Facility:	Sequoyah	Scenario No.:	2	Op Test No.:	2012-302
Examiners:	_____	Operators:	_____		
	_____		_____		

Initial Conditions:	Unit 1 is in MODE 1, 76% power, BOL
Turnover:	Raise power to 100% using 0-GO-5 Section 5.1. 1B EDG is OOS.
Target CTs:	Manually trip the main turbine before an orange path challenge develops to either the subcriticality (S) or the Pressurized Thermal Shock (P) CSF or before transition to ECA-2.1, whichever happens first.
	Manually trip all Reactor Coolant Pumps prior to completing step 4 of FR-H.1, LOSS OF SECONDARY HEAT SINK.
	Initiate RCS bleed and feed so that the RCS depressurizes sufficiently for the Safety Injection pump flow to occur prior to completing step 19 of FR-H.1.

Event No.	Malf. No.	Event Type*	Event Description
1.		R-ATC N- BOP/SRO	The crew raises plant power using 0-GO-5 section 5.1
2.	RX06A	I-ATC/SRO TS-SRO N-ATC	The controlling pressurizer level channel LT 68-339 will fail low resulting in letdown isolation and de-energizing Pressurizer heaters. The ATC will remove the channel from service and restore Pressurizer heaters using AOP-I.04. The SRO will address Tech Specs and determines the instrument is INOPERABLE. The ATC will restore letdown.
3.	RX02D1	I-ATC/SRO TS-SRO	The Loop #4 T-cold instrument will fail high. The ATC will place rod control in manual using Immediate Operator Actions and AOP-I.02. The SRO will address Tech Spec and determines the instrument is INOPERABLE.
4.	CN09 CN11B	C-BOP/SRO	Main Condenser Vacuum degrades with the standby Condenser Vacuum Pump failing to start automatically. The BOP manually starts the standby Condenser Vacuum Pump using AOP-S.02.
5.	FW23D	M-All	A Main Feed line break develops inside the Containment. The Reactor trips and the crew will transition to E-0.
6.	TC11ALL TC12ALL	C-BOP	The Main Turbine will fail to trip when the Reactor Trips, the BOP will manually trip the Main Turbine.
7.	ED06D FW07C FW22A	M-All	While performing E-0 all AFW pumps become unavailable resulting in a severe degradation of Heat Sink, the crew will transition to FR-H.1.
8.	CV22A CV22B		Both Charging Pump suction strainers clog resulting in a loss of all Charging Pumps. The crew will turn off RCP's and transition to FR-H.1 step 17 to initiate bleed and feed to establish once through cooling.

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

2012-302 Scenario 2 Summary

EVENT 1 – The crew raises plant power using GO-5 section 5.1 from 76% to 100% power

EVENT 2 - When directed by the lead examiner, the controlling pressurizer level channel LT 68-339 will fail low resulting in letdown isolation and de-energizing Pressurizer heaters. The ATC will remove the channel from service and restore Pressurizer heaters using AOP-I.04. The SRO will address Tech Specs and determines the instrument is INOPERABLE and enters LCO 3.3.1.1 Table 3.3-1 functional unit 11 Action 6; TS 3.3.3.7 Table 3.3-10 Functional Units 7 Action 2.

EVENT 3 - When directed by the lead examiner, the Loop #4 T-cold instrument will fail high. The ATC will place rod control to manual using Immediate Operator Actions. Additionally, the ATC will remove the affected instrument from service using AOP-I.02, RCS Loop RTD Instrument Malfunction. The crew may enter AOP-C.01, for the unexpected rod motion. The SRO will determine entry in to LCO actions: 3.3.1.1 Table 3.3-1, functional units 7 and 8 Action 6, and 14c Action 10, 3.3.2.1, functional units 6.c.i.c and 6.c.ii.c both Action 37 are required.

EVENT 4 - When directed by the lead examiner, Main Condenser Vacuum degrades with the standby Condenser Vacuum Pump failing to start automatically. The BOP manually starts the standby Condenser Vacuum Pump using AOP-S.02.

EVENT 5 - When directed by the lead examiner, a Main Feed line break develops inside the Containment. The Reactor trips and the crew will transition to E-0.

EVENT 6 - The Main Turbine will fail to trip when the Reactor Trips, the BOP will manually trip the Main Turbine.

EVENT 7 - While performing E-0 all AFW pumps become unavailable resulting in a severe degradation of Heat Sink, the crew will transition to FR-H.1. Both Charging Pump suction strainers clog resulting in a loss of all Charging Pumps. The crew will turn off RCP's and transition to FR-H.1 step 17 to initiate bleed and feed to establish once through cooling.

EVENT 8 - Both Charging Pump suction strainers clog resulting in a loss of all Charging Pumps. The crew will turn off RCP's and transition to FR-H.1 step 17 to initiate bleed and feed to establish once through cooling.

EOP flow: E-0, FR-H.1

The scenario terminates as directed by the Lead Examiner upon establishing RCS bleed and Feed.

BOOTH OPERATOR INSTRUCTIONS

Sim. Setup

1. Reset IC-14 76% power BOL time in core life
2. Perform switch check.
3. Verify control rod step counters reset.
4. Place simulator in RUN.
5. Place Mode 1 placard on panels.
6. Place B Train Week sign on the simulator.
7. Allow the simulator to run for at least 3 minutes before loading SCEN file or starting the exercise. This will initialize ICS.
8. Load SCENS: S-1211 NRC SCN 2
9. Acknowledge any alarms, allow the plant to stabilize, and freeze the simulator.
10. Place 1-HS-57-73A (D/G Bkr) in the PTL.
11. Place 0-HS-82-48 (Mode sel switch) in the PULL FOR LOCAL position.
12. Place OOS tags on
    - Breaker 1914, 1B-B EDG to SD Bd 1A-A
13. Place GO-16 tags on
    - CCP 1A-A
    - Pzr heater 1A-A
    - Pzr heater 1D
    - SI Pump 1A-A
    - RHR Pump 1A-A
    - EGTS Train A-A
    - Cntmt Spray Pump 1A-A
    - Motor Driven AFW Pump 1A-A
    - Unit 1 TDAFWP
    - ERCW Pump J-A OR Q-A (circle one)
    - ERCW Pump K-A OR R-A (circle one)
    - Diesel Generator 1A-A
14. Perform the SIMULATOR OPERATOR CHECKLIST
15. Place turnover sheets on the operator's desks.
16. Place an in-progress copy of GO-5 Section 5.1 on the operator's desks.
17. Place simulator in RUN before crew enters the simulator.

1211-302 SCN 2 Booth Instructions

EVENT	IC/MF/RF/OR #	DESCRIPTION/EXPECTED ACTIONS/BOOTH FEEDBACK
This override is active when the SCN file is loaded.	IMF EG03B f:1 IRF EGR12 f:1 IMF EGCOHS5773A f:3 IOR ZLOHS5773A_M26_GREEN f:0 IOR ZLOHS5773_GREEN F:0 IMF AN_OV_959 f:2 IMF AN_OV_936 f:2 IMF AN_OV_938 f:2 IMF AN_OV_943 f:2 IMF AN_OV_945 f:2 IMF AN_OV_946 f:2 IMF AN_OV_950 f:2 IMF AN_OV_952 f:2 IMF AN_OV_953 f:2	These MFs, RFs, and ORs simulate 1B-B D/G being inop for maintenance and tripped to local. Place 1-HS-57-73A (D/G Bkr) in the PTL position and PLACE H.O. ON HAND SWITCH. Place 0-HS-82-48 (Mode sel switch) in the PULL FOR LOCAL position.
This malfunction is active when the SCN file is loaded	IMF RP16K616A f:1 IMF RP16K616B f:1	MSIV's 1-4 and 1-11 fail to AUTO CLOSE
This malfunction is active when the SCN file is loaded	IMF FW07C f:1 e:1	The TD AFW pump trips due to overspeed.
This malfunction is active when the SCN file is loaded	IMF FW22A f:1 d:60 e:1	1A-A MD AFW pump becomes airbound.
This malfunction is active when the SCN file is loaded	IMF CV22A f:100 r:180 e:1 IMF CV22B f:100 r:180 e:1	Charging Pumps suction become clogged.
This malfunction is active when the SCN file is loaded	IMF TC11ALL f:1 IMF TC12ALL f:1	Main Turbine Auto trip failure.
This malfunction is active when the SCN file is loaded	IMF ED06D f:1 d:120 e:1	Loss of B 6.9 kv SD Board.
After Crew completes Reactivity brief, use **KEY 2** to insert malfunction.	IMF RX06A f:1 k:2	CONTROLLING PZR LEVEL TRANSMITTER FAILS LOW CHNL LT 68-339 **When contacted, inform the crew that the I&C will report to the MCR in ~ 45 minutes.** **If Dispatched to Aux Control Room, inform crew that pressurizer level indicator reading correctly.**

1211-302 SCN 2 Booth Instructions

When directed by the Lead Examiner, use **KEY 3** to insert malfunction.	IMF RX02D1 f:630 r:120 k:3	RC Loop #4 T-cold Fails High Support staff: When MSS is contacted to trip bistables, inform the crew that I&C will report to the MCR in ~25 minutes.
When directed by the Lead Examiner, while the SRC is evaluating Tech Specs use **KEY 4** to insert malfunction.	IMF CN09 f:0.07 k:4 [pre-insert] IMF CN 11B f:1 MMF CN09 f:0 when the power reduction is started.	Loss of Condenser Vacuum- Leak 1B Condenser Vacuum Pump fails to start automatically; Support staff: When personnel are dispatched, wait ~5 minutes and report that the vacuum breaker flange is leaking. If requested, report the 1B Condenser Vacuum Pump is running; post start-up checks are as expected; and MT gland sealing steam regulator is closed by local observation.; If requested, respond when sent to look for vacuum leaks. If requested call the CR as WCC after the main turbine load reduction has started, report a small leak was found on a vacuum breaker flange, Mech Maint has made a temporary repair and it appears to be holding.
When directed by the Lead Examiner, use **KEY 6** to insert malfunction.	IMF FW23D f:100 r:60 k:6	FW Line Break inside Containment.

Triggered from reactor trip (e:1)	IMF ED06D f:1 d:120 e:1	Loss of B 6.9 kv SD Board. Support staff: If contacted respond as the Transmission Operator, report there is a major grid disturbance and there is no estimated time for restoration.
Triggered from reactor trip (e:1)	IMF CV22A f:100 r:180 e:1 IMF CV22B f:100 r:180 e:1	Both Charging Pumps suction become clogged. Support staff: If directed wait 5 minutes and respond, no problem found.
Triggered from reactor trip (e:1)	IMF FW22A f:1 d:60 e:1	1A-A MD AFW pump becomes airbound. Support staff: If directed respond as an AUO, wait 15 minutes then report there restoring the pump is not successful.
Triggered from reactor trip (e:1)	IMF FW07C f:1 e:1	The TD AFW pump trips due to overspeed. Support staff: WHEN personnel are dispatched, wait ~7 min THEN inform the crew that the overspeed trip has actuated and cannot be reset.

Time: Now Date: Today

- **Unit 1 MCR Checklist** (751-6338 ID 950848) Then Press 2

Part 1 - Completed by Off-going Shift / Reviewed by On-coming Shift	
Mode 1, 76% Power **PSA Risk: Green** **Grid Risk: Green** **RCS Leakage ID .14 gpm, UNID .05 gpm**	**NRC phone Authentication Code** **Until 0800 A12B** **After 0800 C34D**

Common Tech Spec Actions

LCO/TRM	Equipment INOP	Time INOP	Owner	RTS
NONE				

U-1 Tech Spec Actions

LCO/TRM	Equipment INOP	Time INOP	Owner	RTS

1B-B EDG out of service for maintenance. LCO 3.8.1.1 Action B entered 2 hours ago, return to service in 4 hours.

Exo Sensor Plasma Display Unit XI-94-102 OOS due to an internal failure. LCO 3.3.3.7 action 1a entered 4 days ago, return to service in 6 days.

Protected Equipment

A Train

Shift Priorities

Raise power from 76% to 100%.

Part 2 – Completed by on-coming shift prior to assuming duties:	
☒ Review current TS/TRM/ODCM/FPR Required Actions	☒ Current Qualification Status
☒ Review the current controlling Reactivity Management Plans	☒ Walkdown MCR Control Boards with off-going Operator
☒ SR/PER reviews complete for previous shift (SM/US/STA)	☒ Review Narrative Logs (previous day and carry-over items)
☒ Relief Time:_____	☒ Relief Date:_____

Part 3 – Completed by on-coming shift. These items may be reviewed after assuming duties:	
☐ Review Operator Workarounds, Burdens, and Challenges (applicable Unit/Station)	☐ Review applicable ODMI actions (first shift of shift week)
☐ Review changes in Standing/Shift orders since last shift worked)	☐ Review changes to TACFs issued (since last shift worked)
☐ Review Control Room Deficiencies (first shift of shift week)	☐ Review Component Deviation Log (Active Procedures)

Time: Now Date: Today

Abnormal Equipment Lineup/Conditions:

MAIN CONTROL ROOM (7690) (593-5409)

AUXILIARY BUILDING (7775) (593-2469)

All equipment operating or operable.

TURBINE BUILDING 7771

All equipment operating or operable.

OUTSIDE (7666) (593-0122)

1B-B EDG out of service

Time: Now Date: Today

Required Additional Monitoring and Contingencies
(Updated and Maintained by SM)

Issue	Required Action	Expiration Date
ODMI		

TACF	Description
TACF	•

UNIT ONE REACTIVITY BRIEF

Date: Today Time: Now

General Information

RCS Boron: **1070** ppm Today		BA Controller Setpoint: **27%** *	RCS B-10 Depletion: **40** ppm
Operable BAT: **A**	BAT A Boron: **6850** ppm	BAT C Boron: **6850** ppm	RWST Boron: **2601** ppm
Nominal Gallons per rod step from 219: **7** gallons of acid, **42** gallons of water			

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

Estimated values for a 1° Change in Tave **

Gallons of acid: **32**	Gallons of water: **227**	Rod Steps: **5**

Estimated rods/boron for emergency step power reduction **

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

Power reduction amount	Estimated Final Rod Position	Estimated boron addition
10%	**198** Steps on bank D	**107** gallons
30%	**175** Steps on bank D	**312** gallons
50%	**156** Steps on bank D	**506** gallons

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

Previous Shift Reactivity Manipulations

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

Current Shift Estimated Reactivity Manipulations

Number of dilutions: 3	Number of borations: 0	Rod steps in: 0
Gallons per dilution: 40	Gallons per boration: 0	Rod steps out: 0
Total expected dilution: 120	Total expected boration: 0	Net change: 0 In/Out

Remarks:

Power ascension in progress.

Unit Supervisor: _____

Name/Date

Operations Chemistry Information

Boron Results					
Sample Point	**Units**	**Boron**	**Date / Time**	**Goal**	**Limit**
U1 RCS	ppm	1070	Today / Now	Variable	Variable
U2 RCS	ppm	816	Today / Now	Variable	Variable
U1 RWST	ppm	2601	Today / Now	2550 - 2650	2500 - 2700
U2 RWST	ppm	2569	Today / Now	2550 - 2650	2500 - 2700
BAT A	ppm	6850	Today / Now	Variable	Variable
BAT B	ppm	6850	Today / Now	Variable	Variable
BAT C	ppm	6850	Today / Now	Variable	Variable
U1 CLA #1	ppm	2556	Today / Now	2470-2630	2400-2700
U1 CLA #2	ppm	2575	Today / Now	2470-2630	2400-2700
U1 CLA #3	ppm	2591	Today / Now	2470-2630	2400-2700
U1 CLA #4	ppm	2589	Today / Now	2470-2630	2400-2700
U2 CLA #1	ppm	2531	Today / Now	2470-2630	2400-2700
U2 CLA #2	ppm	2650	Today / Now	2470-2630	2400-2700
U2 CLA #3	ppm	2522	Today / Now	2470-2630	2400-2700
U2 CLA #4	ppm	2526	Today / Now	2470-2630	2400-2700
Spent Fuel Pool	ppm	2547	Today / Now	$\geq$ 2050	$\geq$ 2000
Lithium Results				**Goal**	**Midpoint**
U1 RCS	ppm	1.1	Today / Now	>1	>1
U2 RCS	ppm	2.43	Today / Now	2.18-2.48	2.33

Primary to Secondary Leakrate Information (Total CPM RM-90-99/119)					
Indicator	**Units**	**U1**	**Date / Time**	**U2**	**Date/Time**
SI 50 S/G Leakage?	Yes/No	No	Today / Now	No	Today / Now
SI 137.5 CVE Leakrate	gpd	< 0.1	Today / Now	< 0.1	Today / Now
5 gpd leak equivalent	cpm	115	Today / Now	68	Today / Now
30 gpd leak equivalent	cpm	490	Today / Now	83	Today / Now
50 gpd leak equivalent	cpm	790	Today / Now	206	Today / Now
75 gpd leak equivalent	cpm	1165	Today / Now	455	Today / Now
100 gpd leak equivalent	cpm	1540	Today / Now	662	Today / Now
150 gpd leak equivalent	cpm	2290	Today / Now	870	Today / Now
CVE Air Inleakage	cfm	10	Today / Now	12.5	Today / Now
Bkgd on 99/119	cpm	40	Today / Now	40	Today / Now
Correction Factor 99/119	cpm/gpd	15	Today / Now	7.34	Today / Now

Steady state conditions are necessary for an accurate determination of leak rate using the CVE Rad Monitor

