	16

==

READ TO OPERATOR

Directions to Trainee:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. Plant is in Mode 3.
2. Excess letdown system has been out of service for maintenance.
3. The work is complete and the system is ready to be filled and vented.
2. You are an extra RO on shift

INITIATING CUES:

1. The SRO has directed you to fill and vent Excess Letdown.
2. You are to notify the SRO when you have completed filling and venting Excess Letdown in accordance with 1-SO-62-6, Excess Letdown.
3. Section 4, Prerequisites Actions, has been completed.

STEP/STANDARD	SAT/UNSAT
STEP 1.: Obtain the appropriate procedure. STANDARD: Operator identifies 1-SO-62-6 and goes to section 8.1 "Filling and Venting Excess Letdown". COMMENTS:	___ SAT ___ UNSAT Start Time____
STEP 2.: **NOTE** An AUO at panel 0-L-2 will be needed to observe an increase in the RCDT level. ***Cue: When AUO is directed to 0-L-2, Acknowledge the direction*** STANDARD: An AUO is directed to be stationed at panel 0-L-2 to observe RCDT level. COMMENTS:	___ SAT ___ UNSAT
STEP 3.: **[1] ENSURE [1-FCV-70-143]** CCS water to Excess Letdown Heat Exchanger is **OPEN**. STANDARD: Candidate determines 1-FCV-70-143 is open by the red light lit above 1-HS-70-143A, EXCESS LETDOWN HX INLET ISOL, on 0-M-27B. COMMENTS:	___ SAT ___ UNSAT
STEP 4.: **[2] OPEN [1-FCV-70-85]** Excess Letdown Heat Exchanger CCS Flow Control. STANDARD: Candidate places 1-HS-70-85A, EXCESS LETDOWN HX OUTLET ISOL, to the OPEN position on 0-M-27B and Holds until the valve is full open (red light is lit and the green light light is dark.) COMMENTS:	___ SAT ___ UNSAT **Critical Step**

STEP/STANDARD	**SAT/UNSAT**
STEP 5.: **[3] PLACE [1-FCV-62-59]** Excess Letdown 3-way Divert Valve in **DIVERT**. STANDARD: Candidate places 1-HS-62-59, EXCESS LTDN DIVERT, to the DIVERT position on 1-M-5. Right side red light will be lit, left side red light will be dark. COMMENTS:	___ SAT ___ UNSAT **Critical Step**
STEP 6.: **[4] OPEN [1-FCV-62-54]** Cold Leg Loop #3 Excess Letdown Isolation Valve. STANDARD: Candidate places 1-HS-62-54A, Excess Letdown Isolation, to the OPEN position on 1-M-5. Red light above handswitch will be lit. COMMENTS:	___ SAT ___ UNSAT **Critical Step**
STEP 7.: **[5] OPEN [1-FCV-62-55]** Excess Letdown Containment Isolation Valve. STANDARD: Candidate places 1-HS-62-55A, Excess Letdown Isolation, to the OPEN position on 1-M-5. Red light above handswitch will be lit. COMMENTS:	___ SAT ___ UNSAT **Critical Step**

STEP/STANDARD	SAT/UNSAT
STEP 8.: **[6] OPEN [1-FCV-62-56]** Excess Letdown Flow Control Valve. **Note: The procedure contains this note prior to the step** **“NOTE** At the completion of step **[6]** a timed duration will be initiated.” ***Cue: After the FCV is opened, state that 5 minutes has elapsed.*** STANDARD: Candidates rotates handswitch 1-HIC-62-56, Excess LTDN Flow Control Valve, to the counter-clockwise to greater than the ‘0” position on 1-M-5. Evaluator Note: *Temperature and pressure rise will be indicated on 1-TI-62-58 and 1-PI-62-57 respectively* ***Cue: If Excess Letdown Hx Temp alarm comes in, state that the temperature is high but has stabilized.*** COMMENTS:	___ SAT ___ UNSAT **Critical Step**
STEP 9.: [7] **OBSERVE** level increase in RCDT for 5 minutes ***Cue: When AUO contacted, state “The RCDT level has been continuously increasing for the last 5 minutes”*** STANDARD: AUO is contacted to monitor RCDT level. (RDCT level can also be monitored on the ICS) COMMENTS:	___ SAT ___ UNSAT
STEP 10.: 8] **WHEN** 5 minutes has elapsed, **THEN CLOSE [1-FCV-62-56]** Excess Letdown Flow Control Valve. STANDARD: Candidates rotates handswitch 1-HIC-62-56, Excess LTDN Flow Control Valve, on 1-M-5, clockwise to the ‘0” position. COMMENTS:	___ SAT ___ UNSAT **Critical Step**

Job Performance Checklist

STEP/STANDARD **SAT/UNSAT**

STEP 11.: **[9] CLOSE** the following valves:

VALVE	IDENTIFICATION	INITIALS
1-FCV-62-55	Excess Letdown Containment Isolation	___ 1st ___ IV
1-FCV-62-54	Cold Leg Loop #3 Excess Letdown Isolation	___ 1st ___ IV
1-FCV-70-85	Excess Letdown Heat Exchanger CCS FCV	___ 1st ___ IV

Cue: If IV is requested, state "An individual will be assigned to performed the IV"

STANDARD: Candidate closes the the listed valves by placing the respective handswitches (1-HS-62-55 & 1-HS-62-54 on 1-M-5, and 1-HS-70-85 on 0-M-27B) to the CLOSE position. Red light will go dark and green light will be lit.

COMMENTS:

___ SAT

___ UNSAT

Critical Step

STEP 12.: **[10] PLACE [1-FCV-62-59]** Excess Letdown 3-way Divert Valve in **NORMAL**.

STANDARD: Candidate places 1-HS-62-59, EXCESS LTDN DIVERT, on 1-M-5 to the NORMAL position. Right side red light will be dark, left side red light will be lit.

COMMENTS:

___ SAT

___ UNSAT

Critical Step

STEP 13.: Notifcation of completion of 1-SO-62-7 is made to the SRO.

STANDARD: SRO is notified that Excess Letdown is filled and vented.

COMMENTS:

___ SAT

___ UNSAT

Stop Time____

End of JPM

CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

DIRECTION TO TRAINEE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. Plant is in Mode 3.
2. Excess letdown system has been out of service for maintenance.
3. The work is complete and the system is ready to be filled and vented.
2. You are an extra RO on shift.

INITIATING CUES:

1. The SRO has directed you to fill and vent Excess Letdown.
2. You are to notify the SRO when you have completed filling and venting Excess Letdown in accordance with 1-SO-62-6, Excess Letdown.
3. Section 4, Prerequisites Actions, has been completed.

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT

SYSTEM OPERATING INSTRUCTION

1-SO-62-6

EXCESS LETDOWN

Revision 16

QUALITY RELATED

PREPARED/PROOFREAD BY: MS LEENERTS

RESPONSIBLE ORGANIZATION: OPERATIONS

APPROVED BY: W. T. LEARY

EFFECTIVE DATE: 06/05/07

LEVEL OF USE: **CONTINUOUS USE**

REVISION DESCRIPTION: Revised Attachment 2 to change position of 1-70-702C from CLOSED & CAPPED to LOCKED CLOSED & CAPPED and changed verification from IV to CV (NB070420).

THIS PROCEDURE COULD AFFECT REACTIVITY

TABLE OF CONTENTS
Page 1 of 1

1.0 INTRODUCTION

1.1 Purpose

To provide instructions for the operation of excess letdown.

1.2 Scope

A. Placing excess letdown in service.

B. Taking excess letdown out of service.

2.0 REFERENCES

2.1 Performance References

None.

2.2 Developmental References

A. SOI-62.1, *Chemical and Volume Control System*

B. 1-SO-62-1, *Chemical and Volume Control System*

C. TVA Drawings

  1. 47W809-1

  2. 47W859-2

D. SQN-VTM-1201-0010 Grinnell Valve vendor manual

3.0 PRECAUTIONS AND LIMITATIONS

A. Failure to observe all posted radiation control requirements may lead to unnecessary radiation absorbed doses.

B. When placing Excess Letdown in service to replace normal letdown, the charging flow temperature may cool enough to lower the RCS average temperature and may cause a change in reactivity.

C. The fluid outlet temperature of the excess letdown heat exchanger should not exceed 200°F. The maximum allowable temperature is 250°F.

D. While placing the excess letdown heat exchanger in service the RCP seal leakoff flow may fluctuate, therefore periodic monitoring should be maintained.

E. When Excess Letdown is placed in service an approximate increase of 100 CPM may be observed on 1-RM-90-106A. This elevated radiation monitor reading should start to trend back to normal after approximately one hour.

F. Operation of Excess Letdown with 1-TI-62-58 (Excess Letdn Temp) greater than 200°F will require that Systems Engineering be notified so that an evaluation of Grinnell valve maintenance can be conducted.

Date________

4.0 PREREQUISITE ACTIONS

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

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

[2] **VERIFY** CVCS system is in service in accordance with Valve Checklists 1-62-1.03 and 1-62-1.04. ________

[3] **ENSURE** Attachment 1, Power Checklist 1-62-6.01 has been completed. ________

[4] **ENSURE** Attachment 2, Valve Checklist 1-62-6.02 has been completed. ________

[5] **ENSURE** Precautions and Limitations, Section 3.0 have been reviewed. ________

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

Print Name	Initials
Chris Brooks	

[7] **INDICATE** below which performance section of this instruction will be used and the reason for this performance:

☐ 5.0 STARTUP/STANDBY READINESS

☐ 7.0 SHUTDOWN

☒ 8.0 INFREQUENT OPERATION

REASON: Sect. 8.1 → F+V Ex, LTPN,

____

Date__________

5.0 STARTUP/STANDBY READINESS

NOTE 1 When excess letdown is placed in service the containment radiation monitors may show some changes in particulate reading.

NOTE 2 Coordinate the following steps with AUO stationed at 0-L-2 to monitor RCDT for pump operation as required during the 50 gallon flush.

[1] **ENSURE** [1-FCV-62-93] is in **MANUAL** and

[a] OPERATE [1-FCV-62-93] **USING** [1-HIC-62-93A] as required to regulate charging flow to keep pressurizer level on program. __________

[b] OPERATE [1-FCV-62-89] **USING** [1-HIC-62-89A] as required to maintain RCP seal flows in limits. __________

[2] **NOTIFY** RADCON that Excess Letdown is being placed in service. __________

[3] **ENSURE** [1-FCV-70-143] CCS water to the excess letdown heat exchanger is **OPEN**. __________

[4] **ENSURE** [1-FCV-70-85] Excess Letdown Heat Exchanger CCS flow control valve is **OPEN**. __________

NOTE Step **[5]** will prevent subjecting the CVCS piping downstream of the Excess Letdown HX to a temperature above the design value.

[5] **ENSURE** [1-FI-70-84] is indicating greater than 230 gpm. __________

[6] **PLACE** [1-FCV-62-59] Excess Letdown 3-way Divert Valve in **DIVERT**. __________

Date__________

5.0 STARTUP/STANDBY READINESS(Continued)

CAUTION **FCV 62-63 has replaced RCP seal leak-off isolation valves as the primary means for isolating seal flow. The normal letdown path for excess letdown will not be available if FCV-62-63 is CLOSED.**

NOTE Back flow through the RCP seals will occur should the RCP seal leakoff isolation valves fail to their OPEN position on loss of air or electrical power.

[7] **IF** less than 100 psig in RCS and [1-FCV-62-63] is **CLOSED** and excess letdown will be aligned for NORMAL operation, **THEN**

[a] **ENSURE** the following are **CLOSED**:

VALVE ID	FUNCTION	INITIALS
1-FCV-62-53	RCP's Seal Bypass	________
1-FCV-62-9	No. 1 Seal Return	________
1-FCV-62-22	No. 2 Seal Return	________
1-FCV-62-35	No. 3 Seal Return	________
1-FCV-62-48	No. 4 Seal Return	________

[b] **ENSURE** [1-FCV-62-63] is **OPEN**. ________

[8] **OPEN** [1-FCV-62-54] Cold Leg Loop #3 Excess Letdown isolation valve. ________

[9] **OPEN** [1-FCV-62-55] Excess Letdown containment isolation valve. ________

Date__________

5.0 STARTUP/STANDBY READINESS(Continued)

NOTE ICS point 1L2400A or the AUO stationed at 0-L-2 can be used to monitor RCDT for level increase during the 50 gallon flush. Reference the RCDT Level vs Volume table in TI-28.

[10] **OPEN** [1-FCV-62-56] slowly to flush piping to RCDT. __________

[11] **WHEN** approximately 50 gallons have flushed, **THEN**

CLOSE [1-FCV-62-56], Excess Letdown Flow Control Valve.

__________ __________
1st IV

[12] **PLACE** [1-FCV-62-59] Excess Letdown 3-way Divert Valve in **NORMAL**.

__________ __________
1st IV

NOTE 1 Normally the temperature read on 1-TI-62-58 should be less than 200°F. If operation requires temperatures greater than 200°F, the pressure at 1-PI-62-64 (local indicator El. 690 Pnl L-46) should be less than 100 psig to protect the Grinnell valves.

NOTE 2 Operation above 200°F will require that Systems Engineering be notified to allow an evaluation of the need for valve maintenance.

[13] **OPEN** [1-FCV-62-56] slowly to increase excess letdown flow to desired amount, not to exceed 240°F heat exchanger outlet temperature, as indicated on 1-TI-62-58. __________

NOTE Placing Excess Letdown in service causes increased activity in various areas of the Auxiliary Building.

[14] **NOTIFY** RADCON that Excess Letdown has been placed in service. __________

END OF TEXT

6.0 NORMAL OPERATION

None.

Date__________

7.0 SHUTDOWN

[1] **IF** letdown is to be placed in service, **THEN**

RETURN to service per 1-SO-62-1. __________

[2] **CLOSE** **[1-FCV-62-56]** Excess Letdown Heat Exchanger outlet valve. ________ 1st ________ IV

[3] **VERIFY** **[1-FCV-62-59]** Excess Letdown 3-way valve in **NORMAL**. ________ 1st ________ IV

[4] **CLOSE** **[1-FCV-62-55]** Excess Letdown containment isolation valve. ________ 1st ________ IV

[5] **CLOSE** **[1-FCV-62-54]** Cold Leg Loop #3 Excess Letdown valve. ________ 1st ________ IV

[6] **IF** charging is in service, **THEN**

ADJUST seal injection flow to 6-11 gpm using **[1-FCV-62-89]**. __________

[7] **IF** auto operation is desired and system conditions will allow it, **THEN**

PLACE **[1-FCV-62-93]** in **AUTO**. __________

[8] **NOTIFY** RADCON that Excess Letdown is REMOVED from SERVICE. __________

Date__________

7.0 SHUTDOWN

[9] **ENSURE** [1-FCV-70-85] Excess Letdown HX CCS Flow Control Valve is **CLOSED**.

________ 1st ________ IV

[10] **ENSURE** [1-HS-70-85A] is in the **A-AUTO** position.

________ 1st ________ IV

[11] **IF** operation at greater than 200 °F has occurred, **THEN**

CONTACT Systems Engineering to evaluate Grinnell valve maintenance requirements. __________

END OF TEXT

Date__________

8.0 INFREQUENT OPERATION

8.1 Filling and Venting Excess Letdown

NOTE An AUO at panel 0-L-2 will be needed to observe an increase in the RCDT level.

[1] **ENSURE** [1-FCV-70-143] CCS water to Excess Letdown Heat Exchanger is **OPEN**. __________

[2] **OPEN** [1-FCV-70-85] Excess Letdown Heat Exchanger CCS Flow Control. __________

[3] **PLACE** [1-FCV-62-59] Excess Letdown 3-way Divert Valve in **DIVERT**. __________

[4] **OPEN** [1-FCV-62-54] Cold Leg Loop #3 Excess Letdown Isolation Valve. __________

[5] **OPEN** [1-FCV-62-55] Excess Letdown Containment Isolation Valve. __________

NOTE At the completion of step **[6]** a timed duration will be initiated.

[6] **OPEN** [1-FCV-62-56] Excess Letdown Flow Control Valve. __________

[7] **OBSERVE** level increase in RCDT for 5 minutes. __________

[8] **WHEN** 5 minutes has elapsed, **THEN**

CLOSE [1-FCV-62-56] Excess Letdown Flow Control Valve. __________ __________

1st IV

Date__________

8.1 Filling and Venting Excess Letdown (Continued)

[9] **CLOSE** the following valves:

VALVE	IDENTIFICATION	INITIALS
1-FCV-62-55	Excess Letdown Containment Isolation	______ ______ 1st IV
1-FCV-62-54	Cold Leg Loop #3 Excess Letdown Isolation	______ ______ 1st IV
1-FCV-70-85	Excess Letdown Heat Exchanger CCS FCV	______ ______ 1st IV

[10] **PLACE [1-FCV-62-59]** Excess Letdown 3-way Divert Valve in **NORMAL**.

________ ________
1st IV

END OF TEXT

9.0 RECORDS

Completed copies of all Sections shall be transmitted to the Operations Superintendents Secretary.

SIM JPM B.1.e

SEQUOYAH NUCLEAR PLANT
JOB PERFORMANCE MEASURE

B.1.e

JPM # 75-AP

Steam Generator Tube Rupture (With MSIV Failure to Close)

PREPARED/ REVISED BY: ______________________ Date/ __________

VALIDATED BY: * ______________________ Date/ __________

APPROVED BY: ______________________ Date/ __________
(Operations Training Manager)

CONCURRED: ** ______________________ Date/ __________
(Operations Representative)

* Validation not required for minor enhancements, procedure Rev changes that do not affect the JPM, or individual step changes that do not affect the flow of the JPM.
** Operations Concurrence required for new JPMs and changes that affect the flow of the JPM (if not driven by a procedure revision).

NUCLEAR TRAINING

REVISION/USAGE LOG

REVISION NUMBER	DESCRIPTION OF REVISION	V	DATE	PAGES AFFECTED	PREPARED/ REVISED BY:
3	Transfer from WP. Minor enhancements.	N	10/15/94	All	HJ Birch
4	Incorporate Rev B changes. Changed to S/G #1 to force swap of TDAFW steam supply.	Y	9/16/95	All	HJ Birch
pen/ink	Added closed, to verify Atm Relief vlvs in auto. Also enhance standard for MSIV bypasses not a JPM critical task.	N	12/7/95	5, 6	HJ Birch
	E-0 Rev chg only.	N	2/6/97	4	HJ Birch
pen/ink	E-0 revision had no impact	N	8/11/98	All	JP Kearney
pen/ink	E-0 Rev chg only.	N	9/23/99	4	SR Taylor
pen/ink	E-0 Rev 22 chg only. E-3 Rev 12 minor changes	N	09/05/01	ALL	WR Ramsey
5	Incorporated pen/ink changes	N	8/22/02	All	J P Kearney
6	Updated to current revision and IC.	N	8/10/04	All	MG Croteau
7	Updated references and reordered steps to conform to the latest revision to E-3. Deleted Critical Step 9 as this step was deleted from the procedure	N	10/28/2005	ALL	JJ Tricoglou
8	Update to E-3 rev 17, added candidate handout sheet, modified instructions and steps to reflect instruction revision and provide clarity.	N		All	

V - Specify if the JPM change will require another validation (Y or N).
See cover sheet for criteria.

SEQUOYAH NUCLEAR PLANT
RO/SRO
JOB PERFORMANCE MEASURE

Task:

Steam Generator Tube Rupture (With MSIV Failure to Close)

JA/TA task # : 0000380501 (**RO**)

K/A Ratings:

038EA1.32 (4.6 - 4.7)

Task Standard:

Steam Generator #1 isolated per E-3.

Evaluation Method : Simulator __X__ In-Plant ________

==

Performer: ________________________________
NAME

Start Time ________

Performance Rating : SAT _____ UNSAT _____ Performance Time _____

Finish Time _______

Evaluator: ______________________________ / ________
SIGNATURE DATE

==

COMMENTS

____

____

____

____

____

____

____

____

SPECIAL INSTRUCTIONS TO EVALUATOR:

1. Sequenced steps identified by an "s"
2. Any UNSAT requires comments
3. Initialize simulator in IC #175.
4. If snapshot unavailable, then Initialize simulator in IC # 16 and Insert the following:
   a. Activate malfunction **IMF TH05A f:8.5** to initiate S/G tube rupture in S/G #1.
   b. Activate malfunction **IMF MS14A f:100**, to fail open S/G Loop 1 MSIV.
   c. Complete the actions of E-0 thru step 12, which will transition the crews to E-3
   d. Complete any required actions in ES-0.5. Including closing the TD AFW LCVs, but do not put handswitches in pull-to-lock.
   e. Complete the first three steps in E-3.
   f. Actuate a MANUAL reactor trip and safety injection, take all actions up through Step 3 of E-3.
5. Freeze the simulator until the operator is ready to begin the JPM.
6. Ensure operator performs the following required actions for **SELF-CHECKING;**
   a. Identifies the correct unit, train, component, etc.
   b. Reviews the intended action and expected response.
   c. Compares the actual response to the expected response.

Validation Time: CR. 12 mins **Local** ____________

Tools/Equipment/Procedures Needed:
E-3

References:

	Reference	Title	Rev No.
A.	E-0	Reactor Trip or Safety Injection	29
B.	ES-0.5	Equipment Verifications	0
C.	E-3	Steam Generator Tube Rupture	17

===

Directions to Trainee:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

Unit 1 has experienced a SGTR. A manual safety injection was initiated and E-0 implemented.

E-0 and ES-0.5 have been completed and a transition to E-3 has been made.

Steps 1 through 3 of E-3 have been completed and S/G #1 has been identified as the ruptured S/G.

INITIATING CUES:

You are the CRO and are directed to continue with the actions/responses of E-3, beginning at Step 4.

Inform the SRO when you are ready to determine the Target Core Exit Thermocouple temperature.

Job Performance Checklist:

STEP/STANDARD	SAT/UNSAT
STEP 1.: Obtain appropriate copy of procedure. STANDARD: Operator obtains a copy of E-3 and continues at step 4 as directed. COMMENTS:	___ SAT ___ UNSAT Start Time____
STEP 2.: [4.a] ADJUST Ruptured S/Gs atmospheric relief controller setpoint to 87% in AUTO. (1040 psig) STANDARD: Operator adjusts PIC-1-6A to 87% and ensures the controller is in auto. COMMENTS:	___ SAT ___ UNSAT **Critical Step**
STEP 3.: [4.b] CHECK Ruptured S/G atmospheric relief handswitch in P-AUTO and CLOSED. STANDARD: Operator checks S/G #1 atmospheric relief HS, FCV-1-6, on 1-M-4 in P-AUTO and checks green light LIT above handswitch. COMMENTS:	___ SAT ___ UNSAT
STEP 4: [4.c] CLOSE TD AFW pump steam supply from Ruptured S/G FCV-1-15 (S/G #1) or FCV-1-16 (S/G #4). STANDARD: Operator closes FCV-1-15 and verifies closed by GREEN light LIT ON 1-M-4 **[Critical part of step].** May verify that FCV-1-16, S/G #4, auto opens or may open valve manually, approx 1 minute later, with red light LIT, not critical). COMMENTS:	___ SAT ___ UNSAT **Critical Step**
STEP 4.: [4.d] VERIFY Ruptured S/G blowdown isolation valves Closed. STANDARD: Operator verifies FCV-1-7 and FCV-1-181 CLOSED as indicated by green indication lights above handswitch 1-HS-1-7/181 on 1-M-4. COMMENTS:	___ SAT ___ UNSAT

Job Performance Checklist:

STEP/STANDARD	**SAT/UNSAT**
STEP 5.: [4.e] CLOSE Ruptured S/G MSIV and MSIV Bypass Valve. **Note: S/G #1 MSIV will NOT close and the operator MUST go to the RNO column at this time.** STANDARD: Attempts to close MSIV FSV-1-4. Recognizes the MSIV failed to close, by the red light LIT, and goes to RNO to isolate the S/G. COMMENTS:	___ SAT ___ UNSAT
STEP 6.: [4.e.1] CLOSE Intact S/G MSIVs and MSIV bypass valves. ***Cue:*** ***When operator dispatches an AUO to close SG #1 MSIV with EA-1-1 acknowledge the direction.*** STANDARD: Operator closes intact S/G MSIVs and verifies their bypasses closed as indicated by blue and green lights LIT on HS-1-11,-22, & -29 MSIVs and Green lights LIT on HS-1-147,-148,-149,-150 bypasses. [Ensuring the bypasses closed is not a JPM critical task since valves are already closed.] COMMENTS:	___ SAT ___ UNSAT **Critical Step**
STEP 7.: [4.e.2] Dispatch operator to perform EA-1-1, Closing MSIVs Locally, for any MSIV or MSIV bypass valve which fails to close. ***Cue:*** ***If operator dispatches an AUO to close SG #1 MSIV with EA-1-1 acknowledge the direction.*** STANDARD: Operator dispatches an AUO to close MSIV FSV-1-4 using EA-1-1. COMMENTS:	___ SAT ___ UNSAT
STEP 8.: [4.e.3] Isolate steam header • PLACE Condenser steam dumps in OFF • ENSURE steam dump valves CLOSED. STANDARD: Operator verifies Condenser Steam dumps are closed as indicated by green position indicating lights LIT on 1-XX-55-4A and places the handswitch(s) 1-HS-1-103A and/or 1-HS-1-103B in the OFF position on 1-M-4. COMMENTS:	___ SAT ___ UNSAT **Critical Step**

Job Performance Checklist:

STEP/STANDARD	**SAT/UNSAT**
STEP 9.: CLOSE FCV-47-180, HP Steam Seal Supply Isolation STANDARD: Operator Verifies Steam seals closed as indicated by green light LIT on 1-HS-47-180 OR AUO dispatched to close local isolation valve on 1-M-2. COMMENTS:	___ SAT ___ UNSAT **Critical Step**
STEP 10.: ENSURE FCV-47-181, HP Steam Seal Supply Bypass CLOSED. STANDARD: Operator Verifies HP steam to MFW pump turbine closed as indicated by green light LIT on 1-HS-47-181 on 1-M-2. COMMENTS:	___ SAT ___ UNSAT
STEP 11.: CLOSE MSR HP Steam supply isolation valves. STANDARD: Operator closes HP steam to MSRs as indicated by green position indicating lights LIT on 1-XX-1-145, MSR HP Steam Supply Status, on 1-M-2 for each of the valves. Two valves on each of the six MSR's have to be closed from the handswitches on 1-M-2. COMMENTS:	___ SAT ___ UNSAT **Critical Step**
STEP 12.: DISPATCH operator to locally isolate steam header USING EA-1-4, Local Isolation of the Steam header in the Turb Bldg. ***Cue:*** ***When operator dispatches an AUO to isolate steam header USING EA-1-4, acknowledge the direction and provide feedback that the traps have been isolated per EA-1-4.*** STANDARD: Operator directs AUO to isolate the steam header traps per EA-1-4, Local Isolation of the Steam Header in Turb. Building. COMMENTS:	___ SAT ___ UNSAT **Critical Step**
STEP 13.: [4.e.4] USE intact S/Gs atmospheric relief for steam dumps. STANDARD: Operator addresses that the atmospheric reliefs will now have to use for RCS temp control. COMMENTS:	___ SAT ___ UNSAT

Job Performance Checklist:

STEP/STANDARD **SAT/UNSAT**

STEP 14.: [5] MONITOR Ruptured S/G level:

a. CHECK narrow range level greater than 10% [25% ADV]

b. WHEN ruptured S/G level is greater than 10% [25% ADV] THEN STOP feed flow to Ruptured S/G.

1) STOP feed flow to ruptured S/G

2) ENSURE Turbine Driven AFW LCV for ruptured S/G in CLOSE PULL TO LOCK.

___ SAT

___ UNSAT

Critical Step

Cue: ***IF level is <10 % state level is now 15%.***

STANDARD: Operator continues AFW flow to SG #1 until the level is $\geq$ 10% on LIS-3-42, 39, 38.
THEN the AFW flow is isolated to the SG #1 by closing the MD AFW and TD AFW level control valves.
MD AFW valves closed by depressing the push button on 1-HS-3-164A, then rotating the switch counterclockwise to the MANUAL or MANUAL BYPASS position and placing switch to RAMP CLOSED
TD AFW valve closed by momentarily placing 1-HS-3-174 to the CLOSE position and pulling out to PULL TO LOCK . (not critical)

Note: When valves are closed the green lights on XX-3-148 for SG #1 will be LIT.

COMMENTS:

STEP 15.: [6] **VERIFY** Rupture S/G ISOLATED from Intact S/G(s):

a. **CHECK** either of the following conditions SATISFIED:

- Rupture S/G MSIVs and MSIV bypass valves CLOSED

OR

- MSIVs and MSIV bypass valves CLOSED on Intact S/Gs to be used for cooldown.

___ SAT

___ UNSAT

STANDARD: Operator determines the intact S/G MSIVs are by the green lights LIT on handswitches 1-HS-1-11A, 1-HS-1-22A, and 1-HS-1-29A. Determines intact S/G MSIV bypasses are closed by green lights LIT on 1-HS-1-148, 1-HS-1-149, 1-HS-1-150

COMMENTS:

STEP 16.: b. **Check** S/G #1 or #4 S/G ruptured.

___ SAT

___ UNSAT

STANDARD: Operator determines S/G #1 is ruptured and continues to the next sub-step (6.c.).

COMMENTS:

Job Performance Checklist:

STEP/STANDARD	SAT/UNSAT
STEP 17.: c. **Check** TDAFW pump steam supply from ruptured S/G ISOLATED: • FCV-1-15 (S/G #1) or FCV-1-16 (S/G #4) CLOSED. STANDARD: Operator verifies FCV-1-15 closed by GREEN light LIT on handswitch. 1-HS-1-15A on 1-M-4 (Closed earlier in the JPM) COMMENTS:	___ SAT ___ UNSAT
STEP 18.: [7] CHECK Ruptured S/G pressure greater than 550 psig (Unit 1) or 425 psig (Unit 2) STANDARD: Operator determines the ruptured S/G (S/G #1) is greater than 500 psig as indicated on 1-PI-11-2A, 1-PI-11-2B, and 1-PI-11-5 COMMENTS:	___ SAT ___ UNSAT
STEP 19.: Notify SRO that the #1 S/G is isolated. STANDARD: Operator informs SRO that he/she is ready to determine the Target Core Exit Thermocouple temperature. COMMENTS:	___ SAT ___ UNSAT Stop Time____

END OF JPM

Directions to Trainee:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

Unit 1 has experienced a SGTR. A manual safety injection was initiated and E-0 implemented.

E-0 and ES-0.5 have been completed and a transition to E-3 has been made.

Steps 1 through 3 of E-3 have been completed and S/G #1 has been identified as the ruptured S/G.

INITIATING CUES:

You are the CRO and are directed to continue with the actions/responses of E-3, beginning at Step 4.

Inform the SRO when you are ready to determine the Target Core Exit Thermocouple temperature.

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT

EOI PROGRAM MANUAL

EMERGENCY PROCEDURE

E-3

STEAM GENERATOR TUBE RUPTURE

Revision **17**

QUALITY RELATED

PREPARED/PROOFREAD BY: D. A. PORTER

RESPONSIBLE ORGANIZATION: OPERATIONS

APPROVED BY: W. T. LEARY

EFFECTIVE DATE: 10/20/07

REVISION DESCRIPTION: Updated title of EA-201-3 (07000399). Clarified guidance on initiating cooldown with S/G atmospheric relief valves in Substep 8.c.RNO (07001129). Reworded Substep 4.e RNO for PER 127171 (07001167, 07001333, 07001569).

This procedure contains a Foldout Page and a Handout Page (2 copies).

FOLDOUT PAGE

SI REINITIATION CRITERIA

IF SI has been terminated **AND** either of the following conditions occurs:

- RCS subcooling based on core exit T/Cs less than 40 °F,

  OR

- Pressurizer level CANNOT be maintained greater than 10% [20% ADV],

THEN

a. **ESTABLISH** ECCS flow by performing one or both of the following:
   - **ESTABLISH** CCPIT flow as necessary **USING** Appendix C
   - **START** CCPs or SI pumps manually as necessary.

b. **GO TO** ECA-3.1, SGTR and LOCA - Subcooled Recovery.

EVENT DIAGNOSTICS

- **IF** both trains of shutdown boards deenergized,
  THEN
  GO TO ECA-0.0, Loss of All AC Power.

- **IF** any S/G pressure dropping in an uncontrolled manner or less than 140 psig
  AND S/G NOT isolated **AND** S/G NOT needed for RCS cooldown,
  THEN
  GO TO E-2, Faulted Steam Generator Isolation.

- **IF** any Intact S/G has level rising in an uncontrolled manner
  OR has abnormal radiation,
  THEN
  STOP any deliberate RCS cooldown or depressurization and
  GO TO E-3 Step 1.

TANK SWITCHOVER SETPOINTS

- **IF** CST level less than 5%,
  THEN
  ALIGN AFW suction to ERCW.

- **IF** RWST level less than 27%,
  THEN
  GO TO ES-1.3, Transfer to RHR Containment Sump.

HANDOUT

Page 1 of 3

STEP	ACTION
FOP	**IF** SI has been terminated **AND** either of the following conditions occurs: • RCS subcooling based on core exit T/Cs less than 40°F **OR** • Pzr level CANNOT be maintained greater than 10% [20% ADV], **THEN** **ESTABLISH** ECCS flow by performing one or both of the following: • **ESTABLISH** CCPIT flow as necessary **USING** Appendix C • **START** CCPs or SI pumps manually as necessary. **GO TO** ECA-3.1.
FOP	**IF** any S/G pressure dropping in an uncontrolled manner or less than 140 psig **AND** S/G NOT isolated **AND** S/G NOT needed for RCS cooldown, **THEN GO TO** E-2, Faulted Steam Generator Isolation.
FOP	**IF** any Intact S/G has level rising in an uncontrolled manner OR has abnormal radiation, **THEN STOP** any deliberate RCS cooldown or depressurization and **GO TO** E-3 Step 1.
FOP	**IF** CST level less than 5%, **THEN ALIGN** AFW suction to ERCW.
FOP	**IF** RWST level less than 27%, **THEN GO TO** ES-1.3, Transfer to RHR Containment Sump.
1.	**MONITOR** at least one RCP RUNNING.
1.b RNO	(If all RCPs stopped) **WHEN** step 32 completed OR E-3 exited, **THEN RESUME** monitoring ruptured loop T-cold.
2.	**MONITOR** RCP trip criteria: • At least one CCP or SI pump RUNNING **AND** RCS pressure less than 1250 psig .
3.	**MONITOR** indications of Ruptured S/G(s).
3.a RNO	**WHEN** ruptured S/G(s) identified, **THEN PERFORM** Steps 4 through 8.
4.b. RNO	**WHEN** Ruptured S/G(s) pressure less than 1040 psig, **THEN ENSURE** S/G atmospheric relief closed.
5.a RNO	**MAINTAIN** feed flow to Ruptured S/G UNTIL level greater than 10% [25% ADV].
5.b	**WHEN** Ruptured S/G level greater than 10% [25% ADV], **THEN STOP** feed flow to ruptured S/G.
8.b.	**WHEN** RCS pressure less than 1960 psig, **THEN BLOCK** low steamline pressure SI.
8.c.6)	**WHEN** T-avg less than 540°F, **THEN BYPASS** steam dump interlock.

HANDOUT

Page 2 of 3

STEP	ACTION
8.d	**WHEN** core exit T/Cs less than target temperature, **THEN** 1) **STOP** RCS cooldown. 2) **MAINTAIN** core exit T/Cs less than target temperature.
9.a. RNO and 16.c	(if Intact S/G level less than 10% [25% ADV]) **MAINTAIN** total feed flow greater than 440 gpm UNTIL level greater than 10% [25% ADV] in at least one S/G.
9.b	**MAINTAIN** Intact S/G narrow range levels between 20% [25% ADV] and 50%.
10.	**MONITOR** pressurizer PORVs and block valves:
12.	**MONITOR** AC busses energized from start busses.
15.d.	**MONITOR** RCS pressure greater than 300 psig.
16.d.	**MAINTAIN** core exit T/Cs less than target temperature.
17. RNO	(if ruptured S/G pressure dropping) **MAINTAIN** pressure of Intact S/Gs used for cooldown at least 250 psi below ruptured S/G(s): • **MAINTAIN** RCS cooldown rate less than 100°F/hr.
19.d. and 20.b.	**CONTINUE** RCS depressurization **UNTIL** any of following conditions satisfied: • Both of the following: 1) RCS press less than ruptured S/G pressure **AND** 2) Pressurizer level greater than 10% [20% ADV] **OR** • Pressurizer level greater than 65% **OR** • RCS subcooling based on core exit T/Cs less than 40°F.
21.RNO	(if RCS pressure dropping) **MONITOR** for indication of leakage from pressurizer PORV.
26.	**CONTROL** charging flow to maintain pressurizer level.
27.	**MONITOR** ECCS flow NOT required: a. RCS subcooling based on core exit T/Cs greater than 40 °F b. Pressurizer level greater than 10% [20% ADV].
29.	**MONITOR** if letdown can be established. (pzr level greater than 20% [35% ADV])
31.a RNO	**WHEN** RCS pressure is less than 700 psig, **THEN ISOLATE** CLAs.

HANDOUT

Page 3 of 3

STEP	ACTION
32.	**CONTROL** RCS pressure and charging flow to minimize RCS-to-secondary leakage:

	RUPTURED S/G LEVEL RISING	**RUPTURED S/G LEVEL DROPPING**	**RUPTURED S/G LEVEL GREATER THAN 84% [80% ADV] AND STABLE**
PZR LEVEL Less than 20% [35% ADV]	• **RAISE** charging flow. • **DEPRESSURIZE** RCS **USING** Substep 32.b.	• **RAISE** charging flow.	• **RAISE** charging flow. • **MAINTAIN** RCS and Ruptured S/G(s) pressures equal.
PZR LEVEL Between 20% [35% ADV] and 50%	• **DEPRESSURIZE** RCS **USING** Substep 32.b.	• **TURN ON** pressurizer heaters.	• **MAINTAIN** RCS and Ruptured S/G(s) pressures equal.
PZR LEVEL Between 50% and 65%	• **REDUCE** charging flow. • **DEPRESSURIZE** RCS **USING** Substep 32.b.	• **TURN ON** pressurizer heaters.	• **MAINTAIN** RCS and Ruptured S/G(s) pressures equal.
Greater than 65%	• **REDUCE** charging flow.	• **TURN ON** pressurizer heaters.	• **MAINTAIN** RCS and Ruptured S/G(s) pressures equal.

32.c.	**MONITOR** RCS pressure less than 1040 psig.
34.	**MONITOR** if containment spray should be stopped. (pressure less than 2.0 psig)
35.	**MONITOR** if containment vacuum control should be returned to normal: (less than 1.0 psig).
38.	**MAINTAIN** pressurizer at saturation temperature for ruptured S/G pressure **USING** pressurizer heaters.
41.	**MONITOR** RCP status. (RCP #2 running)
41.a.4) RNO	**MONITOR** natural circulation (if NO RCP can be started).
42.	**MONITOR** if source range channels should be reinstated. (IRM flux less than 10^{-4}%)
42.f.	**WHEN** shutdown monitor ALARM LEDs dark **AND** HIGH FLUX AT SHUTDOWN bistable lights dark, **THEN PLACE** HIGH FLUX AT SHUTDOWN alarm block switches in NORMAL. [M13]

HANDOUT

Page 1 of 3

STEP	ACTION
FOP	**IF** SI has been terminated **AND** either of the following conditions occurs: • RCS subcooling based on core exit T/Cs less than 40°F **OR** • Pzr level CANNOT be maintained greater than 10% [20% ADV], **THEN** **ESTABLISH** ECCS flow by performing one or both of the following: • **ESTABLISH** CCPIT flow as necessary **USING** Appendix C • **START** CCPs or SI pumps manually as necessary. **GO TO** ECA-3.1.
FOP	**IF** any S/G pressure dropping in an uncontrolled manner or less than 140 psig **AND** S/G NOT isolated **AND** S/G NOT needed for RCS cooldown, **THEN GO TO** E-2, Faulted Steam Generator Isolation.
FOP	**IF** any Intact S/G has level rising in an uncontrolled manner OR has abnormal radiation, **THEN STOP** any deliberate RCS cooldown or depressurization and **GO TO** E-3 Step 1.
FOP	**IF** CST level less than 5%, **THEN ALIGN** AFW suction to ERCW.
FOP	**IF** RWST level less than 27%, **THEN GO TO** ES-1.3, Transfer to RHR Containment Sump.
1.	**MONITOR** at least one RCP RUNNING.
1.b RNO	(If all RCPs stopped) **WHEN** step 32 completed OR E-3 exited, **THEN RESUME** monitoring ruptured loop T-cold.
2.	**MONITOR** RCP trip criteria: • At least one CCP or SI pump RUNNING **AND** RCS pressure less than 1250 psig .
3.	**MONITOR** indications of Ruptured S/G(s).
3.a RNO	**WHEN** ruptured S/G(s) identified, **THEN PERFORM** Steps 4 through 8.
4.b. RNO	**WHEN** Ruptured S/G(s) pressure less than 1040 psig, **THEN ENSURE** S/G atmospheric relief closed.
5.a RNO	**MAINTAIN** feed flow to Ruptured S/G UNTIL level greater than 10% [25% ADV].
5.b	**WHEN** Ruptured S/G level greater than 10% [25% ADV], **THEN STOP** feed flow to ruptured S/G.
8.b.	**WHEN** RCS pressure less than 1960 psig, **THEN BLOCK** low steamline pressure SI.
8.c.6)	**WHEN** T-avg less than 540°F, **THEN BYPASS** steam dump interlock.