DELTA TIME (hrs)	REACTOR POWER (%)	POWER DEFECT (pcm)	ASSUMED ROD HT (steps)	INSERTED WORTH (pcm)	EXPECTED XENON (pcm)	DELTA RHO BORON (pcm)	BORON CONC (ppm)	DELTA PPM (ppm)	ECOMMEN DILUTION (gal)	RECOMME BORATION (gal)	IODINE CONC (% eq)	DATE/TIME
0	76.0	1331.7	185.0	-226.4	-2602.0	---	1070.0	---	---	---	99.4	12/5/12 8:00
1	79.0	1382.0	190.0	-190.6	-2699.1	111.6	1052.3	-17.7	1000	0	97.2	12/5/12 9:00
2	81.0	1422.4	193.0	-169.0	-2756.0	75.7	1040.3	-12.0	742	0	95.6	12/5/12 10:00
3	83.0	1461.0	196.0	-148.0	-2784.6	46.2	1033.0	-7.3	456	0	94.2	12/5/12 11:00
4	85.0	1498.0	199.0	-128.3	-2792.3	25.0	1029.1	-4.0	248	0	93.2	12/5/12 12:00
5	87.0	1534.5	200.0	-121.0	-2785.2	22.0	1025.6	-3.5	219	0	92.5	12/5/12 13:00
6	89.0	1570.9	203.0	-102.0	-2768.0	0.2	1025.6	0.0	2	0	92.1	12/5/12 14:00
7	91.0	1606.0	206.0	-83.9	-2744.4	-6.6	1026.6	1.0	0	11	91.9	12/5/12 15:00
8	93.0	1640.8	209.0	-66.4	-2717.2	-9.9	1028.2	1.6	0	17	91.9	12/5/12 16:00
9	95.0	1675.3	212.0	-49.3	-2688.6	-11.2	1029.9	1.8	0	19	92.1	12/5/12 17:00
10	97.0	1710.4	215.0	-35.0	-2660.2	-7.7	1031.2	1.2	0	13	92.5	12/5/12 18:00
11	99.0	1745.7	216.0	-30.0	-2633.0	3.2	1030.6	-0.5	31	0	93.0	12/5/12 19:00
12	100.0	1763.9	216.0	-29.9	-2609.6	-5.3	1031.5	0.8	0	9	93.7	12/5/12 20:00
13	100.0	1763.5	216.0	-29.9	-2593.4	-16.6	1034.1	2.6	0	29	94.3	12/5/12 21:00
14	100.0	1762.2	216.0	-29.9	-2584.3	-10.4	1035.8	1.7	0	18	94.8	12/5/12 22:00
15	100.0	1761.4	216.0	-29.9	-2580.3	-4.8	1036.5	0.8	0	8	95.4	12/5/12 23:00
16	100.0	1761.0	216.0	-29.9	-2579.9	-0.7	1036.6	0.1	0	1	95.8	12/6/12 0:00
17	100.0	1760.9	216.0	-29.9	-2582.1	2.1	1036.3	-0.3	21	0	96.2	12/6/12 1:00
18	100.0	1761.1	216.0	-29.9	-2586.1	4.1	1035.7	-0.6	40	0	96.6	12/6/12 2:00
19	100.0	1761.4	216.0	-29.9	-2591.1	5.4	1034.8	-0.8	53	0	96.9	12/6/12 3:00
20	100.0	1761.8	216.0	-29.9	-2596.8	6.1	1033.8	-1.0	60	0	97.2	12/6/12 4:00
21	100.0	1762.3	216.0	-29.9	-2602.9	6.5	1032.8	-1.0	64	0	97.5	12/6/12 5:00
22	100.0	1762.8	216.0	-29.9	-2609.0	6.6	1031.8	-1.1	66	0	97.7	12/6/12 6:00
23	100.0	1763.4	216.0	-29.9	-2615.1	6.6	1030.7	-1.0	65	0	98.0	12/6/12 7:00
24	100.0	1763.9	216.0	-29.9	-2620.9	6.4	1029.7	-1.0	63	0	98.2	12/6/12 8:00
25	100.0	1764.4	216.0	-29.9	-2626.6	6.1	1028.7	-1.0	61	0	98.3	12/6/12 9:00
26	100.0	1764.8	216.0	-29.9	-2631.9	5.8	1027.8	-0.9	57	0	98.5	12/6/12 10:00
27	100.0	1765.3	216.0	-29.9	-2636.8	5.4	1027.0	-0.9	54	0	98.7	12/6/12 11:00
28	100.0	1765.7	216.0	-29.9	-2641.5	5.1	1026.2	-0.8	50	0	98.8	12/6/12 12:00
29	100.0	1766.1	216.0	-29.9	-2645.8	4.7	1025.4	-0.7	47	0	98.9	12/6/12 13:00
30	100.0	1766.5	216.0	-29.9	-2649.7	4.3	1024.7	-0.7	43	0	99.0	12/6/12 14:00

31	100.0	1766.8	216.0	-29.9	-2653.4	4.0	1024.1	-0.6	40	0	99.1	12/6/12 15:00
32	100.0	1767.1	216.0	-29.9	-2656.7	3.6	1023.5	-0.6	36	0	99.2	12/6/12 16:00
33	100.0	1767.4	216.0	-29.9	-2659.7	3.3	1023.0	-0.5	33	0	99.3	12/6/12 17:00
34	100.0	1767.7	216.0	-29.9	-2662.5	3.0	1022.5	-0.5	30	0	99.3	12/6/12 18:00
35	100.0	1767.9	216.0	-29.9	-2665.0	2.8	1022.1	-0.4	28	0	99.4	12/6/12 19:00
36	100.0	1768.1	216.0	-29.9	-2667.3	2.5	1021.7	-0.4	25	0	99.5	12/6/12 20:00
37	100.0	1768.3	216.0	-29.9	-2669.4	2.3	1021.3	-0.4	23	0	99.5	12/6/12 21:00
38	100.0	1768.5	216.0	-29.9	-2671.3	2.1	1021.0	-0.3	21	0	99.6	12/6/12 22:00
39	100.0	1768.7	216.0	-29.9	-2673.0	1.9	1020.7	-0.3	19	0	99.6	12/6/12 23:00
40	100.0	1768.8	216.0	-29.9	-2674.6	1.7	1020.4	-0.3	17	0	99.7	12/7/12 0:00
41	100.0	1769.0	216.0	-29.9	-2676.0	1.5	1020.2	-0.2	15	0	99.7	12/7/12 1:00
42	100.0	1769.1	216.0	-29.9	-2677.2	1.4	1020.0	-0.2	14	0	99.7	12/7/12 2:00
43	100.0	1769.2	216.0	-29.9	-2678.4	1.3	1019.8	-0.2	13	0	99.7	12/7/12 3:00
44	100.0	1769.3	216.0	-29.9	-2679.4	1.1	1019.6	-0.2	11	0	99.8	12/7/12 4:00
45	100.0	1769.4	216.0	-29.9	-2680.4	1.0	1019.4	-0.2	10	0	99.8	12/7/12 5:00
46	100.0	1769.5	216.0	-29.9	-2681.2	0.9	1019.3	-0.1	9	0	99.8	12/7/12 6:00
47	100.0	1769.5	216.0	-29.9	-2682.0	0.8	1019.2	-0.1	8	0	99.8	12/7/12 7:00
48	100.0	1769.6	216.0	-29.9	-2682.7	0.8	1019.0	-0.1	8	0	99.8	12/7/12 8:00
49	100.0	1769.7	216.0	-29.9	-2683.3	0.7	1018.9	-0.1	7	0	99.9	12/7/12 9:00
50	100.0	1769.7	216.0	-29.9	-2683.8	0.6	1018.8	-0.1	6	0	99.9	12/7/12 10:00
51	100.0	1769.8	216.0	-29.9	-2684.3	0.6	1018.7	-0.1	6	0	99.9	12/7/12 11:00
52	100.0	1769.8	216.0	-29.9	-2684.8	0.5	1018.7	-0.1	5	0	99.9	12/7/12 12:00
53	100.0	1769.8	216.0	-29.9	-2685.2	0.5	1018.6	-0.1	5	0	99.9	12/7/12 13:00
54	100.0	1769.9	216.0	-29.9	-2685.6	0.4	1018.5	-0.1	4	0	99.9	12/7/12 14:00
55	100.0	1769.9	216.0	-29.9	-2685.9	0.4	1018.5	-0.1	4	0	99.9	12/7/12 15:00
56	100.0	1769.9	216.0	-29.9	-2686.2	0.3	1018.4	-0.1	3	0	99.9	12/7/12 16:00
57	100.0	1770.0	216.0	-29.9	-2686.5	0.3	1018.4	0.0	3	0	99.9	12/7/12 17:00
58	100.0	1770.0	216.0	-29.9	-2686.7	0.3	1018.3	0.0	3	0	99.9	12/7/12 18:00
59	100.0	1770.0	216.0	-29.9	-2687.0	0.2	1018.3	0.0	2	0	100.0	12/7/12 19:00
60	100.0	1770.0	216.0	-29.9	-2687.2	0.2	1018.3	0.0	2	0	100.0	12/7/12 20:00
61	100.0	1770.0	216.0	-29.9	-2687.3	0.2	1018.2	0.0	2	0	100.0	12/7/12 21:00
62	100.0	1770.1	216.0	-29.9	-2687.5	0.2	1018.2	0.0	2	0	100.0	12/7/12 22:00
63	100.0	1770.1	216.0	-29.9	-2687.7	0.2	1018.2	0.0	2	0	100.0	12/7/12 23:00
64	100.0	1770.1	216.0	-29.9	-2687.8	0.1	1018.1	0.0	1	0	100.0	12/8/12 0:00

STARTUP No. XX Unit 1 Date Today

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

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

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

CAUTIONS

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

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

[50] **PRIOR** to raising turbine load above 77%:

ENSURE the following:

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

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

NOTES

1) Ramp load rate rises shall be within the limits of TI-40
2) Intermediate Power Threshold ramp rate target value of 2% / hr may apply.

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

NOTES

1) Operation above 75% Load with only two Hotwell Pumps in service requires further evaluation.
2) Steps 5.1[52] through 5.1[55] may be performed out of sequence.

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

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Event Description: Power Ascension

Time	Position	Applicant's Actions or Behavior
Simulator Operator: No actions required for Event 1		
Examiner Note: The following Steps are from 0-SO-62-7 *Boron Concentration Control*, Section 6.2, *Dilute*		
CAUTION 1		**When making an RCS dilution of ≥ 3000 gallons, it should be done in batches with an RCS boron concentration verification at the halfway point (e.g., 1500 gallons). Allow at least 15 minutes between batches. [C.5] [C.7]**
CAUTION 2		**Returning the Boric Acid Blender to service after unplugging, cleaning, or maintenance on the Boric Acid System could introduce debris, sludge, air or chunks of solidified boron into the CCP suction resulting in pump damage. Extreme care must be exercised to properly flush the Boric Acid Blender system following an outage. [C.2]**
NOTE 1		If an excessive amount of dilution is required (plant startup), the pressurizer heaters should be energized to cause pressurizer spray operation for equalizing boron concentration in RCS and pressurizer.
NOTE 2		Dilute mode will be used anytime a long-term positive reactivity addition is desired. The operator should use the normal dilute mode whenever conditions permit.
Examiner Note: Dilutions will be performed based on the Reactor Engineering provided Reactivity Spreadsheet		
	SRO	**[1] ENSURE** unit is NOT in a Tech Spec or TRM action that prohibits positive reactivity additions. **[C.1]**
NOTE		HUT level rise of 1% is equal to 1380 gallons (TI-28 Figure 34).
	ATC	**[2] ENSURE** sufficient capacity available in the HUT selected to receive expected amounts of CVCS letdown: (**N/A** if not used) HUT / LEVEL / INITIALS A _____ % _____ B _____ % _____
	ATC	**[3] ENSURE** makeup system is aligned for **AUTO** operation in accordance with Section 5.1.

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Event Description: Power Ascension

Time	Position	Applicant's Actions or Behavior
	ATC	**[4] RECORD** the quantity of dilution water required to achieve desired boron concentration using Appendix D. (**N/A** for minor power changes) _____ gals
	NOTE	Due to eyeball interpolation the verified calculation may slightly differ from the initial calculation. The following signoff indicates that any differences in the two results have been discussed and are close enough to be considered validated.
	SRO	**[5] PERFORM** Appendix I *Independent Verification of Calculation for Amount of Boric Acid or Primary Water.* (N/A if App. D was performed by SRO to verify data from Rx Engineering)
	ATC	**[6] PLACE** [HS-62-140A], Boric Acid Supply to Blender Flow Control Switch to the **STOP** position.
	ATC	**[7] PLACE** [HS-62-140B], CVCS Makeup Selector Switch to the **DILUTE** position.
	ATC	**[8] ENSURE** [HS-62-140D], Boric Acid Valve to the Blender is **CLOSED** (Green light is **LIT**).
	ATC	**[9] SET** [FQ-62-142], Batch Integrator for the desired quantity.
NOTE		Primary Water Flow Controller [FC-62-142] receives its reference signal (70 gpm) from setpoint potentiometer (dial indicator) located on panel M-6. A setpoint of 35% corresponds to a 70 gpm primary water flow rate.
	ATC	**[10] ADJUST** [FC-62-142], Primary Makeup Water Flow Controller for the desired flow rate.

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Event Description: Power Ascension

Time	Position	Applicant's Actions or Behavior
	ATC	**[11] PLACE** [HS-62-140A], Boric Acid Supply to Blender Flow Control Switch to the **START** position.
	NOTE	Flow oscillations and/or erratic controller response may require manual operation of Primary Water Flow Controller [FC-62-142] until stable conditions exist.
	ATC	**[12] VERIFY** the following: **[a]** Inlet to top of VCT [FCV-62-128] is **OPEN**. **[b]** Primary Water flow by [FI-62-142A] **OR** [FQ-62-142].
	NOTE	Alternate dilution in small amounts is acceptable on a regular basis, provided no significant changes in seal water temperature or seal leakoff are indicated. Batches of 5 to 10 gallons may be added through FCV-62-144 on a frequency not to exceed once per 30 minutes. ICS points for No. 1 seal leakoffs and seal water temperatures on the RCPs should be monitored during and after dilution.
	ATC	**[13] IF** primary water addition to the bottom of the VCT [FCV-62-144] is desired, **THEN**
	ATC	Addresses step 13 as N/A
	NOTE	It may take approximately 15 minutes before any changes to reactivity are indicated on nuclear instrumentation or RCS temperature indication.
	ATC	**[14] MONITOR** nuclear instrumentation and reactor coolant temperature to ensure the proper response from dilution.
	ATC	**[15] IF** [LI-62-129], Volume Control Tank Level, rises to 63 percent, **THEN** **ENSURE** [LCV-62-118], Volume Control Tank Divert Valve **OPENS** to divert excess water to the Holdup Tanks.

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Event Description: Power Ascension

Time	Position	Applicant's Actions or Behavior
	ATC	**[16] WHEN** dilution is complete, **THEN** **[a] PLACE** [HS-62-140A], Boric Acid to Blender Flow Control Switch to the **STOP** position. **[b] IF** [FCV-62-144] was previously **OPENED**, **THEN CLOSE** [FCV-62-144] with [HS-62-144]. **[c] VERIFY** no primary water flow on either [FI-62-142A] **OR** [FQ-62-142]. **[d] ENSURE** [FCV-62-128] is **CLOSED**.
Lead Examiner may cue the next event when power has been sufficiently raised		

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Event Description: Pressurizer Level Channel LT 68-339 fails low

Time	Position	Applicant's Actions or Behavior
Simulator Operator: When directed, initiate Event 2 Pressurizer Level LT 68-339 fails low		
Indications/Alarms **Annunciator:** **1-M-5** • **5A C-3, "PRESSURIZER LEVEL HIGH-LOW"** • **5A E-3, "PRZR LVL LOW HEATER OFF & LETDOWN SECURED"** **Indications:** **1-M-4** • **1-LI-68-339 RCS PZR LEVEL indicates '0' level** **Significant Resultant Alarms/Indications:** **1-M-6** • **1-FI-62-82, LETDOWN HX OUTLET FLOW indicates '0' flow** **0-M-27** • **0-XA-27B-B A-5, "LETDOWN HX OUTLET FLOW/TEMP ABNORMAL"**		
LS-68-335D/E PRESSURIZER LEVEL HIGH-LOW [1] CHECK pressurizer level (1-LI-68-339A, 335A, 320) [2] IF level is high, THEN ENSURE backup heaters ON. [3] ENSURE level control system is attempting to return level to program with letdown and charging. [4] IF level channel failed, THEN GO TO AOP-I.04, Pressurizer Instrument Malfunction.		
	BOP	Responds to ARP 1-AR-M5A C-3.
Examiner Note: Several steps, notes, and cautions in the Annunciator response procedure do not apply to this failure. Only those that are applicable are listed in this event guide.		
	SRO	Transitions to AOP I.04, PRESSURIZER INSTRUMENT AND CONTROL MALFUNCTIONS

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Event Description: Pressurizer Level Channel LT 68-339 fails low

Time	Position	Applicant's Actions or Behavior
1. **DIAGNOSE** the failure:		
		IF... / **GO TO SECTION** 2.4 / **PAGE** 20 — Pressurizer Level Instrument Malfunction
2.4 Pressurizer Level Instrument Malfunction		
CAUTION		**Chemistry sampling of PZR Liquid Space may result in additional bistables actuating due to impact on 1-LT-68-320 or 2-LT-68-335.**
NOTE		Appendix M shows layout of PZR level control for operator reference.
	ATC	1. **CHECK** LI-68-339 NORMAL. — **PERFORM** the following: a. **ENSURE** LEVEL CONTROL CHANNEL SELECTOR switch XS-68-339E in LT-68-335 & 320. b. **ENSURE** LEVEL REC CHANNEL SELECTOR switch XS-68-339B in LT-68-320 or LT-68-335. c. **GO TO** Step 4.
	ATC	Places LEVEL CONTROL CHANNEL SELECTOR switch XS-68-339E in LT-68-335 & 320.
	ATC	4. **CHECK** letdown IN SERVICE. — **PERFORM** the following: a. **EVALUATE** manual control of charging flow **USING** the following: • HIC-62-93A, Charging Flow Control • HIC-62-89A, Charging Seal Water Flow Control. b. **RESTORE** letdown **USING** EA-62-5, Establishing Normal Charging and Letdown.
	ATC	May place HIC-62-93A, Charging Flow Control in MANUAL to control charging flow
	ATC	May adjust HIC-62-89A, Charging Seal Water Flow Controller to maintain seal injection flow alarms clear.
Examiner note: The following are from EA-62-5.		
		EA-62-5 ESTABLISHING NORMAL CHARGING AND LETDOWN actions

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Event Description: Pressurizer Level Channel LT 68-339 fails low

Time	Position	Applicant's Actions or Behavior
	ATC	2. **IF** normal letdown flow is to be established, **THEN** **GO TO** Section 4.3.

4.3 Establishing Normal Letdown Flow

NOTE EA-62-3, Establishing Excess Letdown, may be utilized if Normal Letdown cannot be established.

	ATC	1. **IF** charging flow **NOT** established, **THEN** **PERFORM** Section 4.2.
	ATC	2. **VERIFY** pressurizer level greater than 17%.
	ATC	3. **ENSURE** letdown orifice isolation valves CLOSED:

LETDOWN ORIFICE ISOLATION VALVES	CLOSED √
FCV-62-72	☐
FCV-62-73	☐
FCV-62-74	☐

	ATC	4. **OPEN** letdown isolation valves:

LETDOWN ISOLATION VALVES	OPEN √
FCV-62-69	☐
FCV-62-70	☐
FCV-62-77	☐

	ATC	Places HS-62-70A to OPEN.