HANDOUT

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STEP	ACTION
8.d	**WHEN** core exit T/Cs less than target temperature, **THEN** 1) **STOP** RCS cooldown. 2) **MAINTAIN** core exit T/Cs less than target temperature.
9.a. RNO and 16.c	(if Intact S/G level less than 10% [25% ADV]) **MAINTAIN** total feed flow greater than 440 gpm UNTIL level greater than 10% [25% ADV] in at least one S/G.
9.b	**MAINTAIN** Intact S/G narrow range levels between 20% [25% ADV] and 50%.
10.	**MONITOR** pressurizer PORVs and block valves:
12.	**MONITOR** AC busses energized from start busses.
15.d.	**MONITOR** RCS pressure greater than 300 psig.
16.d.	**MAINTAIN** core exit T/Cs less than target temperature.
17. RNO	(if ruptured S/G pressure dropping) **MAINTAIN** pressure of Intact S/Gs used for cooldown at least 250 psi below ruptured S/G(s): • **MAINTAIN** RCS cooldown rate less than 100°F/hr.
19.d. and 20.b.	**CONTINUE** RCS depressurization **UNTIL** any of following conditions satisfied: • Both of the following: 1) RCS press less than ruptured S/G pressure **AND** 2) Pressurizer level greater than 10% [20% ADV] **OR** • Pressurizer level greater than 65% **OR** • RCS subcooling based on core exit T/Cs less than 40°F.
21.RNO	(if RCS pressure dropping) **MONITOR** for indication of leakage from pressurizer PORV.
26.	**CONTROL** charging flow to maintain pressurizer level.
27.	**MONITOR** ECCS flow NOT required: a. RCS subcooling based on core exit **T**/Cs greater than 40 °F b. Pressurizer level greater than 10% [20% ADV].
29.	**MONITOR** if letdown can be established. (pzr level greater than 20% [35% ADV])
31.a RNO	**WHEN** RCS pressure is less than 700 psig, **THEN ISOLATE** CLAs.

HANDOUT

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STEP	ACTION
32.	**CONTROL** RCS pressure and charging flow to minimize RCS-to-secondary leakage:

	RUPTURED S/G LEVEL RISING	RUPTURED S/G LEVEL DROPPING	RUPTURED S/G LEVEL GREATER THAN 84% [80% ADV] AND STABLE
PZR LEVEL Less than 20% [35% ADV]	• **RAISE** charging flow. • **DEPRESSURIZE** RCS **USING** Substep 32.b.	• **RAISE** charging flow.	• **RAISE** charging flow. • **MAINTAIN** RCS and Ruptured S/G(s) pressures equal.
PZR LEVEL Between 20% [35% ADV] and 50%	• **DEPRESSURIZE** RCS **USING** Substep 32.b.	• **TURN ON** pressurizer heaters.	• **MAINTAIN** RCS and Ruptured S/G(s) pressures equal.
PZR LEVEL Between 50% and 65%	• **REDUCE** charging flow. • **DEPRESSURIZE** RCS **USING** Substep 32.b.	• **TURN ON** pressurizer heaters.	• **MAINTAIN** RCS and Ruptured S/G(s) pressures equal.
Greater than 65%	• **REDUCE** charging flow.	• **TURN ON** pressurizer heaters.	• **MAINTAIN** RCS and Ruptured S/G(s) pressures equal.

32.c.	**MONITOR** RCS pressure less than 1040 psig.
34.	**MONITOR** if containment spray should be stopped. (pressure less than 2.0 psig)
35.	**MONITOR** if containment vacuum control should be returned to normal: (less than 1.0 psig).
38.	**MAINTAIN** pressurizer at saturation temperature for ruptured S/G pressure **USING** pressurizer heaters.
41.	**MONITOR** RCP status. (RCP #2 running)
41.a.4) RNO	**MONITOR** natural circulation (if NO RCP can be started).
42.	**MONITOR** if source range channels should be reinstated. (IRM flux less than 10^{-4}%)
42.f.	**WHEN** shutdown monitor ALARM LEDs dark **AND** HIGH FLUX AT SHUTDOWN bistable lights dark, **THEN PLACE** HIGH FLUX AT SHUTDOWN alarm block switches in NORMAL. [M13]

1.0 PURPOSE

This procedure provides actions to terminate leakage of reactor coolant into the secondary system following a steam generator tube rupture.

2.0 SYMPTOMS AND ENTRY CONDITIONS

2.1 ENTRY CONDITIONS

E-0 Reactor Trip or Safety Injection:

- Secondary radiation.
- S/G level rising in an uncontrolled manner.

E-1, ES-1.2, and ECA-2.1 Foldout Page

- S/G level rising in an uncontrolled manner.

E-1 Loss of Reactor or Secondary Coolant:

- Secondary radiation.
- S/G level rising in an uncontrolled manner.

ES-1.2 Post LOCA Cooldown and Depressurization:

- S/G level rising in an uncontrolled manner.

E-2 Faulted Steam Generator Isolation:

- Secondary radiation.

ES-3.1 Post - SGTR Cooldown Using Backfill:

- S/G level rising in an uncontrolled manner.

ES-3.2 Post - SGTR Cooldown Using Blowdown:

- S/G level rising in an uncontrolled manner.

ES-3.3 Post - SGTR Cooldown Using Steam Dump:

- S/G level rising in an uncontrolled manner.

(continued on next page.)

2.1 ENTRY CONDITIONS (Continued)

ECA-2.1 Uncontrolled Depressurization of All Steam Generators:

- Secondary radiation.

ECA-3.1 SGTR and LOCA - Subcooled Recovery:

- S/G level rising in an uncontrolled manner.

ECA-3.2 SGTR and LOCA - Saturated Recovery:

- S/G level rising in an uncontrolled manner.

ECA-3.3 SGTR Without Pressurizer Pressure Control:

- S/G level rising in an uncontrolled manner.
- Pressurizer pressure control restored.

FR-H.3 Steam Generator High Level:

- Secondary Radiation.

3.0 OPERATOR ACTIONS

NOTE This procedure has a foldout page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1.	**MONITOR** at least one RCP RUNNING.	**IF** all RCPs are STOPPED, **THEN** **PERFORM** the following: a. **SUSPEND** monitoring ruptured loop T-cold indication on PTS status tree. b. **WHEN** step 32 is completed **OR** E-3 is exited, **THEN** **RESUME** monitoring ruptured loop T-cold indication on PTS status tree.
2.	**MONITOR** RCP trip criteria:	
	a. **CHECK** the following: • RCS pressure less than 1250 psig **AND** • At least one CCP **OR** SI pump RUNNING.	a. **GO TO** Step 3.
	b. **STOP** RCPs.	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3.	**MONITOR** indications of Ruptured S/G(s):	
	a. **IDENTIFY** Ruptured S/G(s) as indicated by any of the following: • Unexpected rise in any S/G narrow range level. **OR** • High radiation from any S/G sample. **OR** • RADCON survey of main steam lines and S/G blowdown lines. **OR** • High radiation on any main steamline radiation monitor.	a. **WHEN** Ruptured S/G(s) identified, **THEN** **PERFORM** Steps 4 through 8. **GO TO** Step 9.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	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.**	
4.	**ISOLATE** flow from Ruptured S/G(s):	
	a. **ADJUST** Ruptured S/G(s) atmospheric relief controller setpoint to 87% in AUTO. (1040 psig)	
	b. **CHECK** Ruptured S/G(s) atmospheric relief hand switch in P-AUTO and valve(s) CLOSED.	b. **WHEN** Ruptured S/G(s) pressure less than 1040 psig, **THEN** **PERFORM** the following: 1) **VERIFY** atmospheric relief CLOSED. 2) **IF** atmospheric relief NOT closed, **THEN** **CLOSE** atmospheric relief. **IF** Ruptured S/G(s) atmospheric relief CANNOT be closed, **THEN** **DISPATCH** personnel to close atmospheric relief **USING** EA-1-2, Local Control of S/G PORVs.
	c. **CLOSE** TD AFW pump steam supply from Ruptured S/G FCV-1-15 (S/G #1) or FCV-1-16 (S/G #4).	c. **IF** at least one MD AFW pump running, **THEN** **ISOLATE** steam to TD AFW pump **USING** FCV-1-17 or FCV-1-18. **IF** TD AFW pump is still running, **THEN** **DISPATCH** operator to locally close steam supply from ruptured S/G FCV-1-15 or FCV-1-16. [West Valve Vault Room]
	d. **VERIFY** Ruptured S/G(s) blowdown isolation valves CLOSED.	d. **CLOSE** valve(s).

(Step continued on next page.)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4.	e. **CLOSE** Ruptured S/G(s) MSIV and MSIV bypass valve.	e. **PERFORM** the following: 1) **CLOSE** Intact S/G MSIVs and MSIV bypass valves. 2) **DISPATCH** operator to perform EA-1-1, Closing MSIVs Locally, for <u>any</u> MSIV or MSIV bypass valve which fails to close. 3) **ISOLATE** steam header: • **PLACE** condenser steam dumps in OFF. [M-4] • **ENSURE** steam dump valves CLOSED. [M-4] • **CLOSE** FCV-47-180, HP Steam Seal Supply Isolation. [M-2] • **ENSURE** FCV-47-181 HP Steam Seal Supply Bypass CLOSED. [M-2] • **CLOSE** MSR HP steam supply isolation valves. [M-2] • **DISPATCH** operator to locally isolate steam header **USING** EA-1-4, Local Isolation of Steam Header in Turb Bldg. 4) **USE** Intact S/G(s) atmospheric relief for steam dump. **IF** any Ruptured S/G CANNOT be isolated from at least one Intact S/G, **THEN** **GO TO** ECA-3.1, SGTR and LOCA - Subcooled Recovery. ➡

CAUTION **Feeding a S/G that is Faulted and Ruptured increases the potential for an uncontrolled RCS cooldown and S/G overfill. This option should NOT be considered UNLESS needed for RCS cooldown.**

5. **MONITOR** Ruptured S/G(s) level:

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	a. **CHECK** narrow range level greater than 10% [25% ADV].	a. **MAINTAIN** feed flow to Ruptured S/G UNTIL level greater than 10% [25% ADV].
	b. **WHEN** ruptured S/G level is greater than 10% [25% ADV], **THEN** **PERFORM** the following: 1) **STOP** feed flow to ruptured S/G. 2) **ENSURE** Turbine Driven AFW LCV for ruptured S/G in CLOSE PULL TO LOCK.	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6.	**VERIFY** Ruptured S/G ISOLATED from Intact S/G(s):	
	a. **CHECK** either of the following conditions SATISFIED: • Ruptured S/G MSIVs and MSIV bypass valves CLOSED **OR** • MSIV(s) and MSIV bypass valve(s) CLOSED on Intact S/G(s) to be used for RCS cooldown.	a. **DO NOT CONTINUE** this procedure UNTIL one of conditions satisfied.
	b. **CHECK** S/G #1 or S/G #4 ruptured.	b. **GO TO** Step 7.
	c. **CHECK** TDAFW pump steam supply from ruptured S/G ISOLATED: • FCV-1-15 (S/G #1) or FCV-1-16 (S/G #4) CLOSED	c. **DO NOT CONTINUE** this procedure UNTIL ruptured S/G steam supply isolated by one of the following: • FCV-1-15 (S/G #1) or FCV-1-16 (S/G #4) CLOSED **OR** • FCV-1-17 or FCV-1-18 CLOSED **OR** • TDAFW pump TRIPPED.
7.	**CHECK** Ruptured S/G pressure greater than 550 psig (<u>Unit 1</u>) or 425 psig (<u>Unit 2</u>).	**GO TO** ECA-3.1, SGTR and LOCA - Subcooled Recovery.

NOTE

- Blocking low steamline pressure SI as soon as pressurizer pressure is less than 1960 psig will prevent an inadvertent MSIV closure and keep the condenser available for steam dump.
- After the low steamline pressure SI signal is blocked, main steamline isolation will occur if the high steam pressure rate setpoint is exceeded.
- The 1250 psig RCP trip criterion is NOT applicable after RCS cooldown is initiated in the following step.

8. **INITIATE** RCS cooldown:

   a. **DETERMINE** target core exit T/C temperature based on Ruptured S/G pressure:

Lowest Ruptured S/G pressure (psig)	Target Core Exit T/C Temp (°F)
1100 or greater	497
1050 - 1099	492
1000 - 1049	486
950 - 999	480
900 - 949	473
850 - 899	467
800 - 849	460
750 - 799	453
700 - 749	445
650 - 699	437
600 - 649	428
550 - 599	419
500 - 549	410
450 - 499	399
425 - 449	393

(Step continued on next page.)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8.	b. **WHEN** RCS pressure less than 1960 psig, **THEN** **PERFORM** the following: 1) **BLOCK** low steamline pressure SI. 2) **CHECK** STEAMLINE PRESS ISOL/SI BLOCK RATE ISOL ENABLE permissive LIT. [M-4A, A4]	
	c. **DUMP** steam to condenser from Intact S/G(s) at maximum achievable rate: 1) **CHECK** condenser available: • C-9 condenser interlock permissive LIT. [M-4A, E6] • Intact S/G MSIVs OPEN. 2) **PLACE** steam dumps in OFF. 3) **ENSURE** steam dumps in steam pressure mode with demand less than 25%. 4) **PLACE** steam dumps in ON. 5) **ADJUST** steam dump demand to FULLY OPEN three cooldown valves. 6) **WHEN** T-avg is less than 540°F, **THEN** **BYPASS** steam dump interlock. 7) **RAISE** AFW flow to intact S/Gs as necessary to support cooldown.	c. **IF** steam dumps NOT available, **THEN** **OPEN** atmospheric relief valves for Intact S/G(s) **RAISE** AFW flow to intact S/Gs as necessary to support cooldown. **IF** local control of atmospheric reliefs is necessary, **THEN** **DISPATCH** personnel to dump steam at maximum achievable rate **USING** EA-1-2, Local Control of S/G PORVs. **IF** NO Intact S/G available, **THEN** **PERFORM** the following: • **USE** Faulted S/G. OR • **GO TO** ECA-3.1, SGTR and LOCA - Subcooled Recovery. ➡

(Step continued on next page.)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

8. d. **WHEN** core exit T/Cs less than target temperature determined in Substep 8.a, **THEN** **PERFORM** the following:

1) **CLOSE** steam dumps or S/G atmospheric reliefs to stop cooldown.

2) **REDUCE** AFW flow as necessary to stop cooldown.

   MAINTAIN total feed flow greater than 440 gpm UNTIL level greater than 10% [25% ADV] in at least one Intact S/G.

3) **MAINTAIN** core exit T/Cs less than target temperature **USING** steam dumps or atmospheric reliefs.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9.	**MAINTAIN** Intact S/G narrow range levels:	
	a. Greater than 10% [25% ADV]	a. **MAINTAIN** total feed flow greater than 440 gpm **UNTIL** level greater than 10% [25% ADV] in at least one Intact S/G. **IF** at least 440 gpm AFW flow CANNOT be established, **THEN** **ESTABLISH** main feedwater or condensate flow **USING** EA-2-2, Establishing Secondary Heat Sink Using Main Feedwater or Condensate System
	b. Between 20% [25% ADV] and 50%.	b. **IF** level in any Intact S/G continues to rise in an uncontrolled manner, **THEN** **STOP** RCS cooldown and **GO TO** Step 1.

CAUTION **Any time a pressurizer PORV opens, there is a possibility that it may stick open.**

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10.	**MONITOR** pressurizer PORVs and block valves:	
	a. Power to block valves AVAILABLE	a. **DISPATCH** personnel to restore power to block valves **USING** EA-201-1, 480 V Board Room Breaker Alignments.
	b. Pressurizer PORVs CLOSED	b. **IF** pressurizer pressure less than 2335 psig, **THEN** **CLOSE** pressurizer PORVs. **IF** pressurizer PORV CANNOT be closed, **THEN** **CLOSE** its block valve. **IF** pressurizer PORV remains open **AND** associated block valve CANNOT be closed, **THEN** **GO TO** ECA-3.1, SGTR and LOCA - Subcooled Recovery. ➡
	c. At least one block valve OPEN.	c. **OPEN** one block valve UNLESS closed to isolate an open PORV.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
11.	**RESET** SI signal.	
12.	**MONITOR** AC busses energized from start busses.	**ENSURE** diesel generators supplying shutdown boards. **WHEN** shutdown power restored, **THEN** **ENSURE** safeguards equipment running as necessary.
13.	**ENSURE** Phase A and Phase B RESET.	
14.	**CHECK** control air established to containment: [Panel 6K and 6L] • 1-FCV-32-80 (2-FCV-32-81) Train A essential air OPEN • 1-FCV-32-102 (2-FCV-32-103) Train B essential air OPEN • 1-FCV-32-110 (2-FCV-32-111) non-essential air OPEN.	**ESTABLISH** control air to containment **USING** EA-32-1, Establishing Control Air to Containment.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
15.	**DETERMINE** if RHR pumps should be stopped:	
	a. **CHECK** RHR pump suction aligned from RWST.	a. **GO TO** Step 16.
	b. **CHECK** RCS pressure greater than 300 psig.	b. **GO TO** Step 16.
	c. **STOP** RHR pumps and **PLACE** in A-AUTO.	c. **IF** pump(s) CANNOT be stopped in A-AUTO, **THEN** **PLACE** affected RHR pump(s) in PULL TO LOCK.
	d. **MONITOR** RCS pressure greater than 300 psig.	d. **IF** RCS pressure dropping uncontrolled, **THEN** **START** RHR pumps.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16.	**CHECK** if RCS cooldown should be stopped:	
	a. **CHECK** core exit T/Cs less than target temperature determined in Substep 8.a.	a. **DO NOT CONTINUE** this procedure UNTIL core exit T/Cs less than target temperature.
	b. **CLOSE** steam dumps or atmospheric reliefs to stop cooldown.	
	c. **REDUCE** AFW flow as necessary to stop cooldown. **MAINTAIN** total feed flow greater than 440 gpm UNTIL level greater than 10% [25% ADV] in at least one Intact S/G.	
	d. **MAINTAIN** core exit T/Cs less than target temperature **USING** steam dumps or atmospheric reliefs.	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17.	**CHECK** Ruptured S/G(s) pressure STABLE or RISING.	**MAINTAIN** pressure of Intact S/Gs used for cooldown at least 250 psi below ruptured S/G(s): • **SLOWLY DUMP** steam from Intact S/Gs • **MAINTAIN** RCS cooldown rate less than 100°F/hr. **IF** Intact S/G(s) used for cooldown CANNOT be maintained at least 250 psi below ruptured S/G(s), **THEN** **GO TO** ECA-3.1, SGTR and LOCA - Subcooled Recovery. →
18.	**CHECK** RCS subcooling based on core exit T/Cs greater than 60°F.	**GO TO** ECA-3.1, SGTR and LOCA - Subcooled Recovery. →

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
19.	**DEPRESSURIZE** RCS to minimize break flow and to refill pressurizer:	
	a. **CHECK** normal pressurizer spray AVAILABLE.	a. **GO TO** Cautions prior to Step 20.
	b. **INITIATE** maximum available pressurizer spray.	
	c. **CHECK** depressurization rate ADEQUATE.	c. **GO TO** Cautions prior to Step 20.
	d. **CONTINUE** depressurization UNTIL any of the following conditions SATISFIED: • Both of the following: 1) RCS pressure less than Ruptured S/G(s) pressure **AND** 2) Pressurizer level greater than 10% [20% ADV]. **OR** • Pressurizer level greater than 65%. **OR** • RCS subcooling based on core exit T/Cs less than 40°F.	

(step continued on next page)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
19.	e. **CLOSE** spray valve(s):	
	1) Normal spray valves.	1) **STOP** RCPs #1 and 2. **IF** RCS pressure continues to drop, **THEN** **STOP** additional RCP as necessary.
	2) Auxiliary spray valves.	2) **ISOLATE** auxiliary spray line.
	f. **GO TO** Caution prior to Step 22.	

CAUTION
- **Depressurizing the RCS using a pressurizer PORV may cause PRT rupture with resulting abnormal containment conditions.**
- **Excessive cycling of a pressurizer PORV increases the potential for PORV failure.**

NOTE Upper head voiding may occur during RCS depressurization if no RCPs are running. This may result in rapidly rising pressurizer level.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
20.	**DEPRESSURIZE** RCS **USING** one pressurizer PORV to minimize break flow and to refill pressurizer:	
	a. **CHECK** at least one pressurizer PORV AVAILABLE	a. **PERFORM** the following to establish auxiliary spray: 1) **ENSURE** at least one SI pump RUNNING. **IF** NO SI pump running, **THEN** **GO TO** ECA-3.3, SGTR Without Pressurizer Pressure Control. ➡ 2) **ENSURE** at least one CCP RUNNING. 3) **CLOSE** CCPIT inlet valves FCV-63-39 and FCV-63-40. 4) **CLOSE** CCPIT outlet valves FCV-63-25 and FCV-63-26. 5) **OPEN** charging line isolation valves FCV-62-90 and FCV-62-91. 6) **ESTABLISH** auxiliary spray **USING** EA-62-4, Establishing Auxiliary Spray.

(step continued on next page)

20. a. (Continued)

IF auxiliary spray established,
THEN
GO TO Step 19.b.

↱

IF auxiliary spray CANNOT be established,
THEN
GO TO ECA-3.3, SGTR Without Pressurizer Pressure Control.

→

b. **OPEN** one pressurizer PORV UNTIL any of the following conditions SATISFIED:

- Both of the following:

    1) RCS pressure less than Ruptured S/G(s) pressure

    AND

    2) Pressurizer level greater than 10% [20% ADV].

OR

- Pressurizer level greater than 65%.

OR

- RCS subcooling based on core exit T/Cs less than 40°F.

(step continued on next page)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
20.	c. **CLOSE** pressurizer PORV.	c. **CLOSE** block valve.
	d. **CLOSE** spray valve(s):	
	1) Normal spray valves	1) **STOP** RCPs #1 and 2. **IF** RCS pressure continues to drop, **THEN** **STOP** additional RCP as necessary.
	2) Auxiliary spray valves.	2) **ISOLATE** auxiliary spray line.
21.	**CHECK** RCS pressure RISING.	**CLOSE** pressurizer PORV block valve. **IF** pressure continues to drop, **THEN** **PERFORM** the following: 1) **MONITOR** the following conditions for indication of leakage from pressurizer PORV: • Acoustic Monitoring System • Tail pipe temperatures • PRT indications. 2) **GO TO** ECA-3.1, SGTR and LOCA - Subcooled Recovery. ➡

CAUTION **Any delay in terminating SI after termination criteria are met may cause Ruptured S/G(s) overfill.**

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
22.	**CHECK** if ECCS flow should be terminated:	
	a. RCS subcooling based on core exit T/Cs greater than 40°F.	a. **GO TO** ECA-3.1, SGTR and LOCA - Subcooled Recovery. ➡
	b. Secondary heat sink: • Narrow range level in at least one Intact S/G greater than 10% [25% ADV] **OR** • Total feed flow to S/Gs greater than 440 gpm AVAILABLE.	b. **IF** neither condition satisfied, **THEN** **GO TO** ECA-3.1, SGTR and LOCA - Subcooled Recovery. ➡
	c. RCS pressure STABLE or RISING.	c. **GO TO** ECA-3.1, SGTR and LOCA - Subcooled Recovery. ➡
	d. Pressurizer level greater than 10% [20% ADV].	d. **GO TO** Step 6. ⤴

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
23.	**STOP** the following ECCS pumps:	
	a. **STOP** SI pumps and **PLACE** in A-AUTO.	a. **IF** any SI pump(s) CANNOT be stopped in A-AUTO, **THEN** **ENSURE** affected pump(s) in PULL TO LOCK.
	b. **CHECK** offsite power supplying shutdown boards.	b. **ENSURE** one CCP in PULL TO LOCK. **GO TO** Step 24.
	c. **STOP** all BUT one CCP and **PLACE** in A-AUTO.	c. **IF** CCP CANNOT be stopped in A-AUTO, **THEN** **ENSURE** one CCP in PULL TO LOCK.
24.	**ISOLATE** CCPIT: a. **CLOSE** inlet isolation valves FCV-63-39 and FCV-63-40. b. **CLOSE** outlet isolation valves FCV-63-26 and FCV-63-25.	**IF** CCPIT flowpath CANNOT be isolated from MCR, **THEN** **CLOSE** affected CCPIT valves **USING** EA-201-3, Operation of Motor-Operated Valves from Outside MCR.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
25.	**ESTABLISH** charging flow:	
	a. **CLOSE** seal water flow control valve FCV-62-89.	
	b. **OPEN** charging flow isolation valves FCV-62-90 and FCV-62-91.	b. **IF** power available, **THEN** **OPEN** affected valve from Rx MOV Board **USING** EA-201-3, Operation of Motor-Operated Valves from Outside MCR.
	c. **ENSURE** normal or alternate charging isolation valve FCV-62-86 or FCV-62-85 OPEN.	
	d. **ESTABLISH** desired charging flow **USING** seal water and charging flow control valves FCV-62-89 and FCV-62-93.	
26.	**CONTROL** charging flow to maintain pressurizer level.	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
27.	**MONITOR** ECCS flow NOT required:	
	a. RCS subcooling based on core exit T/Cs greater than 40°F.	a. **ESTABLISH** ECCS flow manually by performing one or both of the following: • **ESTABLISH** CCPIT flow as necessary **USING** App. C. • **START** CCPs or SI pumps manually as necessary. **GO TO** ECA-3.1, SGTR and LOCA - Subcooled Recovery.
	b. Pressurizer level greater than 10% [20% ADV].	b. **CONTROL** charging flow to maintain pressurizer level. **IF** pressurizer level CANNOT be maintained, **THEN** **PERFORM** the following: 1) **ESTABLISH** ECCS flow manually by performing one or both of the following: • **ESTABLISH** CCPIT flow as necessary **USING** App. C. • **START** CCPs or SI pumps manually as necessary. 2) **GO TO** ECA-3.1, SGTR and LOCA - Subcooled Recovery.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
28.	**CHECK** VCT makeup control system:	**ADJUST** controls as necessary.
	a. Makeup set for greater than RCS boron concentration.	
	b. Makeup set for automatic control.	
29.	**MONITOR** if letdown can be established:	
	a. **CHECK** pressurizer level greater than 20% [35% ADV].	a. **GO TO** Step 30.
	b. **ESTABLISH** letdown **USING** EA-62-5, Establishing Normal Charging and Letdown.	b. **ESTABLISH** excess letdown **USING** EA-62-3, Establishing Excess Letdown.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
30.	**DETERMINE** if CCP suction can be aligned to VCT:	
	a. **CHECK** CCP suction ALIGNED to RWST.	a. **IF** ECCS pumps aligned for sump recirculation, **THEN** **EVALUATE** terminating sump recirculation **USING** EA-63-6, Terminating Sump Recirculation. **GO TO** Step 31.
	b. **ENSURE** VCT level is greater than 20%.	
	c. **OPEN** VCT outlet valves LCV-62-132 and LCV-62-133 and **PLACE** in PULL A-P-AUTO.	
	d. **CLOSE** RWST valves LCV-62-135 and LCV-62-136 and **PLACE** in PULL A-P-AUTO.	
	e. **ENSURE** VCT cover gas established **USING** EA-0-8, Establishing VCT Cover Gas.	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
31.	**DETERMINE** if CLAs should be isolated:	
	a. **CHECK** RCS pressure less than 700 psig.	a. **WHEN** RCS pressure is less than 700 psig, **THEN** **PERFORM** Substeps 31.b, c, and d. **GO TO** Step 32. →
	b. **CHECK** the following: • RCS subcooling based on core exit T/Cs greater than 40°F • Pressurizer level greater than 10% [20% ADV].	b. **GO TO** ECA-3.1, SGTR and LOCA - Subcooled Recovery. →
	c. **CHECK** power to CLA isolation valves AVAILABLE.	c. **DISPATCH** personnel to restore power to CLA isolation valves **USING** EA-201-1, 480 V Board Room Breaker Alignments.
	d. **CLOSE** CLA isolation valves.	d. **IF** power available to affected valve(s), **THEN** **CLOSE** affected valve(s) **USING** EA-201-3, Operation of Motor-Operated Valves from Outside MCR. **IF** any CLA valve CANNOT be closed, **THEN** **VENT** unisolated CLA(s) **USING** EA-63-1, Venting Unisolated Cold Leg Accumulator.

32. **CONTROL** RCS pressure and charging flow to minimize RCS-to-secondary leakage:

    a. **PERFORM** appropriate action(s) from table:

PZR LEVEL	RUPTURED S/G LEVEL RISING	RUPTURED S/G LEVEL DROPPING	RUPTURED S/G LEVEL GREATER THAN 84% [80% ADV] AND STABLE
Less than 20% [35% ADV]	• **RAISE** charging flow. • **DEPRESSURIZE** RCS **USING** Substep 32.b.	**RAISE** charging flow.	• **RAISE** charging flow. • **MAINTAIN** RCS and Ruptured S/G(s) pressures equal.
Between 20% [35% ADV] and 50%	**DEPRESSURIZE** RCS **USING** Substep 32.b.	**TURN ON** pressurizer heaters.	**MAINTAIN** RCS and Ruptured S/G(s) pressures equal.
Between 50% and 65%	• **REDUCE** charging flow. • **DEPRESSURIZE** RCS **USING** Substep 32.b.	**TURN ON** pressurizer heaters.	**MAINTAIN** RCS and Ruptured S/G(s) pressures equal.
Greater than 65%	**REDUCE** charging flow.	**TURN ON** pressurizer heaters.	**MAINTAIN** RCS and Ruptured S/G(s) pressures equal.

(step continued on next page)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
32.	b. **USE** normal pressurizer spray as required by Substep 32.a.	b. **IF** letdown in service, **THEN** **ESTABLISH** auxiliary spray **USING** EA-62-4, Establishing Auxiliary Spray. **IF** letdown NOT in service **OR** auxiliary spray CANNOT be established, **THEN** **USE** one pressurizer PORV.
	c. **MONITOR** RCS pressure less than 1040 psig.	c. **PERFORM** the following: 1) **MAINTAIN** RCS subcooling based on core exit T/Cs greater than 40°F. 2) **DEPRESSURIZE** RCS **USING** Substep 32.b. UNTIL RCS pressure less than 1040 psig. 3) **MAINTAIN** RCS and Ruptured S/G(s) pressures less than 1040 psig.
33.	**CHECK** at least one RCP RUNNING.	**RESUME** monitoring ruptured loop T-cold indication on PTS status tree.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
34.	**MONITOR** if containment spray should be stopped:	
	a. **CHECK** any containment spray pump RUNNING.	a. **GO TO** Step 35. ➔
	b. **CHECK** containment pressure less than 2.0 psig.	b. **GO TO** Step 35. ➔
	c. **CHECK** containment spray suction aligned to RWST.	c. **NOTIFY** TSC to determine when one or both trains of cntmt spray should be stopped. **WHEN** directed by TSC, **THEN** **PERFORM** Substeps 34.d through 34.f. **GO TO** Step 35. ➔
	d. **RESET** Containment Spray signal.	
	e. **STOP** containment spray pumps and **PLACE** in A-AUTO.	
	f. **CLOSE** containment spray discharge valves FCV-72-2 and FCV-72-39.	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
35.	**MONITOR** if containment vacuum control should be returned to normal:	
	a. **CHECK** containment pressure less than 1.0 psig.	a. **GO TO** Step 36.
	b. **ENSURE** containment vacuum relief isolation valves OPEN: [Panel 6K or M-9] • FCV-30-46 • FCV-30-47 • FCV-30-48.	
36.	**DETERMINE** if diesel generators should be stopped:	
	a. **VERIFY** shutdown boards ENERGIZED from start busses.	a. **ATTEMPT** to restore offsite power to shutdown boards **USING** EA-202-1, Restoring Offsite Power to 6900 V Shutdown Boards.
	b. **STOP** any unloaded diesel generators and **PLACE** in standby **USING** EA-82-1, Placing D/Gs in Standby.	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
37.	**DISPATCH** personnel to perform EA-0-3, Minimizing Secondary Plant Contamination.	
38.	**MAINTAIN** pressurizer liquid at saturation temperature for ruptured S/G pressure: • **OPERATE** pressurizer heaters as necessary.	
39.	**CHECK** RCP cooling NORMAL: • RCP CCS flow • RCP seal injection flow.	**ESTABLISH** cooling to RCPs **USING** EA-68-3, Establishing RCP Cooling.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
40.	**DETERMINE** if RCP seal return flow should be established:	
	a. **VERIFY** RCP seal injection flow established.	a. **GO TO** Step 41.
	b. **VERIFY** CCS cooling to seal water heat exchanger NORMAL: • SEAL WATER HX OUTLET FLOW/TEMP ABNORMAL alarm DARK. [M-27B-B, A6 (M-27B-D, A7)].	b. **ESTABLISH** CCS cooling to seal water heat exchanger. **IF** CCS cooling to seal water heat exchanger CANNOT be established, **THEN** **GO TO** Step 41.
	c. **ENSURE** the following: • VCT pressure greater than 13 psig. [M-6] • RCDT pressure [0-L-2] less than VCT pressure.	c. **GO TO** Step 41.
	d. **OPEN** seal return isolation valves FCV-62-61 and FCV-62-63.	

CAUTION **Loss of all RCP seal cooling may cause RCP seal damage and will require a TSC status evaluation prior to restarting affected RCPs.**

NOTE Loop 2 RCP and associated spray valve will provide adequate spray flow for RCS pressure control. If Loop 2 is not available, all three remaining RCPs may be required to ensure adequate spray flow.

41. **MONITOR** RCP status:

a. **CHECK** RCP #2 RUNNING.

RESPONSE NOT OBTAINED:

a. **ATTEMPT** to start RCP(s) to provide normal pzr spray:

1) **IF** all RCP seal cooling has previously been lost,
THEN
NOTIFY TSC to initiate RCP restart status evaluation.

2) **IF** RVLIS upper range indication less than 104%,
THEN
PERFORM the following:

- **RAISE** pressurizer level to greater than 90%
OR until level stops rising.
- **RAISE** RCS subcooling based on core exit T/Cs to greater than 76°F.
- **OPERATE** pzr heaters as necessary to raise pzr liquid temperature to saturation.

3) **ESTABLISH** conditions for starting RCP(s) **USING** EA-68-2, Establishing RCP Start Conditions.

(step continued on next page)

41. a. (Continued)

4) **IF** RCP start conditions established,
THEN
START RCP #2 (if available) OR RCPs #1, 3, and 4.

IF NO RCP can be started,
THEN
MONITOR natural circulation **USING** EA-68-6, Monitoring Natural Circulation Conditions.

IF natural circulation CANNOT be verified,
THEN
RAISE steam dump rate.

b. **STOP** RCP(s) NOT needed for normal pressurizer spray.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
42.	**MONITOR** if source range channels should be reinstated:	
	a. **CHECK** intermediate range flux less than 10^{-4} % power on operable channels.	a. **GO TO** Step 43.
	b. **CHECK** source range channels REINSTATED.	b. **REINSTATE** source range channels by simultaneously placing both SRM TRIP RESET-BLOCK switches to RESET position. [M-4]
	c. **SELECT** one SRM and one IRM on NR-45 recorder.	
	d. **ENSURE** audio count rate operation.	
	e. **RESET** shutdown monitor alarm setpoints. [M-13]	
	f. **WHEN** shutdown monitor ALARM LEDs dark **AND** HIGH FLUX AT SHUTDOWN bistable lights dark, **THEN** **PLACE** HIGH FLUX AT SHUTDOWN alarm block switches in NORMAL. [M-13]	
43.	**SHUT DOWN** unnecessary plant equipment: • **REFER TO** 0-GO-12, Realignment of Secondary Equipment Following Reactor/Turbine Trip.	

44. **PERFORM** EA-0-9, Post Trip Administrative Requirements and Recovery Actions.

NOTE
- Backfill method is slow but preferred since it minimizes radiological releases and facilitates processing of contaminated reactor coolant.
- Blowdown method is slow but minimizes radiological releases and eliminates boron dilution and secondary chemistry effects on RCS.
- Steam dump method is fast but may involve radiological releases and water hammer concerns (if water exists in the steamlines).

45. **DETERMINE** appropriate post-SGTR cooldown method:

    a. **SELECT** appropriate procedure:

    - ES-3.1, Post-SGTR Cooldown Using Backfill.

      OR

    - ES-3.2, Post-SGTR Cooldown Using Blowdown.

      OR

    - ES-3.3, Post-SGTR Cooldown Using Steam Dump.

    b. **GO TO** selected procedure.

    ➡

END

Page 1 of 1

APPENDIX C

ESTABLISHING CCPIT FLOW

1. **ENSURE** CCP suction aligned to one of the following:

   - RWST with level greater than 27% ☐

     OR

   - RHR pump discharge **USING** ES-1.3, Transfer to RHR Containment Sump. ☐

2. **CLOSE** charging flow isolation valves FCV-62-90 and FCV-62-91. ☐

3. **OPEN** CCPIT outlet valves FCV-63-26 and FCV-63-25. ☐

4. **OPEN** CCPIT inlet valves FCV-63-39 and FCV-63-40. ☐

END OF TEXT

SIM JPM B.1.f

SEQUOYAH NUCLEAR PLANT
JOB PERFORMANCE MEASURE

B.1.f

JPM 22-AP2

CALIBRATE POWER RANGE NUCLEAR INSTRUMENTATION

PREPARED/ REVISED BY: ____________________ Date/________

VALIDATED BY: * ____________________ Date/________

APPROVED BY: ____________________ Date/________
(Operations Training Manager)

CONCURRED: ** ____________________ Date/________
(Operations Representative)

* Validation not required for minor enhancements, procedure Rev changes that do not affect the JPM, or individual step changes that do not affect the flow of the JPM.
** Operations Concurrence required for new JPMs and changes that affect the flow of the JPM (if not driven by a procedure revision).

NUCLEAR TRAINING

REVISION/USAGE LOG

REVISION NUMBER	DESCRIPTION OF REVISION	V	DATE	PAGES AFFECTED	PREPARED/ REVISED BY:
0	Created from JPM 22.	Y	8/2/04	All	MG Croteau
1	Updated References	N	10/5/05	All	JJ Tricoglou
2	Updated References. Minor format changes.	N	2/15/07	All	RH Evans
3	Added detail to steps and standards			All	

V - Specify if the JPM change will require another validation (Y or N).
See cover sheet for criteria.

SEQUOYAH NUCLEAR PLANT
RO/SRO
JOB PERFORMANCE MEASURE

Task:

Calibrate the Power Range Nuclear Instrumentation

JA/TA task:

0150050201 **(RO)**

K/A Ratings:

015000 A1.01 (3.5 - 3.8) 015020 G9 (3.4 - 3.3)
015020 G13 (3.3 - 3.6) 015000 A4.02 (3.9 - 3.9)

Task Standard:

1) Each channel of Power Range instrumentation (on its power range "A" drawer) will indicate within acceptance criteria tolerances of the calorimetric.
2) The unit is not tripped by a power range neutron flux rate trip.

Evaluation Method : Simulator ___X____ In-Plant ________

==

Performer: ____________________________________
NAME Start Time ________

Performance Rating : SAT _____ UNSAT _____ Performance Time _____ Finish Time _______

Evaluator: ______________________________/________
SIGNATURE DATE

==

COMMENTS

____

____

____

____

____

____

____

____

SPECIAL INSTRUCTIONS TO EVALUATOR:

1. Sequenced steps identified by an "s"
2. Any UNSAT requires comments
3. This task is to be performed using the simulator in IC #16.
   [Rx Power should be ~ 100 %]
4. **MANUALLY ADJUST N-41 and N-43 power to between 100.5 and 101.0%. ENSURE all other NIS reactor power indications are between 99.5 and 100.5%.**
5. Ensure operator performs the following required actions for **SELF-CHECKING;**
   a. Identifies the correct unit, train, component, etc.
   b. Reviews the intended action and expected response.
   c. Compares the actual response to the expected response.

Validation Time: CR. 27 min **Local** ____________

Tools/Equipment/Procedures Needed:
0-SI-OPS-092-078.0, Sections 3.0, 6.1, 6.2, Appendix D

References:

	Reference	Title	Rev No.
1.	0-SI-OPS-092-078.0	Power Range Neutron Flux Channel Calibration By Heat Balance Comparison	18

===

READ TO OPERATOR

Directions to Trainee:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. The unit is at steady state conditions with all NIS channels and LEFM operable.

INITIATING CUES:

1. You are the CRO and the US has directed you to perform 0-SI-OPS-092-078.0.
2. Section 4.0 of 0-SI-OPS-092-078.0 has been completed.
3. Notify the US when the SI has been completed and any necessary adjustments have been made.

STEP/STANDARD	SAT/UNSAT
STEP 1.: Obtain the appropriate procedure. STANDARD: Operator identifies 0-SI-OPS-092-078.0 and goes to section 6.0 "Performance". COMMENTS:	___ SAT ___ UNSAT Start Time____
STEP 2.: **[1]** **VERIFY** availability of LEFM calorimetric power: [a] CHECK LEFM status NORMAL on ICS (NSSS and BOP) Current Calorimetric Data screen. YES ☐ NO ☐ [b] CHECK LEFM Core Thermal Power (ICS point U2118) showing good (green) data. YES ☐ NO ☐ [c] CHECK LEFM MFW header temperature (ICS point T8502MA) greater than or equal to 250°F. YES ☐ NO ☐ STANDARD: Operator pulls up LEFM ICS screen and points, then annotates procedure that LEFM calorimetric power is available. COMMENTS:	___ SAT ___ UNSAT

Job Performance Checklist

STEP/STANDARD	SAT/UNSAT
STEP 3.: **[2]** **IF** LEFM calorimetric power NOT available OR ICS computer NOT available, THEN....	___ SAT ___ UNSAT

PERFORM the following:

[a] **ENTER** applicable action of TRM 3.3.3.15.