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Event Description: Pressurizer Level Channel LT 68-339 fails low

Time	Position	Applicant's Actions or Behavior
NOTE Placing cooling water on the Letdown Heat Exchanger prior to restoring letdown flow should prevent TIS-62-79B/A from actuating and fully opening TCV-70-192.		
	ATC	5. **PLACE [HIC-62-78]** in **MANUAL, AND** **OPEN [TCV-70-192]** to ~ 50%.
	ATC	Places HIC-62-78 LD HX Outlet Temp to MANUAL, and lowers output to open TCV-70-192 to ~ 50%.
		6. **PLACE** letdown pressure controller **[PCV-62-81]** in MANUAL and **ADJUST** output between 40% and 50%, (50%-60% open).
	ATC	Places letdown pressure controller PCV-62-81 to MANUAL and lowers output between 40 and 50%, (50%-60% open).
	ATC	7. **ADJUST** charging flow as necessary to prevent flashing in the letdown line.
	ATC	8. **OPEN** letdown orifice isolation valves as needed: **LETDOWN ORIFICE ISOLATION VALVES** / **OPEN** √ FCV-62-73 / ☐
	ATC	Places HS-62-73 (or 74) Letdown Orifice B (or C) Isol 75 gpm to OPEN.
NOTE Normal letdown pressure is 325 psig at normal operating temperature.		
		9. **ADJUST** letdown pressure controller **[PCV-62-81]** output to obtain desired pressure.
	ATC	Adjusts letdown pressure controller HIC-62-81 output to obtain desired pressure.
		10. **ADJUST** letdown pressure controller **[PCV-62-81]** setpoint to match existing pressure.
	ATC	Adjusts letdown pressure controller HIC -62-81 setpoint to match existing pressure.
		11. **PLACE** letdown pressure controller **[PCV-62-81]** in AUTO.
	ATC	Places letdown pressure controller HIC -62-81 in AUTO.

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Event Description: Pressurizer Level Channel LT 68-339 fails low

Time	Position	Applicant's Actions or Behavior
NOTE		Normal letdown temperature is ~100°F.
	ATC	12. **ADJUST [HIC-62-78A]** to obtain desired letdown temperature, as indicated on **[TI-62-78]**.
	ATC	Adjusts HIC-62-78A Letdown Controller to obtain desired letdown temperature, as indicated on TI-62-78.
	ATC	13. **PLACE [HIC-62-78A]** in **AUTO**.
	ATC	Places Letdown Controller HIC-62-78A in AUTO.
	NOTE	Letdown temperature may swing due to repeated actuation of TIS-62-79B/A, which causes letdown temperature control valve TCV-70-192 to fully open.
	ATC	14. **IF** necessary to stabilize letdown temperature, **THEN** **PERFORM** the following: a. **PLACE [HIC-62-78A]** in MANUAL and **ADJUST** controller output in OPEN direction. b. **WHEN** letdown heat exchanger outlet temperature is stabilized at approximately 100°F, **THEN** **PLACE [HIC-62-78A]** in AUTO.
Examiner Note: Several steps, notes, and cautions in the procedure do not apply to this failure. Only those that are applicable are listed in this event guide.		
Examiner Note: Letdown temperature may swing due to repeated actuation of TIS-62-79B/A, which causes letdown temperature control valve TCV-70-192 to fully open.		
Examiner note: AOP-I.04 actions recommence here.		
	SRO	5. **EVALUATE** the following Tech Specs for applicability: • 3.3.1.1 (3.3.1), Reactor Trip System Instrumentation • 3.3.3.7 Accident Monitoring Instrumentation

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Event Description: Pressurizer Level Channel LT 68-339 fails low

Time	Position	Applicant's Actions or Behavior
		LIMITING CONDITION FOR OPERATION 3.3.1.1 As a minimum, the reactor trip system instrumentation channels and interlocks of Table 3.3-1 shall be OPERABLE. APPLICABILITY: As shown in Table 3.3-1. ACTION: As shown in Table 3.3-1.

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
11. Pressurizer Water Level—High	3	2	2	1, 2	6

ACTION 6 - With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied:

a. The inoperable channel is placed in the tripped condition within 6 hours.

3.3.3.7 The accident monitoring instrumentation channels shown in Table 3.3-10 shall be OPERABLE.

APPLICABILITY: MODES 1, 2 and 3.

ACTION: As shown in Table 3.3-10

INSTRUMENT	TOTAL NO. OF CHANNELS	MINIMUM CHANNELS REQUIRED	ACTION
7. Pressurizer Level (Wide Range) (Instrument Loops 68-320,-335,-339)	3	3	2

ACTION 2 - NOTE: Also refer to the applicable action requirements from Tables 3.3-1 since it may contain more restrictive actions.

a. With the number of channels one less than the minimum channels required, restore the inoperable channel to OPERABLE status within 30 days or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the next 6 hours.

	SRO	Enters LCO 3.3.1.1 Action 6 and LCO 3.3.3.7 Action 2
	ATC	6. **ENSURE** pressurizer heaters restored to service.
	ATC	Places HS-68-341F to ON
CAUTION		**RCS pressure changes and changes in RCS boron concentration (due to differences between pzr and RCS boron) may impact core reactivity.**

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Event Description: Pressurizer Level Channel LT 68-339 fails low

Time	Position	Applicant's Actions or Behavior
	ATC	7. **MONITOR** reactor power: a. **CHECK** reactor in Mode 1 or 2. b. **MONITOR** core thermal power for unexpected changes.
		NOTE: If performing AOP in conjunction with AOP-I.11 for an Eagle LCP failure, then actions to hard trip bistables should be delayed until Eagle system reset is attempted. Actions to hard trip bistables must be completed within 6 hours UNLESS affected loop is restored to operable status by resetting Eagle rack.
		8. **NOTIFY** I&C to remove failed pressurizer level channel from service **USING** appropriate Appendix: LT-68-339 Appendix I
Lead Examiner may cue the next event when Letdown is restored and Technical Specifications are addressed.		

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Event Description: Loop #4 Cold Leg Instrument fails high

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, initiate Event 3, Loop #4 Cold Leg Instrument Fails High		
Indications available: **Annunciators:** **M-5** • **5A A-6 "TS-68-2M/N RC LOOPS T AVG /AUCT T AVG DEVN HIGH-LOW"** • **5A B-6 "TS-68-2A/B REACTOR COOLANT LOOPSΔT DEVN HIGH-LOW** • **5A C-6 TS-68-2P/Q REAC COOL LOOPS T REF T AUCT HIGH-LOW** • **5A E-7 "NARROW RANGE RTD FAILURE LOOP 4"** **Indications:** • **Control Rods inserting.** • **RCS Loop 4 Indicator, 1-TI-68-67E goes up;** • **1-XX-55-5, Reactor Trip Status Panel "PROT. SET 4 TROUBLE" Status light**		
		TS-68-2M/N RC LOOPS T AVG /AUCT T AVG DEVN HIGH-LOW **[1]** CHECK 1-XX-55-5, Trip status panel for any bistables that may be lit, **AND** EVALUATE Reactor Trip criteria with SRO by comparison with redundant instrumentation. **[2]** IF reactor trips, **THEN** GO TO E-0, *Reactor Trip or Safety Injection.* **[3]** IF Tavg channel failed, **THEN** GO TO AOP-I.02, RCS LOOP RTD INSTRUMENT MALFUNCTION. **[4]** IF rod control system is malfunctioning, **THEN** GO TO AOP-C.01, Rod Control System Malfunctions.
	ATC	Responds to ARP 1-AR-M-5A A-6.
Examiner Note: Several steps, notes, and cautions in the Annunciator response procedure do not apply to this failure. Only those that are applicable are listed in this event guide.		
	ATC	Takes Immediate action to place HS-85-5110 ROD CONTROL MODE SELECTOR in MANUAL.
	SRO	Transitions to AOP-C.01 Rod Control System Malfunctions

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Event Description: Loop #4 Cold Leg Instrument fails high

Time	Position	Applicant's Actions or Behavior
1. **DIAGNOSE** the failure:		
IF...	**GO TO SECTION**	**PAGE**
Uncontrolled rod bank movement (rod movement NOT due to actual T-avg/T-ref mismatch or change in reactor/turbine power)	2.1	4
NOTE: Step 1 is an immediate action step.		
	ATC	1. **STOP** uncontrolled rod motion: a. **PLACE** rod control in MAN. b. **CHECK** rod motion STOPPED.
	ATC	Places HS-85-5110 ROD CONTROL MODE SELECTOR in MANUAL if not already done.
CAUTION: **Control Rods should NOT be manually withdrawn during a plant transient.**		
	ATC	2. **CHECK** for plant transient: a. **CHECK** reactor power and T_{avg} STABLE.
	ATC	3. **CHECK** for instrumentation malfunction: a. **CHECK** all Vital Instrument Power Boards ENERGIZED: • VITAL POWER BOARD UV OR BREAKER TRIP alarms [M-1C windows A-7, B-7, C-7, and D-7] DARK b. **CHECK** nuclear instrumentation OPERABLE.

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Event Description: Loop #4 Cold Leg Instrument fails high

Time	Position	Applicant's Actions or Behavior
	ATC	c. **CHECK** RCS RTDs OPERABLE. c. **GO TO** AOP-I.02, RCS Loop RTD Instrument Malfunction.
CAUTION:		**Control rods should NOT be manually withdrawn during a plant transient.**
NOTE:		Tavg must be within 1°F of Tref when restoring automatic rod control.
	SRO	Transitions to AOP-I.02 RCS LOOP RTD INSTRUMENT MALFUNCTION
	ATC	1. **PLACE** rod control in MANUAL.
	ATC	Places HS-85-5110 ROD CONTROL MODE SELECTOR in MANUAL, if not already done.
	ATC	2. **RESTORE** Tavg as necessary **USING** one of the following: • manual rod control OR • RCS boration/dilution OR • turbine load reduction
	ATC	Places HS-85-5111 Rod Control to OUT as directed by the SRO to restore RCS temperature within 1.5 deg F of T_{REF}.
	ATC	3. **CHECK** loop 1 temperature channel OPERABLE.
	ATC	4. **CHECK** loop 2 temperature channel OPERABLE.
	ATC	5. **CHECK** loop 3 temperature channel OPERABLE.

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Event Description: Loop #4 Cold Leg Instrument fails high

Time	Position	Applicant's Actions or Behavior
	ATC	6. **CHECK** loop 4 temperature channel OPERABLE. **PERFORM** the following: a. **PULL-TO-DEFEAT** TAVG CHANNEL DEFEAT switch XS-68-2M to LOOP 4 b. **PULL-TO-DEFEAT** ΔT CHANNEL DEFEAT switch XS-68-2D to LOOP 4 c. **PLACE** LOOP TAVG ΔT REC/SEL switch XS-68-2B in LOOP 1, 2, or 3
	ATC	Places switch XS-68-2M in LOOP 4 and PULL-TO-DEFEAT TAVG CHANNEL DEFEAT Places switch XS-68-2D to LOOP 4 and PULL-TO-DEFEAT ΔT CHANNEL DEFEAT
	SRO	7. **EVALUATE** the following Tech Specs for applicability: • 3.3.1.1 (3.3.1), Reactor Trip System Instrumentation • 3.3.2.1 (3.3.2), Engineered Safety Feature Actuation System Instrumentation

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Event Description: Loop #4 Cold Leg Instrument fails high

Time	Position	Applicant's Actions or Behavior
	SRO	

LIMITING CONDITION FOR OPERATION

3.3.1.1 As a minimum, the reactor trip system instrumentation channels and interlocks of Table 3.3-1 shall be OPERABLE.

APPLICABILITY: As shown in Table 3.3-1.

ACTION:

As shown in Table 3.3-1.

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
7. Overtemperature ΔT Four Loop Operation	4	2	3	1, 2	6
8. Overpower ΔT Four Loop Operation	4	2	3	1, 2	6

ACTION 6 - With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied:

a. The inoperable channel is placed in the tripped condition within 6 hours.

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
14. Main Steam Generator Water Level--Low-Low					
C. RCS Loop ΔT	4 (1/loop)	2	3	1,2	10

ACTION 10 - With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided that within 6 hours, for the affected protection set, the Trip Time Delays (T_s and T_M) threshold power level for zero seconds time delay is adjusted to 0% RTP.

LIMITING CONDITION FOR OPERATION

3.3.2.1 The Engineered Safety Feature Actuation System (ESFAS) instrumentation channels and interlocks shown in Table 3.3-3 shall be OPERABLE with their trip setpoints set consistent with the values shown in the Nominal Trip Setpoint column of Table 3.3-4.

APPLICABILITY: As shown in Table 3.3-3.

ACTION:

a. With an ESFAS instrumentation channel or interlock trip setpoint less conservative than the value shown in the Allowable Values column of Table 3.3-4, declare the channel inoperable and apply the applicable ACTION requirement of Table 3.3-3 until the channel is restored to OPERABLE status with the trip setpoint adjusted consistent with the Nominal Trip Setpoint value.

6. AUXILIARY FEEDWATER

c. Main Stm. Gen. Water Level—Low-Low

i. Start Motor-Driven Pumps

Op Test No.: NRC 2012-302 Scenario # 2 Event # 3 Page 17 of 35

Event Description: Loop #4 Cold Leg Instrument fails high

Time	Position	Applicant's Actions or Behavior

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
c. RCS LoopΔT	4(1/loop)	2	3	1, 2, 3	37
ii. Start Turbine Driven Pump					
c. RCS LoopΔT	4(1/loop)	2	3	1, 2, 3	37

ACTION 37 - With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided that within 6 hours, for the affected protection set, the Trip Time Delays (T_s and T_M) threshold power level for zero seconds time delay is adjusted to 0% RTP.

SRO: Enters LCO 3.3.1.1 Action 6 and Action 10 and enters LCO 3.3.2.1 Action 37

NOTE: If performing AOP in conjunction with AOP-I.11 for an Eagle LCP failure, then actions to hard trip bistables should be delayed until Eagle system reset is attempted. Actions to hard trip bistables must be completed within 6 hours UNLESS affected loop is restored to operable status by resetting Eagle rack.

8. **NOTIFY** I&C to remove failed TAVG ΔT loop from service **USING** appropriate Appendix:

RCS LOOP	INSTRUMENT LOOP NUMBER	PROT CH	APPENDIX
1	T-68-2 (T-411/412)	I	A
2	T-68-25 (T-421/422)	II	B
3	T-68-44 (T-431/432)	III	C
4	T-68-67 (T-441/442)	IV	D

9. **IF** automatic rod control is available,
THEN
RESTORE rod control to AUTO
USING 0-SO-85-1.

0-SO-85-1, Control Rod Drive System,

Section 6.4, Transferring from Manual to Auto Rod Control

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Event Description: Loop #4 Cold Leg Instrument fails high

Time	Position	Applicant's Actions or Behavior
		NOTES 1) A laminated copy of this section can be maintained in the Unit Control Room for repetitive use for routine rod manipulations. 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. 3) This Section may be N/A if Rod Control is being returned to AUTO in response to a transient (runback) condition.
	ATC	**[1] ENSURE** turbine power is greater than 15 percent.
	ATC	**[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**.
	ATC	**[3] ENSURE** less than 1 degree Tavg/Tref mismatch.
	ATC	**[4] PLACE [HS-85-5110]**, Rod Control Mode Selector in the **AUTO** position.
	ATC	**[5] VERIFY** Rod Speed Indicator **[SI-412]**, indicates 8 Steps/minute.
		End of Section 6.4
	ATC	Places HS-85-5110 ROD CONTROL MODE SELECTOR in AUTO.
		10. **GO TO** appropriate plant procedure. **END OF SECTION**
	Crew	**Performs a Crew Brief** as time allows.
	Crew	Notifications should be addressed as applicable if not specifically addressed by the procedure or in the crew brief. Operations Management - Typically Shift Manager. Maintenance Personnel – Typically Maintenance Shift Supervisor (MSS). (Note: Maintenance notification may be delegated to the Shift Manager).
Lead Examiner may cue next event when Technical Specifications are addressed.		

Op Test No.: NRC 2012-302 Scenario # 2 Event # 4 Page 19 of 35

Event Description: Condenser Vacuum Leak with Vacuum Pump auto start failure

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, initiate Event 4, Condenser Vacuum Leak		
Indications available: • **0-M-12A, D-4, 1-RA-90-99B COND VAC PMP LO RNG AIR EXH MON INSTR MALFUNC** • **1-M-1 Main Generator load decreasing.** • **1-AR-M2-C, C6, CONDENSER VACUUM LOW** • **Condenser Vacuum degrading (Monitored on recorder or ICS), Air in leakage increasing**		
		PS-2-7B CONDENSER VACUUM LOW **[1] VERIFY** alarm via [1-P/TR-2-2] recorder. **[2] VERIFY** required number of CCW pumps are inservice. **[3] CHECK** condenser vacuum exhaust on ICS using either: a. 1F2700A if 1-FCV-2-255 is closed b. 1F2263A if 1-FCV-2-255 is open. **[4] IF** condenser vacuum exhaust flow > 45 CFM, **THEN** **ENSURE** 1-FCV-2-255 OPEN. **[5] IF** alarm is valid, **THEN** GO TO AOP-S.02, *Loss of Condenser Vacuum.* **[6] WHEN** vacuum and air inleakage are returned to normal, **THEN** **ENSURE** 1-FCV-2-255 CLOSED and in P-AUTO.
	BOP	Responds to ARP 1-AR-M2B C-6
Examiner Note: Several steps, notes, and cautions in the Annunciator response procedure do not apply to this failure. Only those that are applicable are listed in this event guide.		
Examiner Note: The crew may recognize vacuum leak early and enter abnormal procedure AOP-S.02, *Loss Of Condenser Vacuum,* prior to alarm.		
Examiner Note: The standby Condenser Vacuum Pump will fail to start automatically; manual start is available and should be manually started in response to this event.		
	SRO	Transitions to AOP-S.02, Loss of Condenser Vacuum.
CAUTION		**Turbine will trip automatically when condenser pressure reaches 3.9 to 5.4 psia.**
NOTE:		Highest reading operable condenser pressure instrument should be used.

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Event Description: Condenser Vacuum Leak with Vacuum Pump auto start failure

Time	Position	Applicant's Actions or Behavior
	BOP	1. **MONITOR** condenser pressure for turbine trip criteria. **[C.1]** a. **CHECK** turbine load greater than or equal to 30%. b. **CHECK** condenser pressure less than or equal to 2.7 psia.
	BOP	2. **ENSURE** all available condenser vacuum pumps RUNNING.
	BOP	Places HS-2-176A CONDR VAC Pump 1B to START.
	BOP	3. **ENSURE** condenser vacuum breaker CLOSED.

Lead Examiner may cue next event when the CREW has started the 1B Condenser Vacuum Pump.

Op Test No.: NRC 2012-302 Scenario # 2 Event # 5, 6, 7, 8 Page 21 of 35

Event Description: Loop #4 S/G Feed Line Break Inside Containment/Loss of AFW/RCS Bleed and Feed.

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, initiate Event, 5 S/G #4 Feed Line Break Inside Containment.		
Indications available: **Annunicators:** **1-M-3** • **3C C-6, "LS-3-171D STM GEN #4 LEVEL LOW"** • **3C E-6, "LS-3-175D STM GEN #4 LEVEL LOW"** **1-M-5** • **5A A-7, "FS-3-35A STEAM GEN FEEDWATER FLOW HIGH"** • **5A B-7, "LS-3-42D STEAM GEN LVL HIGH-LOW DEVIATION"** • **5C B-3, "MS-30-241 LOWER COMPT MOISTURE HI".** **1-M-6** • **6B D-1, "LS-3-107D STM GEN LOOP 4 LOW FW FLOW LOW WATER LEVEL"** • **6B D-4, "LS-3-106B STEAM GENERATOR LOOP 4 LOW LOW WATER LEVEL"** • **6E C-6, ZS-61-186 ICE CONDENSER LOWER INLET DOOR OPEN** **Indicators:** **1-M-4** • **1-FI-1-103A, 103B, SG-4 FW INLET FLOW CH-1 & 2: increasing feedwater flow** • **1-LI-3-110, 107, 106, SG-4 NR LEVEL: decreasing level**		
	SRO	Transitions to E-0 and Direct Immediate Operator Actions (IOAs)

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Event Description: Loop #4 S/G Feed Line Break Inside Containment/Loss of AFW/RCS Bleed and Feed.