[b] **ENSURE** work order initiated as required.

[c] **IF** LEFM calorimetric power CANNOT be restored in time to complete this surveillance,
THEN

PERFORM the following:

1. **REDUCE** reactor power to 98.7% (3411 MWt) or less **USING** U1118 (if available) or NIS.

2. **WHEN** reactor power is less than 98.7%,
THEN
CONTINUE this instruction using alternate power indications as specified below.

STANDARD: Operator marks the 4 sub steps (a, b, c.1, & c.2) N/A because the LEFM was determined to be available in the previous step.

COMMENTS:

STEP/STANDARD **SAT/UNSAT**

STEP 4.: **[3]** **DETERMINE** reactor core power level by performing the applicable appendix below.

CONDITION	APPENDIX	✓
RCS ΔT greater than 15% and LEFM core thermal power (U2118) available (step [1] acceptance criteria met)	A	☐
RCS ΔT between 15% and 40% and LEFM core thermal power (U2118) NOT available	B	☐
RCS ΔT greater than 40% LEFM core thermal power (U2118) NOT available but ICS point U1118 is available	C	☐
RCS ΔT greater than 40% and ICS core thermal power indication (U1118 and U2118) NOT available	D	☐

AND RECORD below the (N/A power if using printout from ICS)
% Rated Core Thermal Power = ____________%

___ SAT

___ UNSAT

Cue: ***Inform the operator that the ICS printer is not available.***

Cue: ***If candidate asks if the engineering procedure 0-PI-SXX-000-022.2 has been performed, state that it has not been performed.***

STANDARD: Operator determines Appendix A. is applicable to determine the reactor power level.

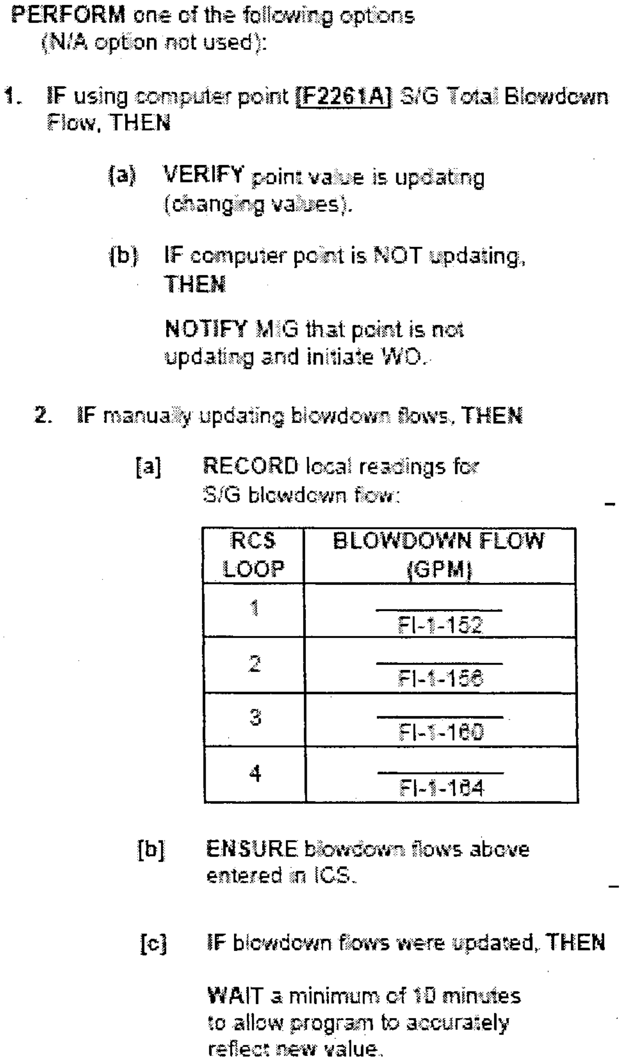
COMMENTS:

Job Performance Checklist

STEP/STANDARD	SAT/UNSAT
EVALUATOR NOTE: The following steps are from Appendix A.	

STEP 5.: **[1]** **ENSURE** S/G blowdown flows are updated by performing the following functions on ICS:

- [a] SELECT "NSS & BOP".
- [b] SELECT "CALORIMETRIC FUNCTION MENU".
- [c] SELECT "UPDATE OPERATOR ENTERED BLOWDOWN FLOW"



PERFORM one of the following options (N/A option not used):

1. **IF** using computer point **[F2261A]** S/G Total Blowdown Flow, **THEN**
   - (a) **VERIFY** point value is updating (changing values).
   - (b) **IF** computer point is NOT updating, **THEN**

     NOTIFY M/G that point is not updating and initiate WO.

2. **IF** manually updating blowdown flows, **THEN**
   - [a] **RECORD** local readings for S/G blowdown flow:

RCS LOOP	BLOWDOWN FLOW (GPM)
1	______ FI-1-152
2	______ FI-1-156
3	______ FI-1-160
4	______ FI-1-164

   - [b] **ENSURE** blowdown flows above entered in ICS.
   - [c] **IF** blowdown flows were updated, **THEN**

     WAIT a minimum of 10 minutes to allow program to accurately reflect new value.

___ SAT

___ UNSAT

Cue: ***The blowdown flow point is updating and manual blowdown flows are not required.***

STANDARD: Operator determines blowdown flow is updating and marks substeps 1b, all of substep 2 N/A.

COMMENTS:

STEP/STANDARD **SAT/UNSAT**

STEP 6.: **[2]** **SELECT** "DISPLAY CURRENT CALORIMETRIC DATA" on ICS Calorimetric menu **AND** PERFORM one of the following:

[a] **RECORD** the following:

LEFM Core Thermal Power (U2118) ____________ Mwt

Percent Rated Core Thermal Power (U1127) ____________ %

OR

[b] **PRINT** power level and NIS values **AND** **ATTACH** report to this instruction.

Cue: Inform the operator that the printer is not available.

STANDARD: Operator records U2118 and U1127 values.

COMMENTS:

___ SAT

___ UNSAT

EVALUATOR NOTE: The operator should transistion back to section 6.1 at the completion of Appendx A. The following steps are from Section 6.1.

STEP 7.: **[4]** **RECORD** "AS FOUND" power level from each of the four NIS A Channel drawers.

POWER RANGE CHANNEL	"AS-FOUND" NIS POWER (%)
N-41 (XI-92-5005B)	
N-42 (XI-92-5006B)	
N-43 (XI-92-5007B)	
N-44 (XI-92-5008B)	

STANDARD: Operator records NIS power range readings from the A channel drawers on 1-M-13 on 1-XI-92-5005B, 5006B, 5007B, and 5008B

COMMENTS:

___ SAT

___ UNSAT

STEP/STANDARD | **SAT/UNSAT**

STEP 8.: **[5]** **COMPARE** NIS indication with core thermal power level.
[a] **CHECK** appropriate box to indicate whether the following "as-found" ACCEPTANCE CRITERIA were satisfied.

ACCEPTANCE CRITERIA: The indicated NIS power level recorded in step **[4]** is equal to the core thermal power level recorded in step **[3]** or as listed on the printed copy to within ± 2.0 percent.

	YES	NO	N/A
NIS Channel N-41	☐	☐	☐
NIS Channel N-42	☐	☐	☐
NIS Channel N-43	☐	☐	☐
NIS Channel N-44	☐	☐	☐

STANDARD: Operator **CHECKS** to determine if NIS channels are within ± 2%. Then, Checks **YES** for all NIS channels.

COMMENTS:

___ SAT

___ UNSAT

STEP 9.: **[b]** **IF** any NIS channels were inoperable during the performance of this instruction, THEN:
NOTIFY applicable unit SRO that this SI must be performed on all inoperable NIS channels when they are returned to service.

STANDARD: Since all were operable per the initiating conditions, the operator marks this substep N/A.

COMMENTS:

___ SAT

___ UNSAT

STEP 10.: **[6]** **VERIFY** that all NIS channel indications are within ±3 percent of the determined core thermal power level.

YES	NO
☐	☐

STANDARD: Operator checks the YES box.

COMMENTS:

___ SAT

___ UNSAT

STEP/STANDARD | **SAT/UNSAT**

STEP 11.: **[7]** **IF** a NIS channel was more than 3 percent in error in the non-conservative direction (core thermal > NIS) THEN **NOTIFY** Engineering to determine if the calibration error impacts operability of the NIS high flux trip.

STANDARD: Operator marks this step N/A.

COMMENTS:

___ SAT

___ UNSAT

STEP 12.: **[8]** **CHECK** appropriate box to indicate whether the following "as-found" acceptance criteria were satisfied:

ACCEPTANCE CRITERIA: The indicated NIS power level recorded in step **[4]** is less than or equal to 100.5 percent.

	YES	NO	N/A
NIS Channel N-41	☐	☐	☐
NIS Channel N-42	☐	☐	☐
NIS Channel N-43	☐	☐	☐
NIS Channel N-44	☐	☐	☐

STANDARD: The operator checks **NO** for N-41 and N-43 and checks **YES** for other 2 channels.

COMMENTS:

___ SAT

___ UNSAT

STEP 13.: **[9]** **IF** any channel does not meet acceptance criteria, OR NIS Channel adjustment is desired ,**THEN**
PERFORM adjustment of section 6.2
AND/OR
REDUCE reactor power not to exceed 100 percent.

STANDARD: Operator continues on to section 6.2.

COMMENTS:

___ SAT

___ UNSAT

STEP/STANDARD	SAT/UNSAT
EVALUATOR NOTE: The following steps are from Section 6.2	
STEP 14.: **[1]** **IF** calculated average power in Section 6.1 *or on printed copy* and differs by more than 3% from average RCS delta T, **THEN** **NOTIFY** Engineering to determine the cause. STANDARD: Operator determines calculated average power and average delta T does not differ by more than 3% by comparing calculated average power against delta T from ICS or use 1-M-5 delta T instruments and N/As this step. COMMENTS:	___ SAT ___ UNSAT
STEP 15.: **[2]** **VERIFY** reactor power has remained constant (± 0.5%) since performance of section 6.1. STANDARD: Operator ensures power has remained stable since he/she took the readings. COMMENTS:	___ SAT ___ UNSAT
STEP 16.: **[3]** **IF** NIS power range channel is inoperable **THEN** **REQUEST** Instrument Maintenance to Bypass inoperable NIS channel in accordance with 0-PI-IXX-092-001.0. STANDARD: Operator N/As this step since all power range instruments are operable. COMMENTS:	___ SAT ___ UNSAT
STEP 17.: **[4]** **ENSURE** all NIS power range channels are operable or bypassed with no bistables tripped. STANDARD: Operator verifies no bistables tripped by monitoring Trip status panel, 1-XX-55-5, bistable llights on 1-M-5. (Initial conditions had all channels operable) COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD **SAT/UNSAT**

STEP 18.: **[5] ENSURE** rod control system is in MANUAL in accordance with 0-SO-85-1

___ SAT

___ UNSAT

STANDARD: Operator turns HS-85-5110, ROD CONTROL MODE SELECTOR, to the MANUAL position. Should refer to 0-SO-85-1. A laminated sheet is available.

COMMENTS:

Evaluator Note: Procedure contains a note stating ***Steps [6] through [9] must be completed on one NIS channel before proceeding to the next channel. Operator must adjust the N-41 and N-43, may choose to adjust all 4 channels.***

STEP 19.: **[6] IF** rate trip exists (or occurs) on the NIS channel being calibrated, **THEN**

CLEAR that channels trip signal (momentarily set RATE MODE switch to RESET position) and annunciator XA-55-6A,. "NC-41U or NC-41K NIS POWER RANGE HIGH NEUTRON FLUX RATE," before proceeding to the next NIS channel.

___ SAT

___ UNSAT

	Trip Cleared	N/A
NIS Channel N-41	☐	☐
NIS Channel N-42	☐	☐
NIS Channel N-43	☐	☐
NIS Channel N-44	☐	☐

Critical Step

STANDARD: Operator verifies NO rate trip signals are in on ANY of the PR and the annunciator is clear. * **CRITICAL PORTION: If rate trip occurs the operator resets it prior to continuing to the next channel.**

COMMENTS:

STEP/STANDARD | **SAT/UNSAT**

STEP 20.: **[7]** **ADJUST** gain potentiometer on associated channel's power range B drawer to bring that channel's indicated power level to within ± .5% of the calorimetric power recorded in section 6.1 or listed on the printed copy. **AND**

ENSURE gain potentiometer latch re-engaged.

	Adjustment Required	N/A
NIS Channel N-41	☐	☐
NIS Channel N-42	☐	☐
NIS Channel N-43	☐	☐
NIS Channel N-44	☐	☐

STANDARD: **Operator must adjust N41 and N43 to satisfy criteria.** The operator should repeat the above step prior to adjusting the second PR. **(only the bold portion of the standard is critical)**

COMMENTS:

N-41 adjustment

___ SAT

___ UNSAT

N-43 adjustment

___ SAT

___ UNSAT

Critical Step

STEP 21.: **[8]** **IF** fine gain potentiometer on power range B drawer will not provide enough adjustment to satisfy the calibration requirements of step **[7]**, **THEN REQUEST** Instrument Maintenance to adjust the coarse gain (resistor R312, Coarse Level Adjust) inside the applicable power range drawer, **AND**
READJUST fine gain potentiometer to achieve calibration requirements specified in step **[7]**.

	Adjustment Required	N/A
NIS Channel N-41	☐	☐
NIS Channel N-42	☐	☐
NIS Channel N-43	☐	☐
NIS Channel N-44	☐	☐

STANDARD: Operator marks step as N/a because the fine gain will provide the needed adjustment.

COMMENTS:

STEP/STANDARD **SAT/UNSAT**

STEP 22.: **[9]** **IF** additional NIS channel(s) require calibration, **THEN**

RETURN to step **[6]**

Evaluator note: Procedure step [6] is JPM step 19

STANDARD: Operator may return to step [6] to adjust either N41 or N43 or other 2 channels if desired. After adjustments to NIs is complete, the operator continues to the next step

COMMENTS:

N-41 adjustment

___ SAT

___ UNSAT

N-43 adjustment

___ SAT

___ UNSAT

STEP 23.: **[10]** **WHEN** NIS adjustments have been completed, **THEN**

RECORD the "as left" power level from NIS power range channels.

POWER RANGE CHANNEL	"AS-LEFT" NIS POWER (%)
N-41 (XI-92-5005B)	
N-42 (XI-92-5006B)	
N-43 (XI-92-5007B)	
N-44 (XI-92-5008B)	

STANDARD: Operator records the readings from each of the 4 PR NIs.

COMMENTS:

___ SAT

___ UNSAT

STEP 24.: **[11]** **IF** NIS power range channel is inoperable, **THEN**
REQUEST Instrument Maintenance to remove Bypass on inoperable NIS channel in accordance with 0-PI-IXX-092-001.0.

STANDARD: Operator N/As this step since all NIs are operable.

COMMENTS:

___ SAT

___ UNSAT

STEP/STANDARD | **SAT/UNSAT**

STEP 25.: **[12] CHECK** appropriate box to indicate whether the following "as left" acceptance criteria were satisfied.

ACCEPTANCE CRITERIA: The indicated NIS power level recorded in step [10] is within ± 0.5 percent the calorimetric power level recorded in Section 6.1 or as listed on the printed copy.

	YES	NO	N/A
NIS Channel N-41	☐	☐	☐
NIS Channel N-42	☐	☐	☐
NIS Channel N-43	☐	☐	☐
NIS Channel N-44	☐	☐	☐

STANDARD: Operator checks **YES** box for N41, N42, N43, & N44, all being within ± .5% (of 100%).

COMMENTS:

___ SAT

___ UNSAT

STEP 26.: **[13] IF** acceptance criteria were NOT satisfied for any NIS channel, **THEN NOTIFY** Shift Manager that acceptance criteria were NOT met and another performance of this test is necessary, subsequently action 2 of LCO 3.3.1.1 (Unit 1) or LCO 3.3.1 (Unit 2) must be satisfied if the other performance does not meet acceptance criteria.

STANDARD: Operator N/As this step.

COMMENTS:

___ SAT

___ UNSAT

STEP 27.: **[14] RETURN** rod control system to AUTO in accordance with 0-SO-85-1.

Cue: **When operator acknowledges the 3 minute wait in the note preceding the step, *Inform the operator that 3 minutes have elapsed.***

STANDARD: Operator places control rod bank selector switch to the AUTO after waiting at least 3 minutes for signal to decay. Should refer to 0-SO-85-1. A laminated sheet is available.

COMMENTS:

___ SAT

___ UNSAT

Job Performance Checklist

STEP/STANDARD		SAT/UNSAT
STEP 28.:	Notify SRO that the NIS channels have been calibrated.	___ SAT
STANDARD:	Operator notifies the SRO that the SI has been completed and all power range nuclear instruments have been adjusted to meet the acceptance criteria.	___ UNSAT Stop Time____
COMMENTS:		

END of JPM

CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

DIRECTION TO TRAINEE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

The unit is at steady state conditions with all NIS channels and LEFM operable.

INITIATING CUES:

You are the CRO and the US has directed you to perform 0-SI-OPS-092-078.0.

Section 4.0 of 0-SI-OPS-092-078.0 has been completed.

Notify the US when the SI has been completed and any necessary adjustments have been made.

SURVEILLANCE TASK SHEET (STS)
Page 1 of 1

SURVEILLANCE TASK SHEET (STS)

Work Order ______
SI Key PC085
Procedure No. 0-SI-OPS-092-078.0
Title POWER RANGE FLUX CHA
Perf. Section OPERATIONS
Test Reason SCHEDULED PERFORMANCE
Data Sheets ______
Due ______
Extension ______
Max. Extension ______
Frequency ______
EQ ______
ASME XI ______
APP Mode ______
Performance Mode ______
Operational Condition ______
Dry Cask Storage ☐ Yes ☐ No
Subsequent Reviews ______
Instruction ______

Page ______ of ______

Authorization to Begin: SRO ______ Date 01/XX/08 Time XXXX

Start Date ______ Time ______

Completion Date ______ Time ______

Name	Test Performer's Signature	Initial	Section
LARRY BUCE			OP

Was this a complete or partial performance? (Explain "Partial" in Remarks) Complete ☐ Partial ☐

Were all Tech Spec/Tech Req./ISFSI CoC/ODCM/Fire Protection Req. acceptance criteria satisfied? Yes ☐ No ☐ N/A ☐

Were all other acceptance criteria satisfied? Yes ☐ No ☐ N/A ☐

If all Tech Spec/Tech Req./ISFSI CoC/ODCM/Fire Protection Req. were not satisfied, was an LCO/TR/ODCM/OR action required? (Explain in Remarks) Yes ☐ No ☐ N/A ☐

Alert Scheduling Required Yes ☐ No ☐ N/A ☐

Test Director/Lead Performer ______ Date ______

Acceptance Criteria Review: SRO (ASME XI SIs require review within 96 hours) ______ Date ______ Time ______

Independent Reviewer ______ Date ______

ANII (If required) ______ Date ______

Remark:

Copy of STS sent to Scheduling ______ / ______ Initials ______ Date ______

Section ______ No. Men ______ Dur. Hrs ______
Section ______ No. Men ______ Dur. Hrs ______
Section ______ No. Men ______ Dur. Hrs ______
Section ______ No. Men ______ Dur. Hrs ______

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT

SURVEILLANCE INSTRUCTION

0-SI-OPS-092-078.0

POWER RANGE NEUTRON FLUX CHANNEL CALIBRATION BY HEAT BALANCE COMPARISON

Revision 18

QUALITY RELATED

PREPARED/PROOFREAD BY: W. T. LEARY

RESPONSIBLE ORGANIZATION: OPERATIONS

APPROVED BY: KEITH PERKINS

EFFECTIVE DATE: 03/30/06

LEVEL OF USE: **CONTINUOUS USE**

REVISION DESCRIPTION: Revised to add a note directing that consistency between channels be considered when determining if adjust is desired. This is a minor change.

THIS PROCEDURE COULD AFFECT REACTIVITY.

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TABLE OF CONTENTS

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1.0 INTRODUCTION

1.1 Purpose

This Surveillance Instruction (SI) provides detailed steps for ensuring proper calibration of the power range neutron flux channels.

1.2 Scope

1.2.1 Surveillance Test to be Performed

This Instruction performs a comparison between the power level calculated by the Nuclear Instrumentation System (NIS) power range neutron flux channels and the "true" power level as determined by a secondary system heat balance based value. If necessary, the power range channels are adjusted to agree with the "true" power level.

This instruction also verifies availability of Leading Edge Flow Meter (LEFM) calorimetric power.

1.2.2 Requirements Fulfilled

Performance of this Instruction completely fulfills Technical Specification (TS) Surveillance Requirement (SR) 4.3.1.1.1.B.2 (Table 4.3-1, item 2, note 2) and Technical Requirements Manual (TR) 4.3.3.15.1.

1.2.3 Modes

A. Applicable Mode - 1 (above 15 percent power).

B. Performance Mode - 1 (above 15 percent power).

1.3 Frequency and Conditions

This test must be performed at least once every 24 hours when the reactor power level is greater than 15 percent. **[C.3]** To ensure NIS accuracy, this test should be performed when directed by 0-GO-4 or 0-GO-5.

In the event that the Plant Computer is unavailable, provisions have been incorporated in this procedure to fulfill the SR requirements. **[C.5]**

2.0 REFERENCES

2.1 Performance References

0-PI-SXX-000-022.2, *Calorimetric Calculation.* (Optional)

2.2 Developmental References

A. SQN Technical Specifications.

B. SPP-8.1, *Conduct of Testing*

C. NP-STD-4.4.7, Attachment 1, *Writer's Guide for Technical Documents*

D. 0-PI-NUC-092-082.0, Post Startup NIS Calibration following Core Load.

E. Memo from Reactor Engineering - RIMS S57 941219 934

F. Integrated Computer System Critical Design Requirements and Operator's Guide.

3.0 PRECAUTIONS AND LIMITATIONS

A. Reactor power must remain constant (± 0.5%) during the performance of Sections 6.1 and 6.2. It is desirable for any required NIS adjustment be made promptly during performance of these sections.

B. Average RCS temperature (T_{avg}) should be maintained within 0.5°F of RCS reference temperature (T_{ref}).

C. Caution should be exercised when adjusting NIS power range instrumentation to minimize the potential for a channel trip.

D. Only one NIS channel shall be adjusted at a time. If a rate trip occurs, the channel's trip signal and annunciator on panel XA-55-6A, "NC-41U or NC-41K NIS POWER RANGE HIGH NEUTRON FLUX RATE" must be cleared before proceeding to the next NIS channel.

3.0 PRECAUTIONS AND LIMITATIONS (Continued)

E. Operations and Engineering should be notified if larger than normal channel adjustments (as determined by the SRO) are required to bring the power range channels into alignment with calculated core thermal power. **[C.4]** An operability concern may exist if excessive error in the non-conservative direction adversely impacts the NIS high flux trip setpoint. The 3% tolerance for calibration error on the high flux trip setpoints was selected using the extrapolated error from the 30% power level.

F. The reactor cores have been loaded with a low leakage loading pattern which can affect NIS Reactor Power level indications such that differences greater than the Acceptance Criteria can occur between NIS and true power level. The impact of the NIS non-linearity due to low leakage loading pattern is in the conservative direction, since NIS indicated power rises faster than true power during a power increase. 0-GO-5 may direct performance of this procedure to ensure excessive errors in the non-conservative direction do not exist. During plant restarts, Reactor Engineering may perform 0-PI-NUC-092-082.0 at 4% power to provide an initial NIS correction for startup.

G. Technical Specifications require a heat balance calculation for adjustment of the NIS when the Plant is above 15% power within 24 hours. If the Leading Edge Flow Meter (LEFM) is available, ICS point U2118 is required to be used for the heat balance when greater than 15% power (TRM 3.3.3.15). If LEFM is NOT available, then Loop ΔT data should be used between 15 and 40% power due to potential inaccuracies in the feedwater flow venturi heat balance below 40%. If LEFM is NOT available above 40%, then venturi-based calorimetric power (U1118) should be used.

Unit 1

Date xx/xx/08

4.0 PREREQUISITE ACTIONS

NOTE During the performance of this Instruction, any "**IF/THEN**" statement may be marked N/A when the corresponding stated condition does not occur.

4.1 Preliminary Actions

[1] **ENSURE** Instruction to be used is a copy of effective version and Data Package Cover Sheet is attached.

4.2 Measuring and Test Equipment, Parts, and Supplies

None.

4.3 Field Preparations

[1] **ENSURE** reactor power and RCS average temperature are stable.

4.4 Approvals and Notifications

[1] **NOTIFY** SRO of test performance. ☑

5.0 ACCEPTANCE CRITERIA

A. The indicated "as-found" power level from each operable NIS neutron flux channel must equal the core thermal power level to within ± 2.0%.

B. The indicated "as-left" power level from each operable NIS neutron flux channel that was adjusted must equal the core thermal power level to within ± 0.5%.

C. If the criteria stated above are NOT satisfied, the SRO shall be notified and Action Requirement 2 of TS Table 3.3-1 satisfied.

D. LEFM shall be used for the plant calorimetric measurement for power range NIS calibration by heat balance comparison. If this criteria is NOT satisfied, the SRO shall be notified and the applicable action of TRM 3.3.3.15 shall be entered.

Unit______________ Date____________

6.0 PERFORMANCE

6.1 As-Found Data

NOTE 1 The following step determines if LEFM is available to satisfy TRM 3.3.3.15. If LEFM is NOT available, operators should notify US, document status and continue with next step.

NOTE 2 Main feedwater temperature must be greater than or equal to 250°F for reliable LEFM data.

[1] **VERIFY** availability of LEFM calorimetric power:

[a] **CHECK** LEFM status NORMAL on ICS (NSSS and BOP) Current Calorimetric Data screen.

YES ☐ NO ☐ __________

[b] **CHECK** LEFM Core Thermal Power (ICS point U2118) showing good (green) data.

YES ☐ NO ☐ __________

[c] **CHECK** LEFM MFW header temperature (ICS point T8502MA) greater than or equal to 250°F.

YES ☐ NO ☐ __________

<u>**ACCEPTANCE CRITERIA**</u>: LEFM is available based upon the indications above.

Unit______________ Date____________

6.1 As-Found Data

NOTE With LEFM unavailable, AFD limit lines in COLR must be made more restrictive by 1% and Rod Insertion Limit lines in COLR must be raised by 3 steps. These adjustments are automatically applied in ICS.

[2] **IF** LEFM calorimetric power NOT available
OR ICS computer NOT available,
THEN

PERFORM the following:

[a] **ENTER** applicable action of TRM 3.3.3.15. __________

[b] **ENSURE** work order initiated as required. __________

[c] **IF** LEFM calorimetric power CANNOT be restored
in time to complete this surveillance,
THEN

PERFORM the following:

1. **REDUCE** reactor power to
98.7% (3411 MWt) or less
USING U1118 (if available) or NIS. __________

2. **WHEN** reactor power is less than 98.7%,
THEN

CONTINUE this instruction using
alternate power indications as
specified below. __________

Unit______________ Date____________

6.1 As-Found Data

NOTE If Engineering has performed 0-PI-SXX-000-022.2, then the applicable section(s) of 0-PI-SXX-000-022.2 may be used in place of Appendix C or D to obtain the current calorimetric power.

[3] **DETERMINE** reactor core power level by performing the applicable appendix below:

CONDITION	APPENDIX	✓
RCS ΔT greater than 15% and LEFM core thermal power (U2118) available (step **[1]** acceptance criteria met)	A	☐
RCS ΔT between 15% and 40% and LEFM core thermal power (U2118) NOT available	B	☐
RCS ΔT greater than 40% LEFM core thermal power (U2118) NOT available but ICS point U1118 is available	C	☐
RCS ΔT greater than 40% and ICS core thermal power indication (U1118 and U2118) NOT available	D	☐

AND RECORD below (N/A power if using printout from ICS):

% Rated Core Thermal Power = ____________ % _________

Unit_______________ Date_____________

6.1 As-Found Data (Continued)

NOTE Data for an inoperable NIS channel may be marked N/A.

[4] **RECORD** "as-found" power level from each of the four NIS power range A channel drawers:

POWER RANGE CHANNEL	"AS-FOUND" NIS POWER (%)
N-41 (XI-92-5005B)	
N-42 (XI-92-5006B)	
N-43 (XI-92-5007B)	
N-44 (XI-92-5008B)	

____

NOTE The following step is performed to satisfy Tech Specs.

[5] **COMPARE** NIS indication with core thermal power level.

[a] **CHECK** appropriate box to indicate whether the following "as-found" acceptance criteria were satisfied:

ACCEPTANCE CRITERIA: The indicated NIS power level recorded in step **[4]** is equal to the core thermal power level recorded in step **[3]** or as listed on the printed copy to within ± 2.0 percent.

	YES	NO	N/A
NIS Channel N-41	☐	☐	☐
NIS Channel N-42	☐	☐	☐
NIS Channel N-43	☐	☐	☐
NIS Channel N-44	☐	☐	☐

____

RO or SRO

Unit_______________ Date_____________

6.1 As-Found Data (Continued)

[b] **IF** any NIS channels were inoperable during the performance of this Instruction, **THEN**

NOTIFY applicable unit SRO that this SI must be performed on all inoperable NIS channels when they are returned to service. ___________

[6] **VERIFY** that all NIS channel indications are within ±3 percent of the determined core thermal power level.

YES ☐ NO ☐ ___________

[7] **IF** a NIS channel was more than 3 percent in error in the non-conservative direction (core thermal power > NIS), **THEN**

NOTIFY Engineering to determine if the calibration error impacts operability of the NIS high flux trip. ___________

[8] **CHECK** appropriate box to indicate whether the following "as-found" acceptance criteria were satisfied:

ACCEPTANCE CRITERIA: The indicated NIS power level recorded in step **[4]** is less than or equal to 100.5 percent.

	YES	NO	N/A
NIS Channel N-41	☐	☐	☐
NIS Channel N-42	☐	☐	☐
NIS Channel N-43	☐	☐	☐
NIS Channel N-44	☐	☐	☐

____

RO or SRO

6.1 As-Found Data (Continued)

NOTE Consistency between the four NIS PR channels is to be considered when determining if an adjustment is desired.

[9] **IF** any channel does not meet acceptance criteria, **OR**

NIS Channel Adjustment is desired, **THEN**

PERFORM adjustment using section 6.2

AND/OR

REDUCE reactor power not to exceed 100 percent. __________

END OF TEXT

Unit_______________ Date_____________

6.2 NIS Channel Adjustment

NOTE 1 Performance of this section is required only for those PR channels designated by the Reactor Operator or that did not satisfy the acceptance criteria in Section 6.1. All other NIS channels may be marked N/A.

NOTE 2 During the performance of Section 6.2, data required for an inoperable NIS channel may be marked N/A.

[1] **IF** calculated average power in Section 6.1 or on printed copy differs by more than 3% from average RCS delta T,
THEN

NOTIFY Engineering to determine the cause. __________

[2] **VERIFY** reactor power has remained constant (± 0.5 %) since performance of Section 6.1. __________

NOTE The inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels.

[3] **IF** NIS power range channel is inoperable,
THEN

REQUEST Instrument Maintenance to Bypass inoperable NIS channel in accordance with 0-PI-IXX-092-001.0. __________

[4] **ENSURE** all NIS power range channels are operable or bypassed with no bistables tripped. __________

[5] **ENSURE** rod control system is in MANUAL in accordance with 0-SO-85-1. ☐

Unit______________ Date____________

6.2 NIS Channel Adjustment (Continued)

NOTE 1 Steps **[6]** through **[9]** must be completed on one NIS channel before proceeding to the next channel.

NOTE 2 NIS channels in the following step may be performed out of sequence.

[6] **IF** a rate trip exists (or occurs) on the NIS channel being calibrated, **THEN**

CLEAR that channels trip signal (momentarily set RATE MODE switch to RESET position) and annunciator on panel XA-55-6A, "NC-41U or NC-41K NIS POWER RANGE HIGH NEUTRON FLUX RATE," before proceeding to the next NIS channel.

	Trip Cleared	N/A
NIS Channel N-41	☐	☐
NIS Channel N-42	☐	☐
NIS Channel N-43	☐	☐
NIS Channel N-44	☐	☐

First Person________________

CV________________

NOTE The gain potentiometers have latches which must be disengaged prior to adjustment, and re-engaged following adjustment.

[7] **ADJUST** gain potentiometer on associated channel's power range B drawer to bring that channel's indicated power level to within ± 0.5% of the calorimetric power recorded in Section 6.1 or as listed on the printed copy. **AND**

ENSURE gain potentiometer latch re-engaged. [C.2]

	Adjustment Required	N/A
NIS Channel N-41	☐	☐
NIS Channel N-42	☐	☐
NIS Channel N-43	☐	☐
NIS Channel N-44	☐	☐

First Person________________

CV________________

Unit_______________ Date_____________

6.2 NIS Channel Adjustment (Continued)

[8] **IF** fine gain potentiometer on power range B drawer will not provide enough adjustment to satisfy the calibration requirements of step **[7]**, **THEN**

REQUEST Instrument Maintenance to adjust the coarse gain (resistor R312, Coarse Level Adjust) inside the applicable power range drawer, **AND**

READJUST fine gain potentiometer to achieve calibration requirements specified in step **[7]**.

	Adjustment Required	N/A
NIS Channel N-41	☐	☐
NIS Channel N-42	☐	☐
NIS Channel N-43	☐	☐
NIS Channel N-44	☐	☐

First Person________________

CV________________

[9] **IF** additional NIS channel(s) require calibration, **THEN**

RETURN TO step **[6]**. __________

[10] **WHEN** NIS adjustments have been completed, **THEN**

RECORD "as-left" power level from NIS power range channels.

POWER RANGE CHANNEL	"AS-LEFT" NIS POWER (%)
N-41 (XI-92-5005B)	
N-42 (XI-92-5006B)	
N-43 (XI-92-5007B)	
N-44 (XI-92-5008B)	

First Person________________

IV________________

Unit______________ Date____________

6.2 NIS Channel Adjustment (Continued)

[11] **IF** NIS power range channel is inoperable, **THEN**

REQUEST Instrument Maintenance to remove Bypass on inoperable NIS channel in accordance with 0-PI-IXX-092-001.0. __________

[12] **CHECK** appropriate box to indicate whether the following "as-left" acceptance criteria were satisfied.

ACCEPTANCE CRITERIA: The indicated NIS power level recorded in step **[10]** is within ± 0.5 percent the calorimetric power level recorded in Section **6.1** or as listed on the printed copy.

	YES	NO	N/A
NIS Channel N-41	☐	☐	☐
NIS Channel N-42	☐	☐	☐
NIS Channel N-43	☐	☐	☐
NIS Channel N-44	☐	☐	☐

____
RO or SRO

[13] **IF** acceptance criteria were NOT satisfied for any NIS channel, **THEN**

NOTIFY Shift Manager that acceptance criteria were NOT met and another performance of this test is necessary, subsequently action 2 of LCO 3.3.1.1 (Unit 1) or LCO 3.3.1 (Unit 2) must be satisfied if the other performance does not meet acceptance criteria. __________

NOTE NIS channel adjustment may cause step change in input to rod control. A delay of at least 3 minutes prior to returning rod control to automatic will allow lead/lag signal to decay off.

[14] **RETURN** Rod Control System to AUTO in accordance with 0-SO-85-1. ☐

END OF TEXT

7.0 POST PERFORMANCE ACTIVITY

[1] **NOTIFY** SRO that test has been completed. ________

Unit _______
Date_______

APPENDIX A
Page 1 of 3

CALCULATION OF CORE THERMAL POWER USING LEFM

NOTE 1 ICS allows two options for blowdown flows:

Option #1 (Preferred) -use point [F2261A] which requires no operator entered data (computer automatically updates the blowdown flows).

Option #2 - use manually entered S/G blowdown flow rates.

NOTE 2 Computer point [F2261A] is more accurate than flow indicators located in the fan rooms. If the computer point is inoperable and blowdown flows from the FIS's are used, then indicated core thermal power may be a slightly different value.

[1] **ENSURE** S/G blowdown flows are updated by performing the following functions on ICS:

[a] **SELECT** "NSSS AND BOP". ☐

[b] **SELECT** "CALORIMETRIC FUNCTION MENU". ☐

[c] **SELECT** "UPDATE OPERATOR ENTERED BLOWDOWN FLOW" on menu **AND**

PERFORM one of the following options (N/A option not used): ☐

1. **IF** using computer point [F2261A] S/G Total Blowdown Flow, **THEN**

(a) **VERIFY** point value is updating (changing values). ☐

(b) **IF** computer point is NOT updating, **THEN**

NOTIFY MIG that point is not updating and initiate WO. ☐

Unit ________
Date________

APPENDIX A
Page 2 of 3

NOTE Local readings of steam generator blowdown flow are obtained from Panel L-357.

2. **IF** manually updating blowdown flows, **THEN**

[a] **RECORD** local readings for S/G blowdown flow: ____________

RCS LOOP	BLOWDOWN FLOW (GPM)
1	____________ FI-1-152
2	____________ FI-1-156
3	____________ FI-1-160
4	____________ FI-1-164

[b] **ENSURE** blowdown flows above entered in ICS. ____________

[c] **IF** blowdown flows were updated, **THEN**

WAIT a minimum of 10 minutes to allow program to accurately reflect new value. ☐

Unit _______

Date_______

APPENDIX A

Page 3 of 3

NOTE ICS printout may be used to document power level and NIS values. Since core thermal power fluctuates, a slight deviation may exist between the recorded core thermal power value (if used) and the printed sheet value (if used). SI acceptance is satisfied in the body of the instruction.

[2] **SELECT** "DISPLAY CURRENT CALORIMETRIC DATA" on ICS Calorimetric menu **AND**

PERFORM one of the following: ☐

[a] **RECORD** the following:

LEFM Core Thermal Power (U2118) _____________ Mwt

Percent Rated Core Thermal Power (U1127) _____________ %

OR

[b] **PRINT** power level and NIS values **AND**

ATTACH report to this instruction. ☐

Unit ________
Date________

APPENDIX B
Page 1 of 1

SUBSTITUTION OF RCS ΔT AT LOW POWER LEVELS (≤ 40% WITH LEFM NOT AVAILABLE)

NOTE 1 RCS delta T loops (ΔT°) are aligned to results of a secondary-side heat balance. Consequently, using ΔTs to adjust NIS at low power levels still satisfies the requirement to use heat balance. Loop ΔT is used to avoid potentially non-conservative errors in NIS power range indication if adjustments were made based upon an inaccurate secondary heat balance at a low feedwater flowrate. At low power levels the traditional secondary-side heat balance (U1118) is not as accurate as Reactor Coolant Loop ΔT's.

NOTE 2 This appendix should NOT be used if LEFM is operable.

[1] **CALCULATE** the average RCS delta T using control board indications or computer point for average RCS ΔT.

Loop A (TI-68-2D) ______________%

PLANT COMPUTER

Loop B (TI-68-25D) ______________% **OR** U0485 _______%

Loop C (TI-68-44D) ______________%

Loop D (TI-68-67D) ______________%

Total _____________% ÷ (4) = Avg __________ %

____

[2] **RECORD** average RCS delta T as the core thermal power level _____________%.

____

Unit _______
Date_______

APPENDIX C
Page 1 of 3

CALCULATION OF CORE THERMAL POWER LEVEL USING U1118 (> 40% WITH LEFM NOT AVAILABLE)

NOTE 1 This appendix is used when RCS ΔT is greater than 40% and LEFM (U2118) NOT available, but ICS and U1118 are available.

NOTE 2 ICS allows two options for blowdown flows:

Option #1 (Preferred) - use point **[F2261A]** which requires no operator entered data (computer automatically updates the blowdown flows).

Option #2 - use manually entered S/G blowdown flow rates.

NOTE 3 Computer point **[F2261A]** is more accurate than flow indicators located in the fan rooms. If the computer point is inoperable and blowdown flows from the FIS's are used in the calculation of U1118, then expect U1118 to indicate a different value and adjustment of NIS may be required.

[1] **ENSURE** S/G blowdown flows are updated by performing the following on ICS:

[a] **SELECT** "NSSS AND BOP". ☐

[b] **SELECT** "CALORIMETRIC FUNCTION MENU" ☐

[c] **SELECT** "UPDATE OPERATOR ENTERED BLOWDOWN FLOW" on menu **AND**

PERFORM one of the following options (N/A option not used): ☐

1. **IF** using computer point **[F2261A]** S/G Total Blowdown Flow, **THEN**

[a] **VERIFY** point value is updating (changing values). ☐

[b] **IF** computer point is **NOT** updating, **THEN**

NOTIFY MIG that point is not updating and initiate WO. ☐

Unit _______
Date_______

APPENDIX C
Page 2 of 3

NOTE Local readings of steam generator blowdown flow are obtained from Panel L-357.