Time	Position	Applicant's Actions or Behavior
Examiner Note: following IOA performance, prior to Steps 1-4 immediate action verification, ATC/BOP surveys MCBs for any expected automatic system response that failed to occur. Upon discovery, they may take manual action(s) to align plant systems as expected for the event in progress. (Ref. EPM-4, Prudent Operator Actions)		
	CREW	Performs the first four steps of E-0 unprompted.
	SRO	Directs performance of E-0
NOTE 1	Steps 1 through 4 are immediate action steps.	
NOTE 2	This procedure has a foldout page.	
	ATC	1. **VERIFY** reactor TRIPPED: • Reactor trip breakers OPEN • Reactor trip bypass breakers DISCONNECTED or OPEN • Rod bottom lights LIT • Rod position indicators less than or equal to 12 steps. • Neutron flux DROPPING
	BOP	2. **VERIFY** turbine TRIPPED: • Turbine stop valves CLOSED.
CRITICAL TASK	BOP	Places HS-47-24 to Trip
	BOP	3. **VERIFY** at least one 6.9KV shutdown board ENERGIZED on this unit.
	ATC	4. **DETERMINE** if SI actuated: • ECCS pumps RUNNING. • Any SI alarm LIT [M-4D].
	BOP	Places HS-1-4A and 11A MSIV S/G #1 and #2 to CLOSE based on FOP actions.
	BOP	Places HS-3-171A and 175A AFW to S/G #4 to CLOSE based on FOP actions.
	ATC	Places HS-68-8A, 31A, 50A and 73A to STOP based on FOP actions.

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Event Description: Loop #4 S/G Feed Line Break Inside Containment/Loss of AFW/RCS Bleed and Feed.

Time	Position	Applicant's Actions or Behavior
	BOP	5. **PERFORM** ES-0.5, Equipment Verifications WHILE continuing in this procedure.
	SRO/ATC	Continue with the performance of E-0 REACTOR TRIP OR SAFETY INJECTION
	BOP	Performs ES-0.5, Equipment Verifications go to page 29 for details
	SRO	Addresses foldout page, see next page for details.

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Event Description: Loop #4 S/G Feed Line Break Inside Containment/Loss of AFW/RCS Bleed and Feed.

FOLDOUT PAGE

RCP TRIP CRITERIA

IF any of the following conditions occurs:

- RCS pressure less than 1250 psig **AND** at least one CCP or SI pump running
  OR
- Phase B isolation,

THEN
STOP all RCPs.

EVENT DIAGNOSTICS

- **IF** any S/G pressure is dropping uncontrolled, **THEN**
  PERFORM the following:

  a. **CLOSE** MSIVs and MSIV bypass valves.

  b. **IF** any S/G pressure continues to drop uncontrolled, **THEN**
  PERFORM the following:

  1) **ENSURE** SI actuated.

  2) **IF** at least one S/G is intact (S/G pressure controlled or rising),
  THEN
  ISOLATE AFW to faulted S/G(s):

  - **CLOSE** AFW level control valves for faulted S/G(s)
  - **IF** any AFW valve for faulted S/G CANNOT be CLOSED, **THEN**
    PERFORM Appendix E, Isolating AFW to Faulted S/G.

  3) **ENSURE** at least one of the following conditions met:
  - total AFW flow greater than 440 gpm
    OR
  - Narrow Range level greater than 10% [25% ADV] in at least one intact S/G.

- **IF** both trains of shutdown boards de-energized, **THEN**
  GO TO ECA-0.0, Loss of All AC Power.

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.

Op Test No.: NRC 2012-302 Scenario # 2 Event # 5, 6, 7, 8 Page 25 of 35

Event Description: Loop #4 S/G Feed Line Break Inside Containment/Loss of AFW/RCS Bleed and Feed.

Time	Position	Applicant's Actions or Behavior
	ATC	6. **DETERMINE** if secondary heat sink available: a. **CHECK** total AFW flow greater than 440 gpm. a. **IF** S/G narrow range level is less than 10% [25% ADV] in all S/Gs, **THEN** **START** AFW pumps and **ALIGN** valves as necessary to raise AFW flow greater than 440 gpm. b. **CHECK** narrow range level greater than 10% [25% ADV] in at least one S/G. b. **MAINTAIN** total feed flow greater than 440 gpm UNTIL narrow range level greater than 10% [25% ADV] in at least one S/G. **IF** AFW flow greater than 440 gpm CANNOT be established, **THEN** **PERFORM** the following: 1) **MONITOR** status trees. 2) **GO TO** FR-H.1, Loss of Secondary Heat Sink.
Examiner Note: Crew should recognize Loss of Heat Sink entry conditions, total AFW flow less than 440 gpm due to a loss of all AFW pumps, and implement 1-FR-0 verification and transitions to FR-H.1.		
	SRO	Transitions to FR-H.1, Loss of Secondary Heat Sink, go to next page.
Examiner Note: MONITOR status trees, the crew will implement status tree monitoring via ICS. When a RED or ORANGE path status tree is observed, the SRO will designate one of the Board operators (typically the BOP) to verify status tree conditions using **1-FR-0, UNIT 1 STATUS TREES**. Once verified, the SRO should direct the crew to transition to the appropriate RED and/or ORANGE path procedure(s).		

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Event Description: Loss of AFW and Charging, FR-H.1 Bleed and Feed

Time	Position	Applicant's Actions or Behavior
CAUTION		**Feeding an Intact or Ruptured S/G is preferred to feeding a Faulted S/G. Thermal stresses from feeding a Faulted S/G could rupture tubes, resulting in a Faulted-AND-Ruptured S/G.**
	SRO	Directs performance of FR-H.1.
	SRO	1. **DETERMINE** procedure applicability: a. **CHECK** the following: • Total feed flow less than 440 gpm due to operator action directed by another procedure. **AND** • Total feed flow capability of greater than 440 gpm AVAILABLE. a. **GO TO** Step 2.
	ATC	2. **MONITOR** RWST level greater than 27%.
	ATC	3. **CHECK** if secondary heat sink required: a. RCS pressure greater than any non-Faulted S/G pressure. b. RCS temperature greater than 350°F.
	ATC	4. **MONITOR** at least one CCP available. **STOP** all RCPs. **GO TO** Caution prior to Step 17.
CRITICAL TASK	ATC	Places HS-68-8A, 31A, 50A and 73A to STOP if not already performed.

Op Test No.: 2012-302 Scenario # 1 Event # 8 Page 27 of 35

Event Description: Loss of AFW and Charging, FR-H.1 Bleed and Feed

	SRO	Immediately transitions to Step 17
CAUTION		**Any delay in completing Steps 17 through 20 could result in fuel damage.**
	ATC	17. **ACTUATE** SI.
	ATC	18. **VERIFY** RCS feed path: a. **CHECK** CCPIT flow established: • CCPIT valves OPEN • CCPIT flow indicated. a. **PERFORM** the following to establish CCPIT flow: • **ALIGN** valves as necessary • **ENSURE** CCPs RUNNING.
	ATC	b. **CHECK** ALL CCPs and SI pumps RUNNING. b. **PERFORM** the following: • **ENSURE** ECCS valves aligned **USING** Appendix A. • **START** CCPs and SI pumps. **IF** at least one CCP or SI pump is running, **THEN** **GO TO** Step 19.
	CREW	Performs Appendix A, as required, see next page
	SRO	Transitions to step 19
	ATC	19. **ESTABLISH** RCS bleed path: a. **CHECK** power to pressurizer PORV block valves AVAILABLE. b. **CHECK** pressurizer PORV block valves OPEN. c. **OPEN** both pressurizer PORVs.
CRITICAL TASK	ATC	Places HS-68-340AA and 334A to OPEN

APPENDIX A

ECCS VALVE ALIGNMENT

1. **IF** ES-1.3 Containment Sump Recirculation has NOT been performed,
   THEN
   PERFORM the following:

   a. **ENSURE** CCP suction aligned to RWST:

   - LCV-62-135 or LCV-62-136 OPEN ☐
   - LCV-62-132 or LCV-62-133 CLOSED ☐

   b. **ENSURE** FCV-63-5 SI Pump suction OPEN. ☐

2. **ENSURE** CCPIT valves OPEN:

   - FCV-63-25 or FCV-63-26 ☐
   - FCV-63-39 or FCV-63-40 ☐

3. **ENSURE** SI Pump suction valves OPEN:

   - FCV-63-47 (Train A) ☐
   - FCV-63-48 (Train B) ☐

4. **ENSURE** SI Pump injection valves OPEN:

   - FCV-63-22 ☐
   - FCV-63-152 (Train A) ☐
   - FCV-63-153 (Train B) ☐

END OF TEXT

	ATC	Verifies Appendix valve alignment

Lead Examiner may terminate the scenario the crew has completed FR-H.1 Step 19, Feed & Bleed.

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Event Description: **Equipment Verifications**

Time	Position	Applicant's Actions or Behavior
ES-0.5 Actions		
	BOP	1. **VERIFY** D/Gs RUNNING.
	BOP	2. **VERIFY** D/G ERCW supply valves OPEN.
	BOP	3. **VERIFY** at least four ERCW pumps RUNNING.
	BOP	4. **VERIFY** CCS pumps RUNNING: • Pump 1A-A (2A-A) • Pump 1B-B (2B-B) • Pump C-S.
	BOP	5. **VERIFY** EGTS fans RUNNING.
	BOP	6. **VERIFY** generator breakers OPEN.
	BOP	7. **NOTIFY** at least two AUOs to report to MCR to be available for local actions.
	BOP	8. **VERIFY** AFW pumps RUNNING: a. MD AFW pumps b. TD AFW pump.
NOTE	AFW level control valves should NOT be repositioned if manual action has been taken to control S/G levels, to establish flow due to failure, or to isolate a faulted S/G.	
	BOP	9. **CHECK** AFW valve alignment: a. **VERIFY** MD AFW LCVs in AUTO. b. **VERIFY** TD AFW LCVs OPEN. c. **VERIFY** MD AFW pump recirculation valves FCV-3-400 and FCV-3-401 CLOSED.

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Event Description: **Equipment Verifications**

Time	Position	Applicant's Actions or Behavior
	BOP	10. **VERIFY** MFW Isolation: a. **CHECK** MFW pumps TRIPPED. b. **ENSURE** the following: • MFW regulating valves CLOSED • MFW regulating bypass valve controllers in MANUAL with output ZERO • MFW isolation valves CLOSED.
	BOP	11. **MONITOR** ECCS operation: a. **VERIFY** ECCS pumps RUNNING: • CCPs • RHR pumps • SI pumps b. **VERIFY** CCP flow through CCPIT. c. **CHECK** RCS pressure less than 1500 psig. d. **VERIFY** SI pump flow. e. **CHECK** RCS pressure less than 300 psig. — e. **GO TO** Step 12. f. **VERIFY** RHR pump flow.

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Event Description: **Equipment Verifications**

Time	Position	Applicant's Actions or Behavior
	BOP	12. **VERIFY** ESF systems ALIGNED: a. Phase A ACTUATED: • PHASE A TRAIN A alarm LIT [M-6C, B5]. • PHASE A TRAIN B alarm LIT [M-6C, B6]. b. Cntmt Vent Isolation ACTUATED: • CNTMT VENT ISOLATION TRAIN A alarm LIT [M-6C, C5]. • CNTMT VENT ISOLATION TRAIN B alarm LIT [M-6C, C6]. c. Status monitor panels: • 6C DARK • 6D DARK • 6E LIT OUTSIDE outlined area • 6H DARK • 6J LIT. d. Train A status panel 6K: • CNTMT VENT GREEN • PHASE A GREEN e. Train B status panel 6L: • CNTMT VENT GREEN • PHASE A GREEN

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Event Description: **Equipment Verifications**

Time	Position	Applicant's Actions or Behavior
	BOP	13. **MONITOR** for containment spray and Phase B actuation: a. **CHECK** for any of the following: • Phase B ACTUATED **OR** • Containment pressure greater than 2.8 psig. b. **VERIFY** containment spray INITIATED: 1) Containment spray pumps RUNNING. 2) Containment spray header isolation valves FCV-72-39 and FCV-72-2 OPEN. 3) Containment spray recirculation valves to RWST FCV-72-34 and FCV-72-13 CLOSED. 4) Containment spray header flow greater than 4750 gpm per train. 5) Panel 6E LIT. c. **VERIFY** Phase B ACTUATED: • PHASE B TRAIN A alarm LIT [M-6C, A5]. • PHASE B TRAIN B alarm LIT [M-6C, A6]. d. **ENSURE** RCPs STOPPED. e. **VERIFY** Phase B valves CLOSED: • Panel 6K PHASE B GREEN. • Panel 6L PHASE B GREEN. f. **WHEN** 10 minutes have elapsed, **THEN** **ENSURE** containment air return fans RUNNING.

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Event Description: **Equipment Verifications**

Time	Position	Applicant's Actions or Behavior
NOTE	The continuous action in Step 14 remains applicable if containment pressure rises above 1.5 psig after ES-0.5 is completed.	
	BOP	14. **MONITOR** if containment vacuum relief isolation valves should be closed: a. **CHECK** containment pressure greater than 1.5 psig. a. **GO TO** Step 15.
	BOP	15. **CHECK** secondary and containment rad monitors **USING** the following: • Appendix A, Secondary Rad Monitors • Appendix B, Containment Rad Monitors.
		APPENDIX A **SECONDARY RAD MONITORS** 1. **IF** SI occurred on Unit 1, **THEN** **CHECK** following rad monitors including available trends prior to isolation: • Condenser exhaust recorder 1-RR-90-119 • S/G blowdown recorder 1-RR-90-120 • Unit 1 Main steam line rad monitors [1-M-30] • Post-Accident rad recorder 1-RR-90-268B points 3 (blue), 4 (violet), 5 (black), and 6 (turquoise). [1-M-31 (back of 1-M-30)] 3. **NOTIFY** Unit Supervisor whether secondary radiation is NORMAL or HIGH.

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Event Description: **Equipment Verifications**

Time	Position	Applicant's Actions or Behavior
	BOP	**APPENDIX B** **CONTAINMENT RAD MONITORS** 1. **IF** SI occurred on Unit 1, **THEN** **CHECK** following rad monitors: • Upper containment post-accident rad monitors 1-RM-90-271A and 1-RM-90-272A NORMAL [1-M-30] • Lower containment post-accident rad monitors 1-RM-90-273A and 1-RM-90-274A NORMAL [1-M-30] • Containment rad recorders 1-RR-90-112 and 1-RR-90-106 NORMAL [0-M-12] (prior to isolation).
	BOP	16. **WHEN** directed by E-0, **THEN** **PERFORM** Appendix D, Hydrogen Mitigation Actions.
	BOP	17. **CHECK** pocket sump pumps STOPPED: [M-15, upper left corner] • HS-77-410, Rx Bldg Aux Floor and Equipment Drain Sump pump A • HS-77-411, Rx Bldg Aux Floor and Equipment Drain Sump pump B.
	BOP	18. **DISPATCH** personnel to perform EA-0-1, Equipment Checks Following ESF Actuation.
	BOP	19. **ENSURE** plant announcement has been made regarding Reactor Trip and SI.
	BOP	20. **PERFORM** Appendix E, Spent Fuel Cooling Actions, as time permits.

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Event Description: **Critical task**

Critical Tasks:	Critical Task Statement
1.	Manually trip the main turbine before an orange path challenge develops to either the subcriticality (S) or the Pressurized Thermal Shock (P) CSF or before transition to ECA-2.1, whichever happens first.
2.	Manually trip all Reactor Coolant Pumps prior to completing step 4 of FR-H.1, LOSS OF SECONDARY HEAT SINK.
3.	Initiate RCS bleed and feed so that the RCS depressurizes sufficiently for the Safety Injection pump flow to occur prior to completing step 19 of FR-H.1.

Facility:	Sequoyah	Scenario No.:	1	Op Test No.:	2012-302
Examiners:	_____	Operators:	_____		
	_____		_____		
	_____		_____		

Initial Conditions: Unit 1 is in MODE 1, ~100% Reactor Power, EOL.

Turnover: Maintain current conditions, currently in 0-GO-5 Section 5.2, At Power Conditions. 1B EDG is OOS.

Target CTs: Energize at least one 6.9 kv Shutdown Board by resetting the 1A EDG LO relay prior to completing step 8 of ECA-0.0.

Manually establish ERCW flow to the required EDG prior to completing step 8.e of ECA-0.0.

Event No.	Malf. No.	Event Type*	Event Description
1.	CV25A	I-ATC/SRO	CVCS Letdown Pressure instrument PT-62-81 fails low. The ATC will manually control letdown pressure using the ARP. The crew may decide to isolate Letdown and place Excess Letdown in service.
2.	RX07A	I-ATC/SRO TS-SRO	The Pressurizer Pressure instrument PT 68-340 will fail high resulting in pressurizer spray valves opening. The ATC will manually close the spray valves and stop the RCS depressurization using immediate operator actions and AOP-I.04. The SRO will enter LCO 3.2.5.b; 3.3.1.1 Action 6 and LCO 3.3.2.1 Action 17.
3.	RD07M2	TS-SRO	A control rod will drop into the core, the crew will take action to stabilize the power using AOP-C.01. The SRO enters LCO 3.1.3.1 Action C, 3.1.3.2 Action C, 3.1.3.5 Action A and 3.2.4 Action A.
4.		R-ATC N-BOP/SRO	The crew will reduce power in response to the dropped rod using AOP-C.03
5.	RX24	I-BOP/SRO	The sensing line to Feed Water Header Pressure Transmitter PT-3-1 fails resulting in the DCS causing an overfeed condition. The BOP will manually control the FWCS to maintain Steam generator levels using AOP-S.01.
6.	ED01 EG03A	M-All C-BOP/SRO	A major grid disturbance results in a Loss of Offsite Power and a Reactor Trip. Additionally, the 1A EDG fails to AUTO-START. The Crew responds using E-0 and transitions to ECA-0.0. The crew will manually start the 1A EDG by resetting the lockout relay to restore power to the 1A 6.9 Shutdown Board.
7.	RW19A	C-BOP	When the 1A EDG starts, the 1A EDG ERCW cooling valve FCV-67-68 fails to auto open. The BOP will manually open FCV-67-68 to restore cooling flow to the 1A EDG.