2. **IF** manually updating blowdown flows, **THEN**

[a] **RECORD** local readings for S/G blowdown flow: ___________

RCS LOOP	BLOWDOWN FLOW (GPM)
1	________ FI-1-152
2	________ FI-1-156
3	________ FI-1-160
4	________ FI-1-164

[b] **ENSURE** blowdown flows above entered in ICS. ___________

[c] **IF** blowdown flows were updated, **THEN**

WAIT a minimum of 10 minutes to allow program to accurately reflect new value. ☐

Unit _______
Date_______

APPENDIX C
Page 3 of 3

NOTE ICS printout may be used to document power level and NIS values. Since core thermal power fluctuates, a slight deviation may exist between the recorded core thermal power value (if used) and the printed sheet value (if used). SI acceptance is satisfied in the body of the instruction.

[2] **SELECT** "DISPLAY CURRENT CALORIMETRIC DATA" on ICS Calorimetric menu **AND** ☐

PERFORM one of the following:

[a] **RECORD** the following:

Venturi Core Thermal Power (U1118) _____________ Mwt

Percent Rated Core Thermal Power (U1127) _____________ %

OR

[b] **PRINT** power level and NIS values **AND**

ATTACH report to this instruction. ☐

[3] **IF** any value is a blue "NCAL" quality, **THEN** **PERFORM** the following:

[a] **IF** cause of bad data is unknown, **THEN** **REQUEST** assistance from MIG or ICS computer engineer. ☐

[b] **INITIATE** WO if required. ☐

[c] **GO TO** Appendix D. ☐

Unit _______
Date_______

APPENDIX D

CALCULATION OF CORE THERMAL POWER LEVEL WITH INOPERABLE PLANT COMPUTER
(RCS ΔT Greater Than 40%)

NOTE 1 This appendix provides guidance determining calorimetric power when ICS core thermal power indication (U1118 and U2118) is unavailable with power above 40% and the computer cannot be restored in time to complete SR 4.3.1.1.1.

NOTE 2 0-PI-SXX-000-022.2 requires several hours from initiation until completion of power calculation.

[1] **IF** 0-PI-SXX-000-022.2 will be used for calorimetric data,
THEN

PERFORM the following:

[a] **NOTIFY** Systems Engineering to perform manual calorimetric calculation using 0-PI-SXX-000-022.2. ☐

[b] **MARK** remaining steps "N/A" in this appendix. ☐

Unit _______
Date_______

NOTE 1 The remaining steps determine core thermal power by manually entering calorimetric data on opposite unit's ICS computer. This method requires adding 3.5% to the calculated power level for additional conservatism due to greater errors associated with indicator error and readability. Therefore, power level should be reduced to less than or equal to 96.5% before performance.

NOTE 2 Calorimetric calculation on opposite unit's ICS assumes that blowdown flow is identical on each unit. This error is accounted for in the 3.5% correction factor.

[2] **IF** opposite unit's ICS will be used to perform a calorimetric calibration,
THEN

PERFORM the following:

[a] **ENSURE** reactor power less than or equal to 96.5%. ☐

[b] **ENSURE** reactor power and RCS temperature stable. ☐

Unit _______
Date_______

APPENDIX D
Page 3 of 7

NOTE 1 If ICS is unavailable, LEFM Feed flow and feed temperature may still be available on LEFM panel [LOCL-500-R183] in Aux Inst Rm.

NOTE 2 MFW header temp must be greater than 250°F for reliable LEFM data.

[3] **IF** LEFM feed flow and feed temperature is available on local LEFM panel, **THEN**

PERFORM the following:

[a] **RECORD** the following data:

Parameter	Indication	Reading
Loop 1 Feedwater Pressure	PI-3-37 [M-3]	psig
Loop 2 Feedwater Pressure	PI-3-50 [M-3]	psig
Loop 3 Feedwater Pressure	PI-3-92 [M-3]	psig
Loop 4 Feedwater Pressure	PI-3-105 [M-3]	psig
Loop 1 S/G Pressure	PI-1-2A or 2B [M-4]	psig
Loop 2 S/G Pressure	PI-1-9A or 9B [M-4]	psig
Loop 3 S/G Pressure	PI-1-20A or 20B [M-4]	psig
Loop 4 S/G Pressure	PI-1-27A or 27B [M-4]	psig
Total Feedwater Flow	LEFM	lbm/hr
Feedwater Temperature (must be > 250°F)	LEFM	°F

____

____
IV

[b] **SELECT** Calorimetric Main Menu screen on other unit's ICS computer. ☐

(step continued on next page)

Unit ________
Date________

APPENDIX D
Page 4 of 7

[3] (Continued)

[c] **SELECT** LEFM Special Offline Calorimetric on Calorimetric Menu. ☐

[d] **ENTER** data in ICS from table in substep **3 [a]**. ________

[e] **SELECT** function key F3 to execute calculation. ☐

[f] **PRINT** calorimetric results. ☐

[g] **VERIFY** data was correctly entered in ICS from table in substep **3 [a]**. ________
IV

[h] **RECORD** Total S/G Thermal Power from calorimetric printout:

__________MWt ________

[i] **CALCULATE** percent power corresponding to item **[h]**

$\frac{\_\_\_\_\_\_\_\_\_\_ \text{MWt}}{34.55} = \_\_\_\_\_\_\_\_ \%$ ________

NOTE The following step adds 3.5% to calorimetric power to compensate for additional errors in this method. The corrected power value below should be used in Section 6.1.

[j] **CALCULATE** corrected core thermal power:

(substep **[i]**)________% + 3.5 % = ________ % ________

[k] **VERIFY** substeps **[g]** through **[j]**. ________
IV

Unit _______
Date_______

NOTE 1,2-PI-ICC-003-036.0 provides details on required test equipment for feedwater temperature measurement.

[4] **IF** LEFM feed flow and feed temperature is NOT available, **THEN**
PERFORM the following:

[a] **NOTIFY** MIG or Systems Engineering to install precision temperature monitoring equipment in feedwater header temperature wells TW-3-197 and TW-3-198 [TB el. 685]. ☐

[b] **RECORD** average feedwater header temperature:

__________ °F

____
MIG or Eng

____
IV

(step continued on next page)

Unit ________
Date________

APPENDIX D
Page 6 of 7

[4] (Continued)

[c] **RECORD** the following data:

Parameter	Indication	Reading
Loop 1 Feedwater Press	PI-3-37 [M-3]	psig
Loop 2 Feedwater Press	PI-3-50 [M-3]	psig
Loop 3 Feedwater Press	PI-3-92 [M-3]	psig
Loop 4 Feedwater Press	PI-3-105 [M-3]	psig
Loop 1 S/G Pressure	PI-1-2A or 2B [M-4]	psig
Loop 2 S/G Pressure	PI-1-9A or 9B [M-4]	psig
Loop 3 S/G Pressure	PI-1-20A or 20B [M-4]	psig
Loop 4 S/G Pressure	PI-1-27A or 27B [M-4]	psig
Loop 1 Feedwater Flow	FI-3-35A or 35B [M-4]	lbm/hr
Loop 2 Feedwater Flow	FI-3-48A or 48B [M-4]	lbm/hr
Loop 3 Feedwater Flow	FI-3-90A or 90B [M-4]	lbm/hr
Loop 4 Feedwater Flow	FI-3-103A or 103B [M-4]	lbm/hr

____

____
IV

[d] **SELECT** Calorimetric Main Menu screen on other unit's ICS computer. ☐

[e] **SELECT** Special Offline Calorimetric on Calorimetric Menu. ☐

(step continued on next page)

Unit _______
Date_______

[4] (Continued)

[f] **ENTER** data in ICS from substeps **4 [b]** and **4 [c]**. __________

[g] **SELECT** function key F3 to execute calculation. ☐

[h] **PRINT** calorimetric results. ☐

[i] **VERIFY** data from substeps **4 [b]** and **4 [c]** was correctly entered in ICS. __________ IV

[j] **RECORD** Total S/G Thermal Power from calorimetric printout:

_________MWt __________

[k] **CALCULATE** percent power corresponding to item **[j]**

$$\frac{\_\_\_\_\_\_\_\_\_\text{MWt}}{34.55} = \_\_\_\_\_\_\_ \%$$ __________

NOTE The following step adds 3.5% to calorimetric power to compensate for additional errors in this method. The corrected power value below should be used in Section 6.1.

[l] **CALCULATE** corrected core thermal power:

(substep **[k]**)_______% + 3.5 % = ________ % __________

[m] **VERIFY** substeps **[j]** through **[l]**. __________ IV

SOURCE NOTES

Page 1 of 1

REQUIREMENTS STATEMENT	SOURCE DOCUMENT	IMPLEMENTING STATEMENT
Ensure calculation of thermal power is correct before calibrating excore detectors.	INPO SER 89-23 CAQR SQQ 90052	C.1
Excore detectors should be calibrated based on best available power indication.	INPO SER 89-09	C.2
NIS power range calibrations should be performed periodically following power ascension above 15% power.	INPO SOER 90-03	C.3
Careful consideration and caution should be exercised before adjusting nuclear instrumentation. Operations and Engineering Management should be notified if larger than normal channel adjustments are required.	INPO SOER 90-03	C.4
0-SI-OPS-092-078.0 will be revised to allow the use of a Plant Computer program to provide an increased frequency of the performance of this procedure.	LER 328/91005 S10 910819 844	C.5

SIM JPM B.1.g

SEQUOYAH NUCLEAR PLANT
JOB PERFORMANCE MEASURE

B.1.g

JPM # 46-1

SHUTDOWN THE DIESEL GENERATORS

(1A-A & 1B-B)

PREPARED/ REVISED BY: ______________________ Date/ __________

VALIDATED BY: * ______________________ Date/ __________

APPROVED BY: ______________________ Date/ __________
(Operations Training Manager)

CONCURRED: ** ______________________ Date/ __________
(Operations Representative)

* Validation not required for minor enhancements, procedure Rev changes that do not affect the JPM, or individual step changes that do not affect the flow of the JPM.
** Operations Concurrence required for new JPMs and changes that affect the flow of the JPM (if not driven by a procedure revision).

NUCLEAR TRAINING

REVISION/USAGE LOG

REVISION NUMBER	DESCRIPTION OF REVISION	V	DATE	PAGES AFFECTED	PREPARED/ REVISED BY:
0	Initial Issue			ALL	

V - Specify if the JPM change will require another validation (Y or N).
See cover sheet for criteria.

SEQUOYAH NUCLEAR PLANT
RO/SRO
JOB PERFORMANCE MEASURE

Task:
Shutdown the Diesel Generators (1A-A & 1B-B)

JA/TA task # : 0640060101 (RO)

K/A Ratings:

064K1.01	(4.1/4.4)	064A1.08	(3.1/3.4)	064A2.04	(2.7/3.0)
064A2.08	(2.5/2.7)	064A2.13	(2.6/2.8)	064A3.03	(3.4/3.3)
064A3.06	(3.3/3.4)	064A4.06	(3.9/3.9)	064A4.01	(4.0/4.3)

Task Standard:
Diesel Generators "1A-A" & "1B-B" have been shutdown in accordance with EA-82-1.

Evaluation Method : Simulator __X__ In-Plant ________

==

Performer: ____________________________________
NAME

Start Time ________

Performance Rating : SAT _____ UNSAT _____ Performance Time _____

Finish Time _______

Evaluator: ______________________________/________
SIGNATURE DATE

==

COMMENTS

SPECIAL INSTRUCTIONS TO EVALUATOR:

1. Critical steps identified by an asterisk (*)
2. Sequenced steps identified by an "s"
3. Any UNSAT requires comments
4. Initialize simulator in IC #191.If IC-191 not available, reset to IC #5 Trip the reactor, use 1-M-1 handswitch to emergency start the diesels generators. Close TDAFW level control valves.
5. **When directed to perform section 4.2, set BOTH RF EGR11 and EGR12 to TEST and THEN BOTH back to NORMAL** to reset the D/G start signal. Set **EGR07** and **EGR 08** to **RESET** to reset the 86LOR for the DGs
6. Acknowledge/reset alarms on all panels.
7. This scenario will require a console operator.
8. Ensure operator performs the following required actions for **SELF-CHECKING;**
   a. Identifies the correct unit, train, component, etc.
   b. Reviews the intended action and expected response.
   c. Compares the actual response to the expected response.

Validation Time: CR. 20 mins **Local** ____________

Tools/Equipment/Procedures Needed:
EA-82-1,

References:

	Reference	Title	Rev No.
1.	EA-82-1	Placing D/Gs in Standby	2

===

READ TO OPERATOR

Directions to Trainee:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. The Unit tripped due to an inadvertent safety injection.
2. The safety injection has been terminated and the plant has been stabilized in MODE 3.
3. The Diesel Generators have been running unloaded for 2 hours and 40 minutes.
4. The status file is complete and there are no outstanding configuration log entries present for the Diesel Generators.

INITIATING CUES:

1. You are the Unit 1 CRO and have been directed to shutdown the Unit 1 Diesel Generators per EA-82-1.
2. The 1A-A D/G is to be shutdown first.
3. All Shutdown Boards are energized by offsite power and the SI signal has been reset.
4. Inform the SM when 1A and 1B D/Gs have been shutdown per EA-82-1.

Job Performance Checklist:

STEP/STANDARD | **SAT/UNSAT**

STEP 1.: Obtain appropriate copy of procedure.

STANDARD: Operator obtains a copy of EA-82-1 and procedes to Section 4.1.

COMMENTS:

___ SAT

___ UNSAT

Start Time____

STEP 2.: **1. SELECT** D/G to be shut down:

- D/G 1A-A _____
- D/G 1B-B _____
- D/G 2A-A _____
- D/G 2B-B _____.

STANDARD: Operator checks 1A-A and 1B-B diesel generators being selected.

COMMENTS:

___ SAT

___ UNSAT

STEP 3.: 2. **IF** EA-202-1 was NOT used to unload the selected D/G, **THEN** **DISPATCH** AUO to perform Section 4.2 to reset selected D/G emergency start signal.

Cue: ***Role Play as AUO and accept EA-82-1, Section 4.2. Report that you will report to him when complete.***

Booth Operator: **Set BOTH RF EGR11 and EGR12 to TEST and THEN BOTH back NORMAL** to reset the D/G start signal. Then, set **EGR07** and **EGR 08** to **RESET**

Cue: ***After performing the above, Role Play as AUO and report EA-82-1, Section 4.2 complete.***

STANDARD: Operator dispatches AUO with EA-82-1, section 4.2.

COMMENTS:

___ SAT

___ UNSAT

Critical Step

STEP 4.: 3. **GO TO** appropriate section based on table below:

IF SELECTED D/G	THEN GO TO SECTION	D/G 1A-A √	D/G 1B-B √	D/G 2A-A √	D/G 2B-B √
Unloaded greater than 2 hours.	Section 4.3, Purging D/G Combustibles.	☐	☐	☐	☐
Unloaded less than 2 hours.	Section 4.4, Shutting Down D/G.	☐	☐	☐	☐

STANDARD: Operator determines that section 4.3 is the appropriate section since the D/G has been running unloaded more than 2 hours. (also checks the 1A-A and 1B-B boxes.)

COMMENTS:

___ SAT

___ UNSAT

Job Performance Checklist:

STEP/STANDARD **SAT/UNSAT**

NOTE: **The following steps are from section 4.3.**

STEP 5.: 1. **POSITION** selected D/G MODE SELECTOR switch to PARALLEL:

D/G	MODE SELECTOR SWITCH	PARALLEL √
1A-A	HS-82-18	☐
1B-B	HS-82-48	☐
2A-A	HS-82-78	☐
2B-B	HS-82-108	☐

STANDARD: Operator places 0-HS-82-18, DG 1A-A MODE SELECTOR, to PARALLEL.

COMMENTS:

___ SAT

___ UNSAT

Critical Step

STEP 6.: 2. **TURN** selected D/G SYNCHRONIZE switch to SYN:

D/G	SYNCHRONIZE SWITCH	SYN √
1A-A	1-HS-57-47	☐
1B-B	1-HS-57-74	☐
2A-A	2-HS-57-47	☐
2B-B	2-HS-57-74	☐

STANDARD: Operator places 0-HS-57-47 DG 1A-A SYNCHRONIZE, to SYN.

COMMENTS:

___ SAT

___ UNSAT

Critical Step

STEP 7.: 3. **ENSURE** selected D/G VOLTAGE REGULATOR switch in PULL-P-AUTO:

D/G	VOLTAGE REGULATOR SWITCH	PULL-P-AUTO √
1A-A	HS-82-12	☐
1B-B	HS-82-42	☐
2A-A	HS-82-72	☐
2B-B	HS-82-102	☐

STANDARD: Operator verifies 0-HS-82-12, DG 1A-A VOLTAGE REGULATOR to PULL-P-AUTO.

COMMENTS:

___ SAT

___ UNSAT

Job Performance Checklist:

STEP/STANDARD | **SAT/UNSAT**

STEP 8.: 4. **ADJUST** running voltage to match incoming voltage **USING** D/G VOLTAGE REGULATOR switch:

D/G	INCOMING VOLTAGE	RUNNING VOLTAGE	VOLTAGE MATCHED √
1A-A	EI-82-4	EI-82-5	☐
1B-B	EI-82-34	EI-82-35	☐
2A-A	EI-82-64	EI-82-65	☐
2B-B	EI-82-94	EI-82-95	☐

STANDARD: Operator adjusts 0-HS-82-12, DG 1A-A VOLTAGE REGULATOR, to match voltages on 0-EI-82-4 and 0-EI-82-5.

COMMENTS:

___ SAT

___ UNSAT

Critical Step

STEP 9.: 5. **ADJUST** selected D/G SPEED CONTROL switch UNTIL associated synchroscope rotating slowly in FAST direction:

D/G	SPEED CONTROL SWITCH	SYNCHROSCOPE	SLOWLY IN FAST DIRECTION √
1A-A	HS-82-13	XI-82-1	☐
1B-B	HS-82-43	XI-82-31	☐
2A-A	HS-82-73	XI-82-61	☐
2B-B	HS-82-103	XI-82-91	☐

STANDARD: Operator adjust 0-HS-82-13 until synchroscope 0-XI-82-1 is rotating slowly in the fast direction.

COMMENTS:

___ SAT

___ UNSAT

Critical Step

STEP 10.: 6. **WHEN** synchroscope needle is at 12 o'clock" position, **THEN CLOSE** selected D/G output breaker:

D/G	SYNCHROSCOPE	D/G OUTPUT BREAKER	CLOSED √
1A-A	XI-82-1	1-HS-57-46A	☐
1B-B	XI-82-31	1-HS-57-73A	☐
2A-A	XI-82-61	2-HS-57-46A	☐
2B-B	XI-82-91	2-HS-57-73A	☐

STANDARD: Operator places 1-HS-57-46A to the close position when synchroscope 0-XI-82-1 is at the 12 0'clock position resulting in the closing of the DG electrical breaker as indicated by Red Light LIT above the breaker handswitch.

COMMENTS:

___ SAT

___ UNSAT

Critical Step

Job Performance Checklist:

STEP/STANDARD **SAT/UNSAT**

STEP 11.: 7. **ADJUST** selected D/G SPEED CONTROL switch to raise D/G MW load to 1.6 MW:

D/G	SPEED CONTROL SWITCH	D/G MEGAWATTS	1.6 MW √
1A-A	HS-82-13	EI-82-10A	☐
1B-B	HS-82-43	EI-82-40A	☐
2A-A	HS-82-73	EI-82-70A	☐
2B-B	HS-82-103	EI-82-100A	☐

STANDARD: Operator intermittently places 0-HS-82-13 to RAISE until the MW loading on 0-EI-82-10A increases to 1.6 mw.

COMMENTS:

___ SAT

___ UNSAT

Critical Step

STEP 12.: 8. **MAINTAIN** +1 MVAR (OUT) for selected D/G, **WHILE** paralleled with offsite power:

D/G	D/G VOLTAGE REGULATOR SWITCH	D/G MEGAVARS	+1 MVAR √
1A-A	HS-82-12	EI-82-11A	☐
1B-B	HS-82-42	EI-82-41A	☐
2A-A	HS-82-72	EI-82-71A	☐
2B-B	HS-82-102	EI-82-101A	☐

STANDARD: Operator places 0-HS-82-12 to RAISE to establish the MVAR loading on 0-EI-82-11A to +1 MVAR outgoing, then maintains this MVAR loading as the DG is loaded by intermittently placing 0-HS-82-12 to RAISE.

COMMENTS:

___ SAT

___ UNSAT

Critical Step

STEP 13.: 9. **DISPATCH** an AUO to selected D/G building to monitor stack exhaust WHILE loading selected D/G.

Cue: ***Role Play as AUO acknowledge the direction to monitor the D/G 1A-A exhaust stack.***

STANDARD: Operator dispatches an AUO to the D/G building to monitor D/G 1A-A exhaust.

COMMENTS:

___ SAT

___ UNSAT

STEP/STANDARD **SAT/UNSAT**

STEP 14.: 10. **LOAD** selected D/G to 4.0 MW **USING** its D/G SPEED CONTROL switch WHILE observing the following guidelines:

a. **IF** stack exhaust smoke becomes twice as dense as normal during loading, **THEN**
STOP D/G loading UNTIL condition clears.

b. **WHEN** exhaust smoke returns to normal, **THEN**
CONTINUE D/G loading.

c. **DO NOT CONTINUE** this procedure UNTIL the following conditions are met:

- D/G load at 4.0 MW
  AND
- Stack exhaust NORMAL.