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

2012-301 Scenario 1 Summary

EVENT 1 - When directed by the lead examiner, CVCS Letdown Pressure instrument PT-62-81 fails low. The ATC will manually control letdown pressure using the ARP. The crew may decide to isolate Letdown and place Excess Letdown in service.

EVENT 2 - When directed by the lead examiner, Pressurizer Pressure instrument PT 68-340 will fail high resulting in pressurizer spray valves opening. The ATC will manually close the spray valves and stop the RCS depressurization using immediate operator actions and AOP-I.04. The SRO will enter LCO 3.2.5.b; 3.3.1.1 Action 6 and LCO 3.3.2.1 Action 17

EVENT 3 - When directed by the lead examiner, a control rod will drop into the core, the crew will take action to stabilize the power using AOP-C.01. The SRO enters LCO 3.1.3.1 Action C, 3.1.3.2 Action C, 3.1.3.5 Action A and 3.2.4 Action A.

EVENT 4 - The crew will reduce power in response to the dropped rod using AOP-C.03.

EVENT 5 - When directed by the lead examiner, the sensing line to Feed Water Header Pressure Transmitter PT-3-1 fails resulting in the DCS causing an overfeed condition. The BOP will manually control the FWCS to maintain Steam generator levels using AOP-S.01.

EVENT 6 - When directed by the lead examiner, A major grid disturbance results in a Loss of Offsite Power and a Reactor Trip. Additionally, the 1A EDG fails to AUTO-START. The Crew responds using E-0 and transitions to ECA-0.0. The crew will manually start the 1A EDG by resetting the lockout relay to restore power to the 1A 6.9 Shutdown Board.

EVENT 7 - When the 1A EDG starts, the 1A EDG ERCW cooling valve FCV-67-68 fails to auto open. The BOP will manually open FCV-67-68 to restore cooling flow to the 1A EDG.

The scenario terminates as directed by the Lead Examiner upon completion restoration water flow to the 1A EDG

EOP Flowpath E-0 ECA-0.0

BOOTH OPERATOR INSTRUCTIONS

Sim. Setup

1. Reset IC-17 100% power EOL time in core life
2. Perform switch check.
3. Verify control rod step counters reset.
4. Place simulator in RUN.
5. Place Mode 1 placard on panels.
6. Place B Train Week sign on the simulator.
7. Allow the simulator to run for at least 3 minutes before loading SCEN file or starting the exercise. This will initialize ICS.
8. Load SCENS: S-1211 NRC SCN 1
9. Acknowledge any alarms, allow the plant to stabilize, and freeze the simulator.
10. Place 1-HS-57-73A (D/G Bkr) in the PTL.
11. Place 0-HS-82-48 (Mode sel switch) in the PULL FOR LOCAL position.
12. Place OOS tags on
    - Breaker 1914, 1B-B EDG to SD Bd 1A-A
13. Place GO-16 tags on
    - CCP 1A-A
    - Pzr heater 1A-A
    - Pzr heater 1D
    - SI Pump 1A-A
    - RHR Pump 1A-A
    - EGTS Train A-A
    - Cntmt Spray Pump 1A-A
    - Motor Driven AFW Pump 1A-A
    - Unit 1 TDAFWP
    - ERCW Pump J-A OR Q-A (circle one)
    - ERCW Pump K-A OR R-A (circle one)
    - Diesel Generator 1A-A
14. Perform the SIMULATOR OPERATOR CHECKLIST
15. Place turnover sheets on the operator's desks.
16. Provide an in-progress copy of 0-GO-5 Section 5.4 completed through step 9.
17. Place simulator in RUN before crew enters the simulator.

EVENT	IC/MF/RF/OR #	DESCRIPTION/EXPECTED ACTIONS/BOOTH FEEDBACK
This override is active when the SCN file is loaded.	IMF EG03B f:1 IRF EGR12 f:1 IMF EGCOHS5773A f:3 IOR ZLOHS5773A_M26_GREEN f:0 IOR ZLOHS5773_GREEN F:0 IMF AN_OV_959 f:2 IMF AN_OV_936 f:2 IMF AN_OV_938 f:2 IMF AN_OV_943 f:2 IMF AN_OV_945 f:2 IMF AN_OV_946 f:2 IMF AN_OV_950 f:2 IMF AN_OV_952 f:2 IMF AN_OV_953 f:2	These MFs, RFs, and ORs simulate 1B-B D/G being inop for maintenance and tripped to local. Place 1-HS-57-73A (D/G Bkr) in the PTL position and PLACE H.O. ON HAND SWITCH. Place 0-HS-82-48 (Mode sel switch) in the PULL FOR LOCAL position.
This override is active when the SCN file is loaded.	IMF RW19A f:1	FCV-67-68 fails to auto open.
When directed by the Lead Examiner, use **KEY 1** to insert malfunction.	IMF CV25A f:1 k:1	CVCS Letdown Pressure instrument PT-62-81 fails low Support staff: If dispatched, after 5 minute, the AB AUO reports the valve is [position from MCB], no apparent problems or damage identified/observed locally.
When directed by the Lead Examiner, use **KEY 2** to insert malfunction.	IMF RX07A f:1 k:2	Controlling Pzr Pressure Transmitter PT 68-340 Fails High Support staff: When MSS is contacted, inform the crew that the I&C will report to the MCR in ~25 minutes. If asked, report Aux CR indication is normal.
When directed by the Lead Examiner, use **KEY 3** to insert malfunction.	IMF RD07M2 f:1 k:3	Dropped Rod: M2 SDB 'A' rod. Support staff: MSS is notified to initiate maintenance, report it will take approx. 2 hours to assemble a team to troubleshoot the dropped rod. Reactor Eng. notified for power peaking, fuel failure, & xenon oscillation considerations, inform crew to proceed with rod retrieval using AOP-C.01 considerations (i.e.: <1 hour).

EVENT	IC/MF/RF/OR #	DESCRIPTION/EXPECTED ACTIONS/BOOTH FEEDBACK
When directed by the Lead Examiner, use **KEY 5** to insert malfunction.	IMF RX24 f:1 k:5 IMF RX24A f:1 k:5 IMF RX24B f:1 k:5	PT-3-1, 1A, 1B fail LOW Support staff: If directed to inspect PT-3-1, respond as the TB AUO, wait 5 minutes and report no abnormal conditions noted. When contacted, inform the crew that the I&C will report to the MCR in ~ 45 minutes.
When directed by the Lead Examiner, use **KEY 6** to insert malfunction.	IMF ED01 k:6 IMF EG03A f:1 e:1	Total loss of offsite power with A EDG failure to AUTO START. Support staff: If dispatched wait 5 min, report no relays actuated and no abnormalities noted.
		When asked respond as Load Dispatcher and report that a system disturbance resulted in losing several substations. Time for recovery is undetermined.

The following reports are used ONLY if the crew fails to start the 1A EDG

WHEN requested by the crew to isolate RCP seals and Thermal Barriers (EA-68-1) then insert this remote function using **KEY 7**	IRF CVR36 f:0 k:7 IRF CVR37 f:0 k:7 IRF CCR06 f:0 k:7 IRF CV6263 f:0 k:7	Closes HCV-62-549, 550 and closes 70-90 and 62-63 When complete inform the crew that RCP seals are isolated.
If asked by the crew to perform EA-3-4 then insert this remote function using **KEY 8**	IRF IA3172 f:1 k:8 IRF IA3173 f:1 k:8 IRF IA3174 f:1 k:8 IRF IA3175 f:1 k:8	Emergency air supply to TDAWP LCVs to emergency When complete inform the crew that emergency air is supplying the TDAFWP LCVs.
If Requested during scenario to provide local value of Gen Hydrogen Pressure, CST Level, or Hotwell level. (Indications will be lost with power loss)	If Requested during scenario to provide local value of Gen Hydrogen Pressure, CST Level, or Hotwell level. (Indications will be lost with power loss)	Hydrogen pressure is available on REQUAL Parameter values table as variable: rwpgenerator, Generator Hydrogen Pressure in PSIA (Subtract 15 psi and provide psig) CST and Hotwell Level are available on Simulator diagram "Condensate" in %. Wait five minutes then respond.
If Dispatched to ensure DC Air Side Seal Oil Pump Running.		**Wait five minutes then respond.**

EVENT	IC/MF/RF/OR #	DESCRIPTION/EXPECTED ACTIONS/BOOTH FEEDBACK
If requested to open Main Gen Hydrogen vent bypass valve 35-568 then insert this remote function using **KEY 11**	IRF EGR13 f:100 K:11	MANUAL POSITION FOR GENERATOR H2 VENT BYPASS, FCV-35-568 Wait five minutes then respond
If Dispatched to manually isolate FCV-2-35A then insert this remote function using **KEY 12**	IRF CNR08 f:0 k:12	VLV-2-562/563 MANUAL ISOL VLVS AROUND FCV-2-35A **Wait five minutes then respond**
If Requested to locally isolate CST from Hotwell (EA-2-1) then insert this remote function using **KEY 13**	IRF CNR01 f:1 k:13	ISOLATE HOTWELL MAKEUP FROM CST **Wait five minutes then respond**
If Requested to open breakers in AOP-P.01 Appendix G, Open Bkrs individually as requested (All may not be opened)	IRF ED250B1B527 IRF ED250B1B530 IRF ED250B1B529 IRF ED250B1B401 IRF ED250B1B525 IRF ED250B1B404	250VDC BAT BD 1 BKR 527 DC EOP 1A (MFPT) 250VDC BAT BD 1 BKR 530 DC EOP 1B (MFPT 250VDC BAT BD 1 BRKR 529 TO PREF INV 1 250VDC BAT BD 1 BKR 401 TO TSC INV 1 250VDC BAT BD 1 BKR 525 GEN AIR SIDE SOB PMP U1 NOR FEED 250VDC BAT BD 1 BKR 404 TURB EOP U1 NOR FEED **Wait five minutes then respond**

EVENT	IC/MF/RF/OR #	DESCRIPTION/EXPECTED ACTIONS/BOOTH FEEDBACK
If Requested to mannualy position TDAFW LCVs locally, Modify remote functions as directed.	IRF FWR36A IRF FWR37A IRF FWR36B IRF FWR37B IRF FWR36C IRF FWR37C IRF FWR36D IRF FWR37D	LCV-3-174 (LP 1) OPERATION (Place in Local) LCV-3-174 (LP 1) POSITION (Set as directed) LCV-3-173 (LP 2) OPERATION (Place in Local) LCV-3-173 (LP 2) POSITION (Set as directed) LCV-3-172 (LP 3) OPERATION (Place in Local) LCV-3-172 (LP 3) POSITION (Set as directed) LCV-3-175 (LP 4) OPERATION (Place in Local) LCV-3-175 (LP 4) POSITION (Set as directed) **Wait five minutes then respond.**
If requested to shed 250 volt DC Loads per EA-250-2 then insert this remote function using **KEY 14**	IRF ED250B1ALL f:0 k:14 IRF ED250B2ALL f:0 k:14	OPEN 250 VOLT LOAD SHED BREAKERS. 250VDC BATT BD 1, OPEN SBO BKRS 401,527,529,530 250VDC BATT BD 2, OPEN SBO BKRS 401,527,529,530 **Wait five minutes then respond.**
If requested to open Unit 1 Gen Air Side Seal Oil Pmp 250 Volt Bkr per EA-250-2 then insert this remote function using **KEY 15**	IRF ED250B1B525 f:0 k:15 IRF ED250B2B525 f:0 k:15	250VDC BATT BD 1 BREAKER 525 TO GEN AIR SIDE SOB PUMP U1 NORMAL FEED 250VDC BATT BD 2 BREAKER 525 TO GEN AIR SIDE SOB PUMP U1 ALTERNATE FEED **Wait five minutes then respond.**
If requested to open Unit 2 Gen Air Side Seal Oil Pmp 250 Volt Bkr per EA-250-2 then insert this remote function using **KEY 16**	IRF ED250B1B526 f:0 k:16 IRF ED250B2B526 f:0 k:16	250VDC BATT BD 1 BREAKER 526 TO GEN AIR SIDE SOB PUMP U2 ALTERNATE FEED 250VDC BATT BD 2 BREAKER 526 TO GEN AIR SIDE SOB PUMP U2 NORMAL FEED **Wait five minutes then respond.**

EVENT	IC/MF/RF/OR #	DESCRIPTION/EXPECTED ACTIONS/BOOTH FEEDBACK
If Requested to Shed 125vdc vital loads per EA-250-1 then insert this remote function using **KEY 17**	IRF ED120B1ALL f:0 k:17 ;IRF ED125B1ALL f:0 k:17 IRF ED120B2ALL f:0 k:17 ;IRF ED125B2ALL f:0 k:17 IRF ED120B3ALL f:0 k:17 ;IRF ED125B3ALL f:0 k:17 IRF ED120B4ALL f:0 k:17 ;IRF ED125B4ALL f:0 k:17	OPEN 120V & 125V VITAL DC LOAD SHED BREAKERS. **Wait five minutes then respond.**

Time: Now Date: Today

- **Unit 1 MCR Checklist** (751-6338 ID 950848) Then Press 2

Part 1 - Completed by Off-going Shift / Reviewed by On-coming Shift	
Mode 1, 100% Power **PSA Risk: Green** **Grid Risk: Green** **RCS Leakage ID .14 gpm, UNID .05 gpm**	**NRC phone Authentication Code** **Until 0800 A12B** **After 0800 C34D**

Common Tech Spec Actions

LCO/TRM	Equipment INOP	Time INOP	Owner	RTS
NONE				

U-1 Tech Spec Actions

LCO/TRM	Equipment INOP	Time INOP	Owner	RTS

1B-B EDG out of service for maintenance. LCO 3.8.1.1 Action B entered 2 hours ago, return to service in 4 hours.

Exo Sensor Plasma Display Unit XI-94-102 OOS due to an internal failure. LCO 3.3.3.7 action 1a entered 4 days ago, return to service in 6 days.

Protected Equipment

A Train

Shift Priorities

GO-5 Section 5.4 Coastdown at step 9.

REDUCE turbine load slowly (less than 1% per hour) as necessary to maintain TAVG on program with TREF.

Part 2 – Completed by on-coming shift prior to assuming duties:	
☒ Review current TS/TRM/ODCM/FPR Required Actions	☒ Current Qualification Status
☒ Review the current controlling Reactivity Management Plans	☒ Walkdown MCR Control Boards with off-going Operator
☒ SR/PER reviews complete for previous shift (SM/US/STA)	☒ Review Narrative Logs (previous day and carry-over items)
☒ Relief Time:_____	☒ Relief Date:_____

Part 3 – Completed by on-coming shift. These items may be reviewed after assuming duties:	
☐ Review Operator Workarounds, Burdens, and Challenges (applicable Unit/Station)	☐ Review applicable ODMI actions (first shift of shift week)
☐ Review changes in Standing/Shift orders since last shift worked)	☐ Review changes to TACFs issued (since last shift worked)
☐ Review Control Room Deficiencies (first shift of shift week)	☐ Review Component Deviation Log (Active Procedures)

Time: Now Date: Today

Abnormal Equipment Lineup/Conditions:

MAIN CONTROL ROOM (7690) (593-5409)

AUXILIARY BUILDING (7775) (593-2469)

All equipment operating or operable.

TURBINE BUILDING 7771

All equipment operating or operable.

OUTSIDE (7666) (593-0122)

1B-B EDG out of service

Time: Now Date: Today

Required Additional Monitoring and Contingencies
(Updated and Maintained by SM)

Issue	Required Action	Expiration Date
ODMI		

TACF	Description
TACF	•

UNIT ONE REACTIVITY BRIEF

Date: Today Time: Now

General Information

RCS Boron: **9** ppm Today		BA Controller Setpoint: **1%** *	RCS B-10 Depletion: **0** ppm
Operable BAT: **A**	BAT A Boron: **6850** ppm	BAT C Boron: **6850** ppm	RWST Boron: **2601** ppm
Nominal Gallons per rod step from 228: **n/a** gallons of acid, **n/a** gallons of water			

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

Estimated values for a 1° Change in Tave **

Gallons of acid: **22**	Gallons of water: **n/a**	Rod Steps: **10**

Estimated rods/boron for emergency step power reduction **

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

Power reduction amount	Estimated Final Rod Position	Estimated boron addition
10%	**201** Steps on bank D	**131** gallons
30%	**168** Steps on bank D	**375** gallons
50%	**109** Steps on bank D	**609** gallons

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

Previous Shift Reactivity Manipulations

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

Current Shift Estimated Reactivity Manipulations

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

Remarks:

Unit Supervisor: _____

Name/Date

Operations Chemistry Information

Boron Results					
Sample Point	**Units**	**Boron**	**Date / Time**	**Goal**	**Limit**
U1 RCS	ppm	9	Today / Now	Variable	Variable
U2 RCS	ppm	816	Today / Now	Variable	Variable
U1 RWST	ppm	2601	Today / Now	2550 - 2650	2500 - 2700
U2 RWST	ppm	2569	Today / Now	2550 - 2650	2500 - 2700
BAT A	ppm	6850	Today / Now	Variable	Variable
BAT B	ppm	6850	Today / Now	Variable	Variable
BAT C	ppm	6850	Today / Now	Variable	Variable
U1 CLA #1	ppm	2556	Today / Now	2470-2630	2400-2700
U1 CLA #2	ppm	2575	Today / Now	2470-2630	2400-2700
U1 CLA #3	ppm	2591	Today / Now	2470-2630	2400-2700
U1 CLA #4	ppm	2589	Today / Now	2470-2630	2400-2700
U2 CLA #1	ppm	2531	Today / Now	2470-2630	2400-2700
U2 CLA #2	ppm	2650	Today / Now	2470-2630	2400-2700
U2 CLA #3	ppm	2522	Today / Now	2470-2630	2400-2700
U2 CLA #4	ppm	2526	Today / Now	2470-2630	2400-2700
Spent Fuel Pool	ppm	2547	Today / Now	$\geq$ 2050	$\geq$ 2000
Lithium Results				**Goal**	**Midpoint**
U1 RCS	ppm	1.1	Today / Now	>1	>1
U2 RCS	ppm	2.43	Today / Now	2.18-2.48	2.33

Primary to Secondary Leakrate Information (Total CPM RM-90-99/119)					
Indicator	**Units**	**U1**	**Date / Time**	**U2**	**Date/Time**
SI 50 S/G Leakage?	Yes/No	No	Today / Now	No	Today / Now
SI 137.5 CVE Leakrate	gpd	< 0.1	Today / Now	< 0.1	Today / Now
5 gpd leak equivalent	cpm	115	Today / Now	68	Today / Now
30 gpd leak equivalent	cpm	490	Today / Now	83	Today / Now
50 gpd leak equivalent	cpm	790	Today / Now	206	Today / Now
75 gpd leak equivalent	cpm	1165	Today / Now	455	Today / Now
100 gpd leak equivalent	cpm	1540	Today / Now	662	Today / Now
150 gpd leak equivalent	cpm	2290	Today / Now	870	Today / Now
CVE Air Inleakage	cfm	10	Today / Now	12.5	Today / Now
Bkgd on 99/119	cpm	40	Today / Now	40	Today / Now
Correction Factor 99/119	cpm/gpd	15	Today / Now	7.34	Today / Now

Steady state conditions are necessary for an accurate determination of leak rate using the CVE Rad Monitor

STARTUP No. XX **Unit** 1 **Date** TODAY

5.4 Power Coastdown at End of Life

CAUTION

Do NOT exceed the positive Axial Flux Difference (AFD) limit of TI-28 during power coastdown.

NOTES

1. The power level of the reactor and turbine slowly coastdown from full power approximately 0.8% per day with T_{AVG} and T_{REF} maintained on program. The core cycle may be extended for 30 days or more. The coastdown enables the plant to reach the refueling date with a core burnup within the prescribed burnup window if the normal cycle length is insufficient for the calendar refueling date.
2. For core operating recommendations during coastdown or unusual power maneuvers, contact Reactor Engineering for guidance. [C.5]

[1] **ENSURE** Section 3.0 Precautions and Limitations has been reviewed. ☑

[2] **ENSURE** RCS boron concentration is less than 50 ppm, **OR** at a higher level acceptable to chemistry. 0

[3] **ENSURE** HUTs have sufficient capacity to hold excess water from the dilution process. 0

NOTE

T_{AVG} is programmed from 578.2°F at 100% power to 547°F at zero power at a rate of 0.312°F per % power.

[4] **MONITOR** T_{AVG} on program with T_{REF} within ± 1.5°F. ☑

STARTUP No. XX Unit 1 Date TODAY

5.4 Power Coastdown at End of Life (continued)

NOTE

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

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

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

[5.2] **IF** necessary to remove Automatic Voltage Control from service,
N/A **THEN**
PERFORM required steps in Appendix E. _____

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

[6] **WHEN** RCS boron is less than or equal to approximately 40 ppm **OR** when recommended by Chemistry, **THEN**

DE-BORATE RCS periodically as necessary to maintain T_{AVG} on program using 1,2-SO-62-9, *Placing Mixed Bed Demin in service*. ☐

[7] **IF** de-boration using Mixed Bed Demineralizer or dilution becomes ineffective for maintaining T_{AVG} on program with T_{REF},
THEN
WITHDRAW control rods to maintain T_{AVG} on program **USING** 0-SO-85-1. _____

STARTUP No. XX **Unit** 1 **Date** Today

5.4 Power Coastdown at End of Life (continued)

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

[8.1] **CONTACT** Reactor Engineering. ☐

[8.2] **IF** AFD is swinging in a positive direction, **THEN**
STEP control rods inward
USING 0-SO-85-1, *Control Rod Drive System*, in ~2 step increments as requested by Reactor Engineering. ☐

[8.3] **IF** AFD is swinging in a negative direction, **THEN**
PERFORM the following:

[8.3.1] **ENSURE** core thermal power is reduced sufficiently to prevent the ten minute average power from exceeding 3455 MW_T (or 3411 MW_T , if applicable) when stepping rods outward in the next substep. ☐

[8.3.2] **STEP** control rods outward
USING 0-SO-85-1, *Control Rod Drive System*, in no more than 1 step increments as requested by Reactor Engineering. ☐

[8.4] **REPEAT** substeps 5.4[8.2] and 5.4[8.3] as required to suppress xenon oscillation. ☐

STARTUP No. XX Unit 1 Date TODAY

5.4 Power Coastdown at End of Life (continued)

NOTE

The annunciator for Bank D Rod Withdrawal Limit High (XA-55-4B, window 21) will be illuminated when rods are withdrawn to ≥ 220 steps on D control rod bank.

[9] **WHEN** control rods have been withdrawn to the fully withdrawn position, **THEN**

[9.1] **REDUCE** turbine load slowly (less than 1% per hour) as necessary to maintain TAVG on program with T_{REF}. ☐

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

CAUTION

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

NOTE

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

[10] **IF** unsatisfactory load swings are experienced as the turbine load is reduced, **THEN**

[10.1] **SLOWLY** and **CAUTIOUSLY** PULSE the governor VALVE POSITION LIMIT in the LOWER direction while monitoring megawatts for a reduction and the VALVE POS LIMIT light to ILLUMINATE.

1st CV

[10.2] **WHEN** the limiter just reaches the governor valve position (Valve Pos Limit light should be lit), **THEN**

STOP limiter adjustment. ☐

STARTUP No._____ Unit _____ Date _____

5.4 Power Coastdown at End of Life (continued)

[10.3] **ENSURE** that indicated T_{AVG} and Megawatt readings are acceptable. ☐

[11] **REMOVE** secondary system equipment from service as Unit load is reduced (Reference Section 5.3 of this instruction for timely removal of secondary equipment). ☐

End of Section

Op Test No.: NRC 2012-302 Scenario # 1 Event # 1 Page 1 of 45

Event Description: CVCS Letdown Pressure instrument PT-62-81 fails low

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, initiate Event 1 CVCS Letdown Pressure instrument PT-62-81 fails low.		
Indications available: • **Annunciator XA-55-6C Window C-4** **Indicator 1-FI-62-82 indicates ≈0 gpm [M-6]** • **Indicator 1-PI-62-81 indicates pressure lowers to 0 psig [M-6]**		
TS-62-75 LOW PRESSURE LETDOWN RELIEF TEMP HIGH [1] MONITOR letdown pressure on [1-PI-62-81]. [2] IF [1-PCV-62-81] is Closed, THEN TAKE manual control of [1-PCV-62-81] and RESTORE normal letdown flow. [3] MONITOR low press letdown relief tailpipe temp on [1-TI-62-75]. [4] MONITOR VCT and PRT levels.		
Examiner Note: Several steps, notes, and cautions in the Annunciator response procedure do not apply to this failure. Only those that are applicable are listed in this event guide.		
	ATC	Responds to alarm using ARP 1-AR-M6C, C4
	ATC	Places HIC-62-81 Letdown Pressure Pressure Control to MANUAL and lowers output.
Examiner Note: If normal letdown flowpath remains in service, PCV-62-81 will remain in manual control for the remainder of the scenario; and, the ATC is expected to manually control letdown pressure.		
	Crew	**Performs a Crew Brief** as time allows.
	Crew	**Notifications** should be addressed as applicable if not specifically addressed by the procedure or in the crew brief. Operations Management - Typically Shift Manager. Maintenance Personnel – Typically Maintenance Shift Supervisor (MSS). (**Note:** Maintenance notification may be delegated to the Shift Manager).
	Crew	Addresses controller PIC-62-81 being placed in MANUAL and letdown flow established in a pre-determined band.
Lead Examiner may cue the next event when letdown flow is established in the pre-determined band.		

Op Test No.: NRC 2012-302 Scenario # 1 Event # 2 Page 2 of 45
Event Description: PT 68-340 Fails High

Time	Position	Applicant's Actions or Behavior
Simulator Operator: When directed, initiate Event 2 Controlling Pzr Pressure Transmitter PT 68-340 Fails High		
Indications/Alarms **Annunciator:** **1-M-5** • **1-XA-55-5A Window B-3, "PS-68-340F/G PRESSURIZER PRESS ABOVE REF SET POINT"** **1-M-6** • **1-XA-55-6A Window C-5, "PS-68-340A PRESSURIZER HIGH PRESSURE"** **Indications** **1-M-5** • **1-PI-68-334, 323, 322 RCS PZR PRESS indicators decreasing** **Significant Resultant Alarms/Indications:** **1-M-4** • **1-XI-68-340B & 340D RED indicating lights illuminated indicating Pzr Spray Valves open**		
PS-68-340F/G PRESSURIZER PRESS ABOVE REF SET POINT [1] CHECK pressurizer pressure. [2] IF channel failed, THEN GO TO AOP-I.04, Pressurizer Instrument Malfunction. [3] IF pressurizer pressure high, THEN PERFORM the following: [a] ENSURE pressurizer heaters OFF. [b] ENSURE pressurizer spray valves OPEN. [c] ADJUST plant parameters as necessary. [4] EVALUATE TS 3.3.1, 3.3.2, 3.3.3.5.		
Examiner Note: Several steps, notes, and cautions in the Annunciator response procedure do not apply to this failure. Only those that are applicable are listed in this event guide.		
	ATC	Responds to alarm using ARP 1-AR-M5A, B3

Op Test No.: NRC 2012-302 Scenario # 1 Event # 2 Page 3 of 45
Event Description: PT 68-340 Fails High

Time	Position	Applicant's Actions or Behavior
	ATC	Places PIC-68-340A, Master Pressure Controller in MANUAL and lowers output. OR Places PZR Spray controllers PIC-68-340D (Loop 1) and PIC-68-340B (Loop 2) and lowers output. Using immediate operator actions (IOAs)
	SRO	Transitions to AOP-I.04 Pressurizer Instrument And Control Malfunctions.

NOTE: If spray valve is open due to pressure instrument failure, then Section 2.3 is the appropriate entry point.

1. **DIAGNOSE** the failure:

IF...	GO TO SECTION	PAGE
Pressurizer Pressure Instrument OR Controller Malfunction	2.3	11

NOTE Step 1 is an IMMEDIATE ACTION.

	SRO	1. **CHECK** normal spray valves CLOSED.	**IF** RCS pressure is less than 2260 psig, **THEN** **CLOSE** affected spray valve(s) **USING** the following: • PIC-68-340A, Master Pressure Controller. **OR** • PZR Spray controllers PIC-68-340D (Loop 1) and/or PIC-68-340B (Loop 2).
	ATC	Places Master Pressure Controller in MANUAL OR Spray controllers PIC-68-340D (Loop 1) and PIC-68-340B (Loop 2) in MANUAL if not already performed during IOA's.	

Op Test No.: NRC 2012-302 Scenario # 1 Event # 2 Page 4 of 45
Event Description: PT 68-340 Fails High

Time	Position	Applicant's Actions or Behavior
	ATC	2. **MONITOR** pressurizer pressure stable or trending to desired pressure. **RESTORE** pressurizer pressure **USING** manual control of the following: • PIC-68-340A, Master Pressure Controller. **OR** • PZR Spray controllers PIC-68-340D (Loop 1) and/or PIC-68-340B (Loop 2) **OR** • Pressurizer Heaters.
	ATC	May energize additional Pressurizer heaters.
NOTE:		Appendix L shows layout of PZR pressure control for operator reference.
	ATC	3. **CHECK** PI-68-340A NORMAL. **PERFORM** the following: a. **ENSURE** PRESS CONTROL SELECTOR switch XS-68-340D in PT-68-334 & 323. b. **ENSURE** LOOP TAVG ΔT REC/SEL selector switch XS-68-2B in LOOP 2, 3, or 4. c. **ENSURE** PRESS REC CHANNEL SELECTOR XS-68-340B in PT-68-334, PT-68-323, or PT-68-322. d. **GO TO** Caution prior to Step 8.
	ATC	Places PRESS CONTROL SELECTOR switch XS-68-340D in PT-68-334 & 323.
CAUTION		**RCS pressure changes and changes in RCS boron concentration (due to differences between pzr and RCS boron) may cause small change in core reactivity.**
	ATC	8. **MONITOR** reactor power: a. **CHECK** reactor in Mode 1 or 2. b. **MONITOR** core thermal power for unexpected changes.

Op Test No.: NRC 2012-302 Scenario # 1 Event # 2 Page 5 of 45
Event Description: PT 68-340 Fails High

Time	Position	Applicant's Actions or Behavior
	SRO	9. **EVALUATE** the following Tech Specs for applicability: • 3.2.5 DNB Parameters • 3.3.1.1 (3.3.1), Reactor Trip System Instrumentation • 3.3.2.1 (3.3.2), ESF Actuation System Instrumentation • 3.3.3.5 Remote Shutdown Instrumentation
	SRO	3.2.5 The following DNB related parameters shall be maintained within the limits shown on Table 3.2-1: a. Reactor Coolant System (RCS)T_{avg} b. Pressurizer Pressure c. RCS Total Flow Rate APPLICABILITY: MODE 1 ACTION: With any of the above parameters exceeding its limit, restore the parameter to within its limit within 2 hours or reduce THERMAL POWER to less than 5% of RATED THERMAL POWER within the next 4 hours. PARAMETER / LIMITS (4 Loops In Operation): Reactor Coolant System T_{avg} ≤ 583°F Pressurizer Pressure ≥ 2220 psia* Reactor Coolant System Total Flow Figure 3.2-1
	SRO	If in MODE 1 enters LCO 3.2.5 Action if RCS Pressure decreases to less than 2220 psia.

Op Test No.: NRC 2012-302 Scenario # 1 Event # 2 Page 6 of 45
Event Description: PT 68-340 Fails High

Time	Position	Applicant's Actions or Behavior
	SRO	LIMITING CONDITION FOR OPERATION 3.3.1.1 As a minimum, the reactor trip system instrumentation channels and interlocks of Table 3.3-1 shall be OPERABLE. APPLICABILITY: As shown in Table 3.3-1. ACTION: As shown in Table 3.3-1. FUNCTIONAL UNIT / TOTAL NO. OF CHANNELS / CHANNELS TO TRIP / MINIMUM CHANNELS OPERABLE / APPLICABLE MODES / ACTION 9. Pressurizer Pressure-Low 4 2 3 1, 2 6 10. Pressurizer Pressure—High 4 2 3 1, 2 6 ACTION 6 - With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied: a. The inoperable channel is placed in the tripped condition within 6 hours. b. The Minimum Channels OPERABLE requirement is met; however, the inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels per Specification 4.3.1.1.1.
	SRO	Enters LCO 3.3.1.1 Action 6
	SRO	LIMITING CONDITION FOR OPERATION 3.3.2.1 The Engineered Safety Feature Actuation System (ESFAS) instrumentation channels and interlocks shown in Table 3.3-3 shall be OPERABLE with their trip setpoints set consistent with the values shown in the Nominal Trip Setpoint column of Table 3.3-4. APPLICABILITY: As shown in Table 3.3-3. ACTION: a. With an ESFAS instrumentation channel or interlock trip setpoint less conservative than the value shown in the Allowable Values column of Table 3.3-4, declare the channel inoperable and apply the applicable ACTION requirement of Table 3.3-3 until the channel is restored to OPERABLE status with the trip setpoint adjusted consistent with the Nominal Trip Setpoint value. b. With an ESFAS instrumentation channel or interlock inoperable, take the ACTION shown in Table 3.3-3. FUNCTIONAL UNIT / TOTAL NO. OF CHANNELS / CHANNELS TO TRIP / MINIMUM CHANNELS OPERABLE / APPLICABLE MODES / ACTION 1. SAFETY INJECTION, TURBINE TRIP AND FEEDWATER ISOLATION d. Pressurizer Pressure-Low 3 2 2 1, 2, 3# 17

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Event Description: PT 68-340 Fails High

		ACTION 17 - With the number of OPERABLE Channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied: a. The inoperable channel is placed in the tripped condition within 6 hours. b. The Minimum Channels OPERABLE requirements is met; however, the inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels per Specification 4.3.2.1.1.
	SRO	Enters LCO 3.3.2.1 Action 17
	ATC	10. **CHECK** PZR PRESS and PZR SPRAY controllers in AUTO. **WHEN** malfunction has been identified **AND** isolated or corrected, **THEN** **PERFORM** the following: a. **ENSURE** Master Pzr Pressure Controller PIC–68–340A Output Percent Meter is less than 40%. b. **ENSURE** PZR PRESS Controller, PZR SPRAY controller, and PZR HTRS in AUTO.
	ATC	Lowers output to less than 40% as required and places Master Pressure Controller in AUTO **OR** Spray controllers PIC-68-340D (Loop 1) and/or PIC-68-340B (Loop 2) in AUTO.
NOTE:		If performing AOP in conjunction with AOP-I.11 for an Eagle LCP failure, then actions to hard trip bistables should be delayed until Eagle system reset is attempted. Actions to hard trip bistables must be completed within 6 hours UNLESS affected loop is restored to operable status by resetting Eagle rack.
	CREW	11. **REMOVE** failed pressurizer pressure channel from service: a. **CHECK** any pressurizer pressure channel INOPERABLE. — a. **IF** all channels are OPERABLE, **THEN** **GO TO** Step 12. b. **CHECK** OTΔT setpoint on affected channel NORMAL. — b. **GO TO** Substep 11.d.

		11. d. **IF** any of the following conditions exists: • transmitter signal failed (entire instrument loop affected including OTΔT pressure input) **OR** • OTΔT pressure input potentially affected or status CANNOT be determined, **THEN** **PERFORM** applicable appendix: **PZR PRESSURE INSTRUMENT** / **CHANNEL** / **APPENDIX** P-68-340 (P-455) / I / A
		CREW Brief would typically be conducted for this event as time allows prior to the next event.
		Notifications should be addressed as applicable if not specifically addressed by the procedure or in the CREW brief. Operations Management - Typically Shift Manager. Maintenance Personnel – Typically Maintenance Shift Supervisor (MSS). (**Note:** Maintenance notification may be delegated to the Shift Manager).
Lead Examiner may cue next event when Pressurizer Pressure control is in AUTO and Tech Specs are identified		

Op Test No.: NRC 2012-302 Scenario # 1 Event # 3 Page 9 of 45
Event Description: Dropped Rod

Time	Position	Applicant's Actions or Behavior
Simulator Operator: When directed, initiate Event 3 Dropped Rod.		
Indications/Alarms **Annunciator:** **1-M-4** • **1-AR-M4-B, D4, COMPUTER ALARM ROD DEV & SEQ PWR RANGE TILTS** • **1-AR-M4-B, D7, FULL LENGTH RODS AT BOTTOM** • **1-AR-M4-B, E3, NIS POWER RANGE CHANNEL DEVIATION** • **1-AR-M4-B, B3, NIS POWER RANGE UPPER DETECTOR HI FLUX DEVN OR AUTO DEFEAT (Later)** • **1-AR-M4-B C3, NIS POWER RANGE LOWER DETECTOR HI FLUX DEVN OR AUTO DEFEAT (Later)** **Indications available:** **1-M-4** • **1 Rod Bottom Light illuminated on M-4 IRPI Display**		
FULL LENGTH RODS RODS AT BOTTOM [1] CHECK rod position. [2] IF more than one rod drops, THEN TRIP the reactor and GO TO E-0, *Reactor Trip or Safety Injection*. [3] IF a single rod dropped, THEN GO TO AOP-C.01, *Rod Control System Malfunctions*. [4] IF RPI malfunction or failure, THEN GO TO AOP-C.01, *Rod Control System Malfunctions*. [5] IF dropped rod occurs or rod position indication is the malfunction, THEN REFER TO Technical Specifications 3.2.4, 3.1.3.1, 3.1.3.5, and 3.2.1.		
	BOP	Responds to ARP 1-AR-M4-B D-7.
Examiner Note: Several steps, notes, and cautions in the Annunciator response procedure do not apply to this failure. Only those that are applicable are listed in this event guide.		
	SRO	Transitions to AOP-C.01 Rod Control System Malfunctions

Op Test No.: NRC 2012-302 Scenario # 1 Event # 3 Page 10 of 45
Event Description: Dropped Rod

Time	Position	Applicant's Actions or Behavior
1. **DIAGNOSE** the failure:		
IF...	**GO TO SECTION**	**PAGE**
Dropped shutdown/control rod(s) with reactor initially in Mode 1 or 2	2.2	10
NOTE: Step 1 is an immediate action step.		
	ATC	1. **PLACE** rod control in MAN.
	ATC	Places HS-85-5110 to MANUAL.
	ATC	2. **VERIFY** ONLY ONE rod dropped.
NOTE: If a dropped rod occurs at low power level, retrieval of the dropped rod is NOT the conservative action to take and could violate Tech Specs (if Mode 2 has been entered). **[C.2]**		
	ATC	3. **MONITOR** reactor power greater than 5%.
	BOP	4. **REDUCE** load to control T-avg: a. **MONITOR** T-avg greater than 541°F. (LCO 3.1.1.4) b. **CHECK** main turbine loaded. c. **REDUCE** turbine load to establish T-avg within 3°F of T-ref.
	BOP	Lowers Main Turbine load to restore T_{AVE} within 3 deg F of T_{REF} as required.