___ SAT

___ UNSAT

Critical Step

Cue: ***When the AUO is asked, state the exhaust has cleared up and now appears normal.***

STANDARD: Operator loads the D/G 1A-A to 4.0 MW by intermittently placing 0-HS-82-13 to RAISE until the MW loading on 0-EI-82-10A increases to 4.0 mw.

COMMENTS:

STEP 15.: 11. **ADJUST** selected D/G SPEED CONTROL switch to lower D/G MW load to 0.5 MW:

D/G	SPEED CONTROL SWITCH	0.5 MW √
1A-A	HS-82-13	☐
1B-B	HS-82-43	☐
2A-A	HS-82-73	☐
2B-B	HS-82-103	☐

___ SAT

___ UNSAT

Critical Step

STANDARD: Operator places 0-HS-82-13 to LOWER until the MW loading on 0-EI-82-10A reduces to 0.5 mw.

COMMENTS:

STEP 16.: 12. **ADJUST** selected D/G VOLTAGE REGULATOR switch to lower D/G MVAR load to zero:

D/G	D/G VOLTAGE REGULATOR SWITCH	D/G MEGAVARS	0 MVAR √
1A-A	HS-82-12	EI-82-11A	☐
1B-B	HS-82-42	EI-82-41A	☐
2A-A	HS-82-72	EI-82-71A	☐
2B-B	HS-82-102	EI-82-101A	☐

___ SAT

___ UNSAT

Critical Step

STANDARD: Operator places 0-HS-82-12 to LOWER until the MVAR loading on 0-EI-82-11A reduces to 0.

COMMENTS:

Job Performance Checklist:

STEP/STANDARD | **SAT/UNSAT**

STEP 17.: 13. **PLACE** selected D/G output breaker control switch to TRIP:

D/G	D/G OUTPUT BREAKER	TRIPPED √
1A-A	1-HS-57-46A	☐
1B-B	1-HS-57-73A	☐
2A-A	2-HS-57-46A	☐
2B-B	2-HS-57-73A	☐

STANDARD: Operator places 1-HS -57-46A to the TRIP position.

COMMENTS:

___ SAT

___ UNSAT

Critical Step

STEP 18.: 14. **GO TO** Section 4.4 to shut down D/G.

STANDARD: Operator goes to section 4.4 to shut down the D/G 1A-A.

COMMENTS:

___ SAT

___ UNSAT

Evaluator Note: The following steps are from Section 4.4

STEP 19.: 1. **VERIFY** selected D/G unloaded with output breaker open:

D/G	D/G OUTPUT BREAKER	BREAKER HANDSWITCH	UNLOADED & OUTPUT BREAKER OPEN √
1A-A	1912	1-HS-54-46A	☐
1B-B	1914	1-HS-57-73A	☐
2A-A	1922	2-HS-54-46A	☐
2B-B	1924	2-HS-57-73A	☐

STANDARD: Operator verifies D/G 1A-a output breaker open by green light LIT over Handswitch 1-HS-54-46A.

COMMENTS:

___ SAT

___ UNSAT

STEP 20.: 2. **PLACE** selected D/G(s) CONTROL START-STOP switch to STOP:

D/G	D/G CONTROL START-STOP SWITCH	STOP √
1A-A	HS-82-14	☐
1B-B	HS-82-44	☐
2A-A	HS-82-74	☐
2B-B	HS-82-104	☐

NOTE: Operator may elect to turn the synchroscope on to verify D/G goes to idle speed when HS is placed to stop.

STANDARD: Operator places handswitch 0-HS-82-14, on panel 0-M-26, to the STOP.

COMMENTS:

___ SAT

___ UNSAT

Critical Step

Job Performance Checklist:

STEP/STANDARD	SAT/UNSAT

STEP 21.: 3. **WHEN** selected D/G(s) has run at idle speed (400 rpm) for 10 minutes, **THEN**
VERIFY D/G shuts down and speed drops to zero:

D/G	ZERO RPM √
1A-A	☐
1B-B	☐
2A-A	☐
2B-B	☐

NOTE: **Override AN:OVRDN[905] to OFF to clear the 40 RPM running alarm.**

Cue: ***When alarm clears, CUE: 10 minutes have elapsed***

Cue: ***If AUO notified, play role and state: D/G is now at zero speed.***

STANDARD: Operator addresses need to monitor this step. They may contact the AUO to have him/her contact the UO when speed is zero.

COMMENTS:

___ SAT

___ UNSAT

STEP 22.: 4. **ENSURE** selected D/G MODE SELECTOR switch in **PUSH IN UNIT** position:

D/G	MODE SELECTOR SWITCH	PUSH IN UNIT √
1A-A	1-HS-82-18	☐
1B-B	1-HS-82-48	☐
2A-A	2-HS-82-78	☐
2B-B	2-HS-82-108	☐

STANDARD: Operator places handswitch 1-HS-82-18, on panel 0-M-26, to be in PUSH TO UNIT position.

COMMENTS:

___ SAT

___ UNSAT

Critical Step

STEP 23.: 5. **ENSURE** selected D/G SYNCHRONIZE switch is in OFF:

D/G	SYNCHRONIZE SWITCH	OFF √
1A-A	1-HS-57-47	☐
1B-B	1-HS-57-74	☐
2A-A	2-HS-57-47	☐
2B-B	2-HS-57-74	☐

STANDARD: Operator places handswitch 1-HS-57-47, on panel 0-M-26, in the OFF position.

COMMENTS:

___ SAT

___ UNSAT

Job Performance Checklist:

STEP/STANDARD **SAT/UNSAT**

STEP 24.: 6. **WHEN** selected D/G(s) have cooled,
THEN
ENSURE ERCW valves to D/G heat exchangers closed:

D/G	ERCW TO D/G HEAT EXCHANGERS	CLOSED √
1A-A	1-HS-67-66A 1-HS-67-68A	☐ ☐
1B-B	1-HS-67-67A 1-HS-67-65A	☐ ☐
2A-A	2-HS-67-66A 2-HS-67-68A	☐ ☐
2B-B	2-HS-67-67A 2-HS-67-65A	☐ ☐

Cue: ***Play role of AUO: I will monitor D/G temperature and ensure DG 1A-A ERCW valves are closed when D/G reaches ambient temp.***

STANDARD: Operator addresses need to monitor this step. They may contact the AUO to have him/her monitor D/G temperatures and shut the ERCW valve, 1-FCV-67-66, when the D/G is at ambient conditions.

COMMENTS:

___ SAT

___ UNSAT

Critical Step

STEP 25.: 7. **GO TO** Section 4.1, step in effect.

STANDARD: Operator returns to section 4.1 and determines the other DG needs to be shutdown.

Cue: ***When candidate returns to section 4.1 to shutdown the other Diesel Generator, state "We'll stop here."***

COMMENTS:

___ SAT

___ UNSAT

Stop Time____

End of JPM

Directions to Trainee:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. The Unit tripped due to an inadvertent safety injection.
2. The safety injection has been terminated and the plant has been stabilized in MODE 3.
3. The Diesel Generators have been running unloaded for 2 hours and 40 minutes.
4. The status file is complete and there are no outstanding configuration log entries present for the Diesel Generators.

INITIATING CUES:

1. You are the Unit 1 CRO and have been directed to shutdown the Unit 1 Diesel Generators per EA-82-1.
2. The 1A-A D/G is to be shutdown first.
3. All Shutdown Boards are energized by offsite power and the SI signal has been reset.
4. Inform the SM when 1A and 1B D/Gs have been shutdown per EA-82-1.

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT

EOI PROGRAM MANUAL

EMERGENCY ABNORMAL PROCEDURE

EA-82-1

PLACING D/Gs IN STANDBY

Revision **2**

QUALITY RELATED

PREPARED/PROOFREAD BY: Marie Hankins

RESPONSIBLE ORGANIZATION: OPERATIONS

APPROVED BY: J.A. DVORAK

EFFECTIVE DATE: 26 May 03

REVISION DESCRIPTION: Revised section 4.4 to add steps to place the Mode Selector switch in PUSH IN UNIT position and turn the Sync Switch to OFF. This is an intent change.
Added HS UNID for D/G output breakers in section 4.4 step 1.
Added a note in section 4.1 to clarify D/G's have not been returned to TS operability but are placed in a condition for Auto Restart, if required prior to exiting the EOP's. This is a non-intent change.

1.0 PURPOSE

To shut down unloaded D/Gs and place the D/Gs in a standby condition. If a D/G has been running unloaded greater than 2 hours, this EAP will load it to purge combustibles and then unload it and shut it down.

2.0 SYMPTOMS AND ENTRY CONDITIONS

2.1 Entry Conditions

A. E-0, Reactor Trip or Safety Injection.

B. E-1, Loss of Reactor or Secondary Coolant.

C. E-3, Steam Generator Tube Rupture.

D. ECA-2.1, Uncontrolled Depressurization of All Steam Generators.

E. ECA-3.1, SGTR and LOCA - Subcooled Recovery.

F. ECA-3.2, SGTR and LOCA - Saturated Recovery.

G. ECA-3.3, SGTR Without Pressurizer Pressure Control.

H. ES-1.1, SI Termination.

I. ES-1.2, Post LOCA Cooldown and Depressurization.

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Precautions

A. If the accountability siren sounds, the operator should continue performing this procedure. The SOS will remain aware of procedure progress and location of performing personnel.

3.2 Limitations

A. This EAP does NOT meet all procedural and Technical Specification requirements for returning the D/Gs to a full standby condition. This procedure only returns the D/Gs to a condition for auto-restart to ensure availability if needed prior to exiting the EOPs.

4.0 OPERATOR ACTIONS

4.1 Section Applicability

1. **SELECT** D/G to be shut down:

   - D/G 1A-A _____
   - D/G 1B-B _____
   - D/G 2A-A _____
   - D/G 2B-B _____.

NOTE If EA-202-1 was used to unload the selected D/G, then the D/G emergency start signal and the shutdown board blackout relays have already been reset.

2. **IF** EA-202-1 was NOT used to unload the selected D/G, **THEN**

   DISPATCH AUO to perform Section 4.2 to reset selected D/G emergency start signal. ☐

3. **GO TO** appropriate section based on table below:

IF SELECTED D/G	**THEN GO TO SECTION**	**D/G 1A-A √**	**D/G 1B-B √**	**D/G 2A-A √**	**D/G 2B-B √**
Unloaded greater than 2 hours,	Section 4.3, Purging D/G Combustibles.	☐	☐	☐	☐
Unloaded less than 2 hours,	Section 4.4, Shutting Down D/G.	☐	☐	☐	☐

4.1 **Section Applicability** (Continued)

4. **IF** another D/G to be shut down,
   THEN
   GO TO Step 4.1.1 ☐

NOTE This procedure places the D/G's in a condition for Auto-Restart, if required prior to exiting the EOP's. Restoration to TS operability and procedural requirements for standby alignment is performed after the EOP's are exited.

5. **RETURN TO** procedure and step in effect. ☐

END OF SECTION

4.2 Resetting D/G Auto Start Signals

NOTE Performance of Steps 4.2.1 and 4.2.2 are required the first time this section is performed but their performance is not required on subsequent passes through this section.

1. **NOTIFY** UO to verify SI reset. ☐

2. **RESET** D/G emergency start signals by performing the following:

   [6.9 KV shutdown board room]

   a. **PLACE** all D/G **[43T(L)]** switches to TEST:

SHUTDOWN BOARD LOGIC PANEL	SWITCH	TEST √
1A-A	43T(L)	☐
1B-B	43T(L)	☐
2A-A	43T(L)	☐
2B-B	43T(L)	☐

   b. **VERIFY** emergency start signals RESET by observing amber lights lit:

SHUTDOWN BOARD LOGIC PANEL	AMBER LIGHT LIT √
1A-A	☐
1B-B	☐
2A-A	☐
2B-B	☐

4.2 Resetting D/G Auto Start Signals (Continued)

c. **PLACE** all D/G **[43T(L)]** switches to NOR:

SHUTDOWN BOARD LOGIC PANEL	SWITCH	NOR √
1A-A	43T(L)	☐
1B-B	43T(L)	☐
2A-A	43T(L)	☐
2B-B	43T(L)	☐

3. **PERFORM** the following:

a. **VERIFY** D/G **[86 LOR]** red lights DARK:

D/G RELAY BOARD	RED LIGHT DARK √
1A-A	☐
1B-B	☐
2A-A	☐
2B-B	☐

b. **PLACE** selected D/G **[86 LOR]** switch to RESET:

D/G RELAY BOARD	SWITCH	RESET √
1A-A	86 LOR	☐
1B-B	86 LOR	☐
2A-A	86 LOR	☐
2B-B	86 LOR	☐

4.2 Resetting D/G Auto Start Signals (Continued)

4. **GO TO** Section 4.1, step in effect. ☐

END OF SECTION

4.3 Purging D/G Combustibles

CAUTION **Only one diesel shall be operated in parallel with off-site power at any time.**

NOTE This section purges the D/G of any combustibles accumulated during the unloaded condition prior to shutting down the D/G.

1. **POSITION** selected D/G MODE SELECTOR switch to PARALLEL:

D/G	MODE SELECTOR SWITCH	PARALLEL √
1A-A	HS-82-18	☐
1B-B	HS-82-48	☐
2A-A	HS-82-78	☐
2B-B	HS-82-108	☐

2. **TURN** selected D/G SYNCHRONIZE switch to SYN:

D/G	SYNCHRONIZE SWITCH	SYN √
1A-A	1-HS-57-47	☐
1B-B	1-HS-57-74	☐
2A-A	2-HS-57-47	☐
2B-B	2-HS-57-74	☐

4.3 Purging D/G Combustibles (Continued)

3. **ENSURE** selected D/G VOLTAGE REGULATOR switch in PULL-P-AUTO:

D/G	VOLTAGE REGULATOR SWITCH	PULL-P-AUTO √
1A-A	HS-82-12	☐
1B-B	HS-82-42	☐
2A-A	HS-82-72	☐
2B-B	HS-82-102	☐

4. **ADJUST** running voltage to match incoming voltage **USING** D/G VOLTAGE REGULATOR switch:

D/G	INCOMING VOLTAGE	RUNNING VOLTAGE	VOLTAGE MATCHED √
1A-A	EI-82-4	EI-82-5	☐
1B-B	EI-82-34	EI-82-35	☐
2A-A	EI-82-64	EI-82-65	☐
2B-B	EI-82-94	EI-82-95	☐

5. **ADJUST** selected D/G SPEED CONTROL switch UNTIL associated synchroscope rotating slowly in FAST direction:

D/G	SPEED CONTROL SWITCH	SYNCHROSCOPE	SLOWLY IN FAST DIRECTION √
1A-A	HS-82-13	XI-82-1	☐
1B-B	HS-82-43	XI-82-31	☐
2A-A	HS-82-73	XI-82-61	☐
2B-B	HS-82-103	XI-82-91	☐

4.3 Purging D/G Combustibles (Continued)

NOTE When closing the D/G output breaker at 12 o'clock position, consideration should be given to speed of rotation of synchroscope needle and time it takes to close the breaker.

6. **WHEN** synchroscope needle is at 12 o'clock" position, **THEN CLOSE** selected D/G output breaker:

D/G	SYNCHROSCOPE	D/G OUTPUT BREAKER	CLOSED √
1A-A	XI-82-1	1-HS-57-46A	☐
1B-B	XI-82-31	1-HS-57-73A	☐
2A-A	XI-82-61	2-HS-57-46A	☐
2B-B	XI-82-91	2-HS-57-73A	☐

7. **ADJUST** selected D/G SPEED CONTROL switch to raise D/G MW load to 1.6 MW:

D/G	SPEED CONTROL SWITCH	D/G MEGAWATTS	1.6 MW √
1A-A	HS-82-13	EI-82-10A	☐
1B-B	HS-82-43	EI-82-40A	☐
2A-A	HS-82-73	EI-82-70A	☐
2B-B	HS-82-103	EI-82-100A	☐

8. **MAINTAIN** +1 MVAR (OUT) for selected D/G, **WHILE** paralleled with offsite power:

D/G	D/G VOLTAGE REGULATOR SWITCH	D/G MEGAVARS	+1 MVAR √
1A-A	HS-82-12	EI-82-11A	☐
1B-B	HS-82-42	EI-82-41A	☐
2A-A	HS-82-72	EI-82-71A	☐
2B-B	HS-82-102	EI-82-101A	☐

4.3 Purging D/G Combustibles (Continued)

9. **DISPATCH** an AUO to selected D/G building to monitor stack exhaust WHILE loading selected D/G. ☐

10. **LOAD** selected D/G to 4.0 MW
USING its D/G SPEED CONTROL switch
WHILE observing the following guidelines:

    a. **IF** stack exhaust smoke becomes twice as dense as normal during loading,
    THEN
    STOP D/G loading UNTIL condition clears. ☐

    b. **WHEN** exhaust smoke returns to normal,
    THEN
    CONTINUE D/G loading. ☐

    c. **DO NOT CONTINUE** this procedure
    UNTIL the following conditions are met:

        - D/G load at 4.0 MW ☐

        AND

        - Stack exhaust NORMAL. ☐

11. **ADJUST** selected D/G SPEED CONTROL switch
to lower D/G MW load to 0.5 MW:

D/G	SPEED CONTROL SWITCH	0.5 MW √
1A-A	HS-82-13	☐
1B-B	HS-82-43	☐
2A-A	HS-82-73	☐
2B-B	HS-82-103	☐

4.3 Purging D/G Combustibles (Continued)

12. **ADJUST** selected D/G VOLTAGE REGULATOR switch to lower D/G MVAR load to zero:

D/G	D/G VOLTAGE REGULATOR SWITCH	D/G MEGAVARS	0 MVAR √
1A-A	HS-82-12	EI-82-11A	☐
1B-B	HS-82-42	EI-82-41A	☐
2A-A	HS-82-72	EI-82-71A	☐
2B-B	HS-82-102	EI-82-101A	☐

13. **PLACE** selected D/G output breaker control switch to TRIP:

D/G	D/G OUTPUT BREAKER	TRIPPED √
1A-A	1-HS-57-46A	☐
1B-B	1-HS-57-73A	☐
2A-A	2-HS-57-46A	☐
2B-B	2-HS-57-73A	☐

14. **GO TO** Section 4.4 to shut down D/G. ☐

END OF SECTION

4.4 Shutting Down D/G

1. **VERIFY** selected D/G unloaded with output breaker open:

D/G	D/G OUTPUT BREAKER	BREAKER HANDSWITCH	UNLOADED & OUTPUT BREAKER OPEN √
1A-A	1912	1-HS-54-46A	☐
1B-B	1914	1-HS-57-73A	☐
2A-A	1922	2-HS-54-46A	☐
2B-B	1924	2-HS-57-73A	☐

2. **PLACE** selected D/G(s) CONTROL START-STOP switch to STOP:

D/G	D/G CONTROL START-STOP SWITCH	STOP √
1A-A	HS-82-14	☐
1B-B	HS-82-44	☐
2A-A	HS-82-74	☐
2B-B	HS-82-104	☐

3. **WHEN** selected D/G(s) has run at idle speed (400 rpm) for 10 minutes,
THEN
VERIFY D/G shuts down and speed drops to zero:

D/G	ZERO RPM √
1A-A	☐
1B-B	☐
2A-A	☐
2B-B	☐

4.4 Shutting Down D/G (Continued)

4. **ENSURE** selected D/G MODE SELECTOR switch in **PUSH IN UNIT** position:

D/G	MODE SELECTOR SWITCH	PUSH IN UNIT √
1A-A	1-HS-82-18	☐
1B-B	1-HS-82-48	☐
2A-A	2-HS-82-78	☐
2B-B	2-HS-82-108	☐

5. **ENSURE** selected D/G SYNCHRONIZE switch is in OFF:

D/G	SYNCHRONIZE SWITCH	OFF √
1A-A	1-HS-57-47	☐
1B-B	1-HS-57-74	☐
2A-A	2-HS-57-47	☐
2B-B	2-HS-57-74	☐

4.4 Shutting Down D/G (Continued)

6. **WHEN** selected D/G(s) have cooled,
THEN
ENSURE ERCW valves to D/G heat exchangers closed:

D/G	ERCW TO D/G HEAT EXCHANGERS	CLOSED √
1A-A	1-HS-67-66A 1-HS-67-68A	☐ ☐
1B-B	1-HS-67-67A 1-HS-67-65A	☐ ☐
2A-A	2-HS-67-66A 2-HS-67-68A	☐ ☐
2B-B	2-HS-67-67A 2-HS-67-65A	☐ ☐

7. **GO TO** Section 4.1, step in effect. ☐

END OF TEXT

5.0 REFERENCES

None.