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Event Description: Dropped Rod

Time	Position	Applicant's Actions or Behavior
	ATC	5. **MONITOR** Quadrant Power Tilt Ratio (QPTR) less than 1.09 **USING** one of the following: • ICS **OR** • 0-SI-NUC-000-133.0, Quadrant Power Tilt Ratio.
	SRO	6. **EVALUATE** the following Tech Specs/TRM for applicability: • 3.1.1.4, Minimum Temperature for Criticality • 3.1.3.1, Movable Control Assemblies, Group Height • 3.1.3.2, Position Indication Systems - Operating • 3.1.3.5, Shutdown Rod Insertion Limit • 3.1.3.6, Control Rod Insertion Limits • 3.2, Power Distribution Limits (entire section)
	SRO	LIMITING CONDITION FOR OPERATION 3.1.3.1 All full length (shutdown and control) rods shall be OPERABLE and positioned within ± 12 steps (indicated position) of their group step counter demand position. APPLICABILITY: MODES 1* and 2* ACTION: c. With one full length rod misaligned from its group step counter demand height by more than ± 12 steps (indicated position), POWER OPERATION may continue provided that within one hour either: 1. The rod is restored within the above alignment requirements, or 2. The remainder of the rods in the group with the misaligned rod are aligned to within ± 12 steps of the misaligned rod while maintaining the rod sequence and insertion limit of specification 3.1.3.6. The THERMAL POWER level shall be restricted pursuant to Specification 3.1.3.6 during subsequent operation, or 3. The rod is declared inoperable and the SHUTDOWN MARGIN requirement of Specification 3.1.1.1 is satisfied. POWER OPERATION may then continue provided that:

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Event Description: Dropped Rod

Time	Position	Applicant's Actions or Behavior
		3.1.3.2 The shutdown and control rod position indication system and the demand position indication system shall be OPERABLE and capable of determining the control rod positions within ± 12 steps. APPLICABILITY: MODES 1 and 2. ACTION: c. With a maximum of one demand position indicator per bank inoperable either: 1. Verify that all rod position indicators for the affected bank are OPERABLE and that the most withdrawn rod and the least withdrawn rod of the bank are within a maximum of 12 steps of each other at least once per 12 hours, or 2. Reduce THERMAL POWER to less than 50% of RATED THERMAL POWER within 8 hours. LIMITING CONDITION FOR OPERATION 3.1.3.5 All shutdown rods shall be limited in physical insertion as specified in the COLR. APPLICABILITY: MODES 1* and 2*# ACTION: a. With a maximum of one shutdown rod inserted beyond the insertion limit specified in the COLR, except for surveillance testing pursuant to Specification 4.1.3.1.2 or when complying with ACTION b of this specification, within one hour either: 1. Restore the rod to within the insertion limit specified in the COLR, or 2. Declare the rod to be inoperable and apply ACTION 3.1.3.1.c.3. 3.2.4 The QUADRANT POWER TILT RATIO shall not exceed 1.02. APPLICABILITY: MODE 1 above 50% of RATED THERMAL POWER* ACTION: a. With the QUADRANT POWER TILT RATIO determined to exceed 1.02 but less than or equal to 1.09: 1. Calculate the QUADRANT POWER TILT RATIO at least once per hour until: a) Either the QUADRANT POWER TILT RATIO is reduced to within its limit, or b) THERMAL POWER is reduced to less than 50% of RATED THERMAL POWER. 2. Within 2 hours: a) Either reduce the QUADRANT POWER TILT RATIO to within its limit, or b) Reduce THERMAL POWER at least 3% from RATED THERMAL POWER for each 1% of indicated QUADRANT POWER TILT RATIO in excess of 1.02 and similarly reduce the Power Range Neutron Flux-High Trip Setpoints within the next 4 hours. 3. Verify that the QUADRANT POWER TILT RATIO is within its limit within 24 hours after exceeding the limit or reduce THERMAL POWER to less than 50% of RATED THERMAL POWER within the next 2 hours and reduce the Power Range Neutron Flux-High Trip setpoints to less than or equal to 55% of RATED THERMAL POWER within the next 4 hours. 4. Identify and correct the cause of the out of limit condition prior to increasing THERMAL POWER; subsequent POWER OPERATION above 50% of RATED THERMAL power may proceed provided that the QUADRANT POWER TILT RATIO is verified within its limit at least once per hour for 12 hours or until verified acceptable at 95% or greater RATED THERMAL POWER.
	SRO	Enters LCO 3.1.3.1 Action C, 3.1.3.2 Action C, 3.1.3.5 Action A and 3.2.4 Action A

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Event Description: Dropped Rod

Time	Position	Applicant's Actions or Behavior
NOTE	Core thermal power must be reduced to less than 75% within one hour and shutdown margin must be verified within one hour UNLESS dropped rod can be restored in one hour. (LCO 3.1.3.1 action c)	
	SRO	7. **PERFORM** the following to comply with LCO 3.1.3.1: a. **INITIATE** power reduction to less than 75% **USING** one of following: • AOP-C.03, Rapid Shutdown or Load Reduction **OR** • 0-GO-5, Normal Power Operation. b. **VERIFY** adequate Shutdown Margin within 1 hour and once every 12 hours **USING** SI-NUC-000-038.0.
	SRO	Transitions to AOP-C.03 RAPID SHUTDOWN OR LOAD REDUCTION, go to page 14 for details.

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Event Description: Rapid Power Reduction			

Time	Position	Applicant's Actions or Behavior
Simulator Operator: No action required for Event 4, Rapid Power reduction		
	SRO	Directs performance of AOP-C.03 RAPID SHUTDOWN OR LOAD REDUCTION.
	SRO	1. **ENSURE** crew has been briefed on reactivity management expectations **USING** Appendix A.

		REACTIVITY MANAGEMENT BRIEFING
		NOTE This appendix should be used in addition to event-based brief.
		[1] ENSURE crew has been briefed on the following:
		• Reason for Rapid Shutdown or Load Reduction
		• Load Reduction Rate:_____
		• Desired final power level:_____
		• Reactivity Management expectations:
		  • Unit Supervisor shall concur with all reactivity manipulations
		  • Ensure reactor responding as expected using diverse indications
		  • Tavg-Tref Mismatch requirements:
		  • 3°F control band
		  • 5°F reactor trip criteria
		  • Crew focus will be on reducing power in a controlled and conservative manner.
		  • OATC will monitor rod insertion limits and AFD limit
		  • Boration source: _____
		• Crew will monitor reactor trip and turbine trip criteria using App. B
		• CRO will stop secondary plant equipment using App. C.
		• If time permits, review expected annunciators (ex. Computer Alarm, Upper and Lower Flux Dev)
		• Termination Criteria (conditions requiring Reactor Trip, Turbine Trip, or condition no longer requiring rapid load reduction):

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Event Description: Rapid Power Reduction

Time	Position	Applicant's Actions or Behavior
	SRO	Chooses a power reduction rate of 1% final power level of <75% and BAT as the boration source. (1% to 3% acceptable.)
	CREW	2. **NOTIFY** following personnel of rapid shutdown or load reduction: • Load Coordinator **[C.1]** • Chemistry • Radiation Protection • Plant Management
	CREW	Makes notifications as required.
	CREW	3. **MONITOR** reactor/turbine trip NOT required **USING** Appendix B, *Reactor and Turbine Trip Criteria.*
Examiner note: Appendix B reactor and turbine trip criteria see page 21		
NOTE:		Step 4 should be handed off to opposite unit or extra operator (if available). If NO operator is available, notifications should be performed concurrently with subsequent steps (when time permits).
	CREW	4. **ENSURE** following personnel notified of rapid shutdown or load reduction: **[C.1]** • Balancing Authority (Load Coordinator) (751-7547). • Chemistry • Radiation Protection • Plant Management
NOTE:		Boration volumes and flowrates listed in this procedure are recommendations and may be adjusted as necessary.
	ATC	5. **INITIATE** boration: a. **CHECK** rod control AVAILABLE: • Control Bank D rods capable of being moved • NO dropped or misaligned rods in Control Bank D.

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Event Description: Rapid Power Reduction

Time	Position	Applicant's Actions or Behavior
	ATC	5. b. **CHECK** Control Bank D group position greater than 200 steps. c. **CHECK** boration capability from BAT AVAILABLE.
	SRO	d. **DETERMINE** recommended boration volume from BAT: • ~800 gal to reduce power from 100% to 20% **OR** • 10 gal for each 1% power reduction (from current power level) **OR** • volume recommended by Reactor Engineering.
	SRO	Determines 260 gal as required to reduce power from 100% to <75%.
	SRO	5. e. **DETERMINE** recommended boration flowrate from table below or from Reactor Engineering:

LOAD REDUCTION RATE(%/min)	BORATION FLOWRATE
2%	~30 gpm
3%	~45 gpm

	SRO	Chooses a 1% load reduction rate. (1% to 3% acceptable.)
	ATC	f. **ENSURE** concurrence obtained from STA for boration volume and flowrate.
	ATC	g. **CHECK** the following conditions met: • normal boration flowpath (blender) AVAILABLE • desired load reduction rate is less than 4% per minute • time is available for normal boration.
	ATC	h. **INITIATE** normal boration **USING** Appendix H.

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Event Description: Rapid Power Reduction

Time	Position	Applicant's Actions or Behavior
	ATC	i. **CONTROL** boration flow as required to inject desired boric acid volume.
Examiner note: Appendix H Actions are listed in the following steps.		
		APPENDIX H **NORMAL BORATION**
	ATC	**[1]** **RECORD** desired boration volume and flowrate: ☐ Volume (gal) _____ Flowrate (gpm) _____
	ATC	Records 260 gal as required at 15 to 45 gpm
	ATC	**[2]** **PLACE [HS-62-140A]** Makeup Control to STOP position. ☐
	ATC	Places HS-62-140A to STOP.
	ATC	**[3]** **PLACE [HS-62-140B]** Makeup mode selector switch in BORATE position. ☐
	ATC	Places HS-62-140B to BORATE
NOTE		Boric Acid controller setting is twice the desired flow rate. Maximum Boric Acid flow is ~45 gpm.
	ATC	**[4]** **ADJUST [FC-62-139]** BA flow controller setpoint for desired flow rate. ☐
	ATC	Places FIC-62-139 to 15 to 45 gpm.
	ATC	**[5]** **ADJUST [FQ-62-139]** BA integrator (batch counter) to desired boric acid volume. ☐
	ATC	Places FQ-62-139 to 260 gal.
	ATC	**[6]** **PLACE [HS-62-140A]** Makeup Control Switch mode selector switch to START. ☐
	ATC	Places HS-62-140A to START

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Event Description: Rapid Power Reduction

Time	Position	Applicant's Actions or Behavior
	ATC	**[7]** **ENSURE** boric acid transfer pump aligned to blender in FAST speed. ☐
	ATC	**[8]** **IF** desired boric acid flow rate NOT obtained, **THEN** **ADJUST** one or both of the following as necessary: • **[FC-62-139]** BA flow controller ☐ • recirculation valve for BAT aligned to blender. ☐
	ATC	Adjusts FIC-62-139 as required.
	ATC	**[9]** **ENSURE** desired boric acid flow indicated on FI-62-139. ☐
	ATC	**[10]** **RECORD** time when boration flow established: ☐ Time: _____
	ATC	Records time boration initiated.
	ATC	**[11]** **WHEN** required boric acid volume has been added **AND** control rods are above low-low insertion limit, **THEN** **PERFORM** the following: **[a]** **PLACE [HS-62-140A]**, Makeup Control to STOP position. ☐
	ATC	Places HS-62-140A to STOP.
	ATC	**[b]** **ENSURE [FC-62-142]**, Primary Water to Blender Flow Controller in AUTO with dial indicator set at 35%. ☐
	ATC	**[c]** **ADJUST [FC-62-139]**, Boric Acid Flow Controller to desired blend solution **USING** TI-44 Boron Tables. ☐
	ATC	Places FIC-62-139 to 1.

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Event Description: Rapid Power Reduction

Time	Position	Applicant's Actions or Behavior
	ATC	**[d] PLACE [HS-62-140B]**, Makeup Mode Selector Switch in AUTO position. ☐
	ATC	Places HS-62-140B to AUTO.
	ATC	**[e] PLACE [HS-62-140A]**, Makeup Control to START. ☐
	ATC	Places HS-62-140A to START.
	ATC	**[f] ENSURE** boric acid transfer pumps running in SLOW speed. ☐
	ATC	Places HS-62-230A BA Transfer Pump 1A to STOP Places HS-62-230A BA Transfer Pump 1A to START.
	ATC	Places HS-62-232A to BA Transfer Pump 1B to STOP Places HS-62-232A to BA Transfer Pump 1B to START.
CAUTION:		**If borating from the RWST, Turbine Load Reduction Rate greater than 2% per minute could result in violating Rod Insertion Limit.**
	BOP	6. **INITIATE** load reduction as follows: a. **ADJUST** load rate to desired value: • between 1% and 4% per minute if borating via FCV-62-138 **OR** • between 1% and 3% per minute if borating via normal boration (App. H) **OR** • 2% per minute if borating from RWST.
	BOP	Adjusts load rate approx 1% to 3% per minute
	BOP	b. **ADJUST** setter for desired power level: **DESIRED RX POWER LEVEL** / **RECOMMENDED SETTER VALUE** 80% — 56 70% — 46
	BOP	Adjusts setter to approx. 51

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Event Description: Rapid Power Reduction

Time	Position	Applicant's Actions or Behavior
	BOP	6. c. **VERIFY** boration flow established. d. **INITIATE** turbine load reduction by depressing GO pushbutton.
	BOP	Depresses GO pushbutton.
		e. **CONTROL** turbine load reduction as necessary to reduce power to desired level.
	ATC	7. **MONITOR** T-avg/T-ref mismatch: a. **CHECK** T-ref indication AVAILABLE. a. **PERFORM** the following: 1) **MONITOR** Program T-avg for current reactor power **USING** TI-28 Figure 3 or ICS (NSSS / BOP, Program Reactor Average Temperature). 2) **USE** program T-avg in place of T-ref. 3) **MAINTAIN** T-avg within 3°F of program T-avg **USING** manual rod control. 4) **ADJUST** turbine load rate as necessary. 5) **IF** mismatch between T-avg and program value CANNOT be maintained less than 5°F, **THEN** **TRIP** the reactor and **GO TO** E-0, *Reactor Trip or Safety Injection*.

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Event Description: Rapid Power Reduction

		7. b. **MONITOR** automatic rod control maintaining T-avg/T-ref mismatch less than 3°F.	b. **IF** auto rod control is functional **AND** situation allows slowing down load reduction, **THEN** **PERFORM** the following: 1) **REDUCE** turbine load rate to allow auto rod control to restore T-avg/T-ref mismatch. 2) **WHEN** T REF T AUCT HIGH LOW alarm (M-5A, C-6) is clear, **THEN** **RESTORE** turbine load rate to desired value. **IF** any of the following conditions met: • auto rod control NOT functional **OR** • turbine load rate adjustment is NOT effective in reducing mismatch **OR** • situation does NOT allow slowing down load reduction, **THEN** **RESTORE** T-avg to within 3°F of T-ref **USING** manual rod control as necessary. **IF** T-avg/T-ref mismatch CANNOT be maintained less than 5°F, **THEN** **TRIP** the reactor and **GO TO** E-0, *Reactor Trip or Safety Injection*.
	ATC	Coordinates with the BOP to maintain T-avg/Program T-ref mismatch less than 3°F using the TI-28 figure 3 or ICS.	
	BOP	8. **MONITOR** automatic control of MFW pump speed AVAILABLE.	
	BOP	9. **STOP** secondary plant equipment **USING** Appendix C, *Secondary Plant Equipment*.	

Examiner Note: Appendix C, Secondary Plant Equipment starts at page 23.

Examiner Note: Additional AOP-C.03 steps not included as required power reduction should be complete at or around this step.

Examiner Note: When the crew has sufficiently reduced power the Lead Examiner may go to the next event starting at page 33.

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Event Description: Rapid Power Reduction

APPENDIX B
REACTOR AND TURBINE TRIP CRITERIA

REACTOR TRIP CRITERIA	TURBINE TRIP CRITERIA
Turbine trip required or imminent with reactor power greater than P-9 (50%)	Turbine vibration exceeding 14 mils with one of the following: • high vibration on multiple bearings **OR** • abnormal noise/vibration apparent
Uncontrolled rod movement which CANNOT be stopped by placing rods in MANUAL (AOP-C.01)	
Loss of S/G level control: level dropping or rising toward trip setpoint and level CANNOT be restored (AOP-S.01)	
More than one dropped rod (AOP-C.01)	
T-avg/T-ref mismatch CANNOT be maintained less than 5°F (refer to Step 7 or App. E)	
≥ 30% turbine load: Condenser Pressure > 2.7 psia **AND** CANNOT be restored within 5 minutes (AOP-S.02)	< 30% turbine load: Condenser Pressure > 1.72 psia (AOP-S.02)
Any automatic reactor trip setpoint reached **OR** automatic trip imminent: • Turbine trip above P-9 (50%) • Safety injection • Power Range high flux 109% • Power Range flux rate ± 5% in 2 seconds • Pressurizer high level 92% • Pressurizer pressure low 1970 psig • Pressurizer pressure high 2385 psig • RCS low flow 90% • RCP undervoltage 5.022 kilovolts • RCP underfrequency 56.0 Hz • OTΔT 115% (variable) • OPΔT 108.7% (variable) • S/G low level 10.7% [15% EAM] • SSPS general warning in both trains	Any automatic turbine trip setpoint reached **OR** automatic trip imminent: • High Stator Cooling Water temp 90°C **OR** Stator D/P 12 psig below normal • Both MFPT's tripped • Low Auto Stop Oil pressure 45 psig • High S/G level 81% narrow range • Main Turb Bearing Oil low pressure 7 psig • Thrust Bearing Oil high pressure 60 psig • Turbine Overspeed 1980 rpm • Loss of EHC pressure • Generator PCBs tripped.

APPENDIX C

SECONDARY PLANT EQUIPMENT

[1] **ENSURE** plant announcement(s) made on the following:

- starting rapid shutdown (or load reduction) due to (reason) ☐
- stopping secondary plant equipment ☐

NOTE 1 If reactor power will be reduced below 50%, AUO should be on station at #3 heater drain tank (if possible) when 60% power is reached.

NOTE 2 Dispatching of AUO in Steps **[2]** and **[3]** may be performed out of sequence.

[2] **IF** reactor power will be reduced below 50%,
THEN
DISPATCH AUO with Appendix J (Unit 1) or K (Unit 2)
to #3 Heater Drain Tank. ☐

[3] **IF** one MFP will be shutdown using this appendix,
THEN
DISPATCH AUO to **OPEN** MFWP recirc manual Isolation valve
for MFWP to be removed from service: (N/A valves NOT opened)

UNIT	MFWP	VALVE	LOCATION	OPEN √
1	1A	1-VLV-3-576	TB el. 706, Northeast corner of 1A condenser	☐
	1B	1-VLV-3-577	TB el. 706, Northeast corner of 1A condenser	☐
2	2A	2-VLV-3-576	TB el. 706, Southeast corner of 2A condenser	☐
	2B	2-VLV-3-577	TB el. 706, Southeast corner of 2A condenser	☐

APPENDIX C

[4] **IF** BOTH of the following conditions are met:

- power is being reduced as directed by AOP-S.01 (Main Feedwater Malfunctions) or AOP-S.04 (Condensate or Heater Drain Malfunctions)
- leaving secondary pumps in service is desired,

THEN
GO TO Step **[8]**. ☐

[5] **WHEN** turbine impulse pressure is approximately 80% or less,
THEN
PERFORM the following:

[a] ENSURE one Cond Demin Booster Pump STOPPED. ☐

[b] ENSURE associated suction valve CLOSED:

COND DEMIN BOOSTER PUMP	SUCTION VALVE	CLOSED √
A	FCV-2-290	☐
OR		
B	FCV-2-285	☐
OR		
C	FCV-2-280	☐

[6] **WHEN** turbine impulse pressure is approximately 70-75%,
THEN
PERFORM the following:

[a] ENSURE one Condensate Booster Pump STOPPED. ☐

[b] ENSURE associated CBP suction valve CLOSED:

CONDENSATE BOOSTER PUMP	SUCTION VALVE	CLOSED √
A	FCV-2-94	☐
OR		
B	FCV-2-87	☐
OR		
C	FCV-2-81	☐

[c] PERFORM applicable procedure to adjust seal injection water pressure on stopped CBP to prevent water intrusion in oil:
(may be assigned to another operator or delayed if necessary)

- 1-SO-2/3-1 Section 7.2 ☐

  OR

- 2-SO-2/3-1 Section 7.3 ☐

[7] **WHEN** turbine impulse pressure is approximately 65% or less,
THEN
PERFORM the following:

[a] STOP remaining two Cond Demin Booster Pumps simultaneously. ☐

[b] ENSURE suction valves CLOSED:

COND DEMIN BOOSTER PUMP	SUCTION VALVE	CLOSED √
A	FCV-2-290	☐
B	FCV-2-285	☐
C	FCV-2-280	☐

[c] STOP one No. 3 Heater Drain pump. ☐

[d] STOP one No. 7 Heater Drain pump. ☐

[8] **IF** reactor power will be maintained greater than 50%,
THEN
GO TO Notes prior to Step **[11]**. ☐

CAUTION **Isolation of all three intermediate heater strings could occur if turbine is tripped prior to fully opening LCV-6-105A and B using Appendix J or K.**

[9] **WHEN** reactor power is less than 60%
AND AUO with App. J (Unit 1) or K (Unit 2) is on station at #3 Heater Drain Tank,
THEN
PERFORM the following:

[a] STOP #3 Heater Drain Tank Pumps. ☐

[b] NOTIFY AUO to perform App. J (Unit 1) or App. K (Unit 2), Fully Opening #3 Heater Drain Tank Bypass Valves. ☐

[c] CLOSE isolation valves from #3 Htr Drain Pumps to heater strings:

VALVE	DESCRIPTION	CLOSED √
FCV-6-108	Htr Drain Tk Pump 3 to Htr String A	☐
FCV-6-109	Htr Drain Tk Pump 3 to Htr String B	☐
FCV-6-110	Htr Drain Tk Pump 3 to Htr String C	☐

Op Test No.: NRC 2012-302	Scenario # 1	Event # 4	Page 28 of 45
Event Description: Rapid Power Reduction			

NOTE 1 The following step ensures that MFW Bypass valves are available to control feedwater flow at low power.

NOTE 2 If any MFW Reg valve is in MANUAL, the associated MFW Bypass valve controller should remain in MANUAL to prevent undesired opening of bypass valve.

[10] **WHEN** Reactor power is less than 50%,
THEN
PERFORM the following:

[a] **IF** all MFW Reg Valves are in AUTO,
THEN
PLACE MFW Bypass Reg Valve controllers in AUTO. ☐

[b] **IF** any MFW Reg Valve is in MANUAL,
THEN
PERFORM the following:

1) **MAINTAIN** MFW Bypass Reg Valve in MANUAL for S/G with MFW Reg valve in MANUAL. ☐

2) **PLACE** MFW Bypass Reg Valves in AUTO for remaining S/Gs. ☐

Op Test No.: NRC 2012-302	Scenario # 1	Event # 4	Page 29 of 45
Event Description: Rapid Power Reduction			

NOTE 1 If performing this AOP to reduce power to allow shutting down one MFW pump, the affected MFWP may be removed from service at power level less than 55% (Unit 1) or 65% (Unit 2).

NOTE 2 AFW start function on loss of both MFW pumps is inoperable when a MFW pump is RESET but NOT pumping forward. LCO 3.3.2.1 (Unit 1) or 3.3.2 (Unit 2) allows AFW start channel to be inoperable for up to 4 hours when shutting down a MFWP.

[11] **WHEN** it is desired to remove one MFW pump from service
AND power level is less than applicable limit:

- turbine impulse pressure less than approximately 45%

  OR

- reactor power less than value specified in Note 1

THEN
PERFORM the following:

[a] **ENSURE** MFWP Recirc Manual Isolation valve OPEN for MFWP to be removed from service: (N/A valves NOT opened)

UNIT	MFWP	VALVE	LOCATION	OPEN √
1	1A	1-VLV-3-576	TB el. 706, Northeast corner of 1A condenser	☐
	1B	1-VLV-3-577	TB el. 706, Northeast corner of 1A condenser	☐
2	2A	2-VLV-3-576	TB el. 706, Southeast corner of 2A condenser	☐
	2B	2-VLV-3-577	TB el. 706, Southeast corner of 2A condenser	☐

[b] **THROTTLE OPEN** recirc valve in MANUAL (30-50% OPEN) for MFWP to be removed from service. ☐

[c] **PLACE** speed controller in MANUAL for MFWP to be removed from service. ☐

[d] **REDUCE** speed gradually on MFWP to be removed from service. ☐

[11] (Continued)

[e] **ENSURE** proper loading on remaining MFWP. ☐

[f] **IF** MFWP CANNOT be fully unloaded with speed controller,
THEN
PERFORM one of the following:

- **NOTIFY** I&C to slowly adjust hand speed changer for affected MFWP UNTIL MFWP is fully unloaded. ☐

  OR

- **THROTTLE OPEN** recirc valve for affected MFWP to assist in unloading MFWP ☐

  OR

- **SLOWLY CLOSE** governor valve by bumping closed governor valve positioner (if operable) ☐

  OR

- **OBTAIN** SRO concurrence that MFWP flow is sufficiently low to allow tripping MFWP. ☐

[g] **WHEN** MFWP is unloaded sufficiently,
THEN
TRIP affected MFWP. ☐

[h] **CLOSE** recirc valve for MFWP removed from service. ☐

[i] **CLOSE** recirc valve Manual Isolation inlet valve for MFWP removed from service. ☐

[j] **OPEN** drain valves for MFWP removed from service: [M-3]

- **[HS-46-14]**, MFWP A drain valves ☐

  OR

- **[HS-46-41]**, MFWP B drain valves. ☐

[12] **WHEN** turbine impulse pressure is approximately 45% or less,
THEN
PERFORM the following:

[a] **STOP** remaining No. 7 Heater Drain pump. ☐

[b] **CLOSE** isolation valves from #7 Heater Drain Pumps to heater strings:

VALVE	DESCRIPTION	CLOSED √
FCV-6-143	Htr Drain Tk Pump 7 to Htr String A	☐
FCV-6-163	Htr Drain Tk Pump 7 to Htr String B	☐
FCV-6-184	Htr Drain Tk Pump 7 to Htr String C	☐

[13] **WHEN** turbine impulse pressure is approximately 30% or less,
THEN
PERFORM the following:

[a] **ENSURE** main turbine EHC controls in IMP OUT. ☐

[b] **IF** #3 heater drain tank pumps are still running,
THEN
PERFORM Step **[9]**. ☐

[c] **STOP** one of two remaining Condensate Booster Pumps. ☐

(step continued on next page)

[13] (Continued)

[d] ENSURE associated CBP suction valve CLOSED:

CONDENSATE BOOSTER PUMP	SUCTION VALVE	CLOSED √
A	FCV-2-94	☐
OR		
B	FCV-2-87	☐
OR		
C	FCV-2-81	☐

[e] STOP one of three Hotwell Pumps. ☐

[f] PERFORM applicable procedure to adjust seal injection water pressure on stopped CBP to prevent water intrusion in oil:
(may be assigned to another operator or delayed if necessary)

- 1-SO-2/3-1 Section 7.2 ☐

  OR

- 2-SO-2/3-1 Section 7.3 ☐

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Event Description: PT-3-1 Fails Low

Time	Position	Applicant's Actions or behavior

Simulator Operator: When Directed, Initiate Event 5 Feed Water Header Pressure Transmitter Fails Low; PT-3-1

Indications/Alarms

Annunciator:

1-M-3

- **1-XA-55-3C, C-1 "PS-3-4 NO 1 FW HTR PRESSURE Low"**
- **1-XA-55-3B, D-1 Main Feedwater Digital Control Sys Transfer To Manual**

Indications:

1-M-4

- **SG-1 thru 4 SG FW INLET FLOW increasing flow- above steam flow**

1-M-3

- **FW MASTER CONTROLLER shifts to MANUAL (AMBER)**

Significant Resultant Alarms/Indications:

Indications:

ICS

- **Thermal Power Increasing**

MAIN FEEDWATER DIGITAL CONTROL SYS TRANSFER TO MANUAL

[1] IF using the hand controllers to determine which Digital Feedwater controller(s) has transferred to manual,
THEN
DETERMINE which controller(s) in Manual by ORANGE backlit "Manual" on controller.

[2] IF using the DCS Operator Display monitors to determine which Digital Feedwater controller(s) has transferred to MANUAL,
THEN
OBSERVE controller(s) "yellow" status light being LIT.

[3] ADJUST controller(s) to maintain system parameters steady.

[4] NOTIFY US which controller(s) are in manual and system status

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Event Description: PT-3-1 Fails Low

Time	Position	Applicant's Actions or behavior
		[5] IF any of the following occur: • System parameters can NOT be maintained OR • At the discretion of the US THEN GO TO any of the following: • AOP-C.03, *Emergency Shutdown* • AOP-S.01, *Main Feedwater Malfunctions* • E-0, *Reactor Trip or Safety Injection*
	BOP	Responds to ARP 1-AR-M3B D-1.

Examiner Note: Several steps, notes, and cautions in the Annunciator response procedure do not apply to this failure. Only those that are applicable are listed in this event guide.

Evaluator Note: For this event, crew may respond per the Annunciator Response Procedure directly enter AOP-S.01 Section 2.2. Section 2.2 Step 1 is an IMMEDIATE ACTION step; the BOP may perform the action(s) associated with Step 1 from memory without direction.

	BOP	Manually lowers output MFP (Master) Speed Control to maintain S/G levels.
	SRO	Transitions to AOP-S.01, MAIN FEEDWATER MALFUNCTIONS section 2.2

1. **DIAGNOSE** the failure:

IF...	GO TO SECTION	PAGE
Failure of Automatic S/G Level Control	2.1	4
Failure of Automatic MFW Pump Control	2.2	7
Loss of One Main Feedwater Pump Above 76% (Unit 1) or 77% (Unit 2) Turbine Load	2.3	12
Main Feedwater Pump Trip Below 76% (Unit 1) or 77% (Unit 2) Turbine Load	2.4	19

NOTE Step 1 is an IMMEDIATE ACTION

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Event Description: PT-3-1 Fails Low

Time	Position	Applicant's Actions or behavior
	BOP	1. **RESTORE** feedwater pressure: a. **ENSURE** affected MFP speed controller(s) in MANUAL: • MFPT A & B Speed Control **OR** • MFPT A Speed Controller **OR** • MFPT B Speed Controller b. **ADJUST** speed on affected MFP(s) to restore feedwater pressure to normal (~1040 psig at full power).
	BOP	Manually lowers output MFP (Master) Speed Control to maintain S/G levels on program level.
	BOP	2. **DETERMINE** if MFP trip is needed: a. **CHECK** BOTH MFW pumps IN SERVICE.
CAUTION:		**Feed flow transients may impact core thermal power.**
	BOP	3. **MAINTAIN** steam generator level(s) on program.
NOTE:		Appendix C or DCS Operator Display monitors "MFP Control" screen may be used to determine program feedwater D/P for current power.
	BOP	4. **MAINTAIN** MFP discharge pressure on program **USING** DCS Operator Display monitors, ICS, or available control board indications.
CAUTION		**Reactor operation at low power levels for extended periods may challenge reactivity control due to xenon changes.**
	BOP	5. **CHECK** Reactor power greater than 5%.

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Event Description: PT-3-1 Fails Low

Time	Position	Applicant's Actions or behavior
	CREW	6. **INITIATE** repairs on failed equipment.
	SRO	7. **WHEN** automatic control of affected MFW pump controller(s) is available and reliable, **THEN** **PLACE** controller(s) in AUTO **USING** 1,2-SO-98-1, *Distributed Control System.* **NOTE:** Instructions for restoring bypassed instrument channels are contained in 1,2-SO-98-1. 8. **GO TO** appropriate plant procedure. **END OF SECTION**
	Crew	**Performs a Crew Brief** as time allows.
	Crew	**Notifications** should be addressed as applicable if not specifically addressed by the procedure or in the crew brief. Operations Management - Typically Shift Manager. Maintenance Personnel – Typically Maintenance Shift Supervisor (MSS). (**Note:** Maintenance notification may be delegated to the Shift Manager).
		END OF SECTION
Lead Examiner may cue the next event when plant is stable with MFP speed control in manual.		

Op Test No.: NRC 2012-302 Scenario # 1 Event # 6, 7 Page 37 of 45

Event Description: Loss of ALL AC Power, Manually Reset 1A EDG Lockout, Manually Open 1A EDG Cooling Valve

Time	Position	Applicant's Actions or Behavior
Simulator Operator: When directed, initiate Event 6 Loss of Offsite Power		
Indications available: • RPI for all control rods at 0 • Reactor trip alarms lit [M-4D]. • Rapid drop in neutron level. • Simulator Lights reduced to minimum.		
	SRO	Enter and Direct performance of E-0, Reactor Trip Or Safety Injection.
Examiner Note: following IOA performance, prior to Steps 1-4 immediate action verification, ATC/BOP surveys MCBs for any expected automatic system response that failed to occur. Upon discovery, they may take manual action(s) to align plant systems as expected for the event in progress. (Ref. EPM-4, Prudent Operator Actions)		
Examiner Note: MONITOR status trees, the crew will implement status tree monitoring via ICS. When a RED or ORANGE path status tree is observed, the SRO will designate one of the Board operators (typically the BOP) to verify status tree conditions using 1-FR-0, UNIT 1 STATUS TREES. Once verified, the SRO should direct the crew to transition to the appropriate RED and/or ORANGE path procedure(s).		
	CREW	Performs the first four steps of E-0 unprompted.
	SRO	Directs performance of E-0
NOTE 1 Steps 1 through 4 are immediate action steps. **NOTE 2** This procedure has a foldout page.		
	ATC	1. **VERIFY** reactor TRIPPED: • Reactor trip breakers OPEN • Reactor trip bypass breakers DISCONNECTED or OPEN • Rod bottom lights LIT • Rod position indicators less than or equal to 12 steps. • Neutron flux DROPPING
	BOP	2. **VERIFY** turbine TRIPPED: • Turbine stop valves CLOSED.

Op Test No.: NRC 2012-302 Scenario # 1 Event # 6, 7 Page 38 of 45

Event Description: Loss of ALL AC Power, Manually Reset 1A EDG Lockout, Manually Open 1A EDG Cooling Valve

Time	Position	Applicant's Actions or Behavior
	BOP	3. **VERIFY** at least one 6.9KV shutdown board ENERGIZED on this unit. **ATTEMPT** to start D/Gs. **IF** power CANNOT be immediately restored to at least one shutdown board on this unit, **THEN** **GO TO** ECA-0.0, Loss of All AC Power.
	BOP	Attempts to manually start Diesel generators.
	SRO	Transitions to ECA-0.0, Loss Of All AC Power.
	SRO	Directs actions of ECA-0.0, Loss Of All AC Power.
NOTE		Steps 1, 2, and 3 are immediate action steps.
	CREW	1. **SUSPEND** FRP implementation and **MONITOR** status trees for information only.
	ATC	2. **VERIFY** reactor TRIPPED: • Reactor trip breakers OPEN • Reactor trip bypass breakers OPEN or DISCONNECTED • Neutron flux DROPPING
	ATC	3. **VERIFY** turbine TRIPPED: • ALL turbine stop valves CLOSED [SSPS status lights on M-6].
	ATC	4. **ENSURE** RCPs STOPPED.
NOTE		Step 5 should be handed off to a Unit Operator.

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Event Description: Loss of ALL AC Power, Manually Reset 1A EDG Lockout, Manually Open 1A EDG Cooling Valve

Time	Position	Applicant's Actions or Behavior
	ATC	5. **PERFORM** the following notifications: a. **NOTIFY** four AUOs to report to MCR immediately to be available as necessary for DC load shed and local operation of TD AFW LCVs. b. **NOTIFY** Site Security to station officers at key vital doors **USING** SSI-1, Security Instructions for Members of the Security Force.
	ATC	6. **CHECK** RCS ISOLATED: a. Pressurizer PORVs CLOSED.
	ATC	6. **CHECK** RCS ISOLATED: b. Letdown isolation valves CLOSED: b. **CLOSE** valves. • FCV-62-69 • FCV-62-70 • FCV-62-72 • FCV-62-73 • FCV-62-74
	ATC	Places HS-62-69 and 62-70 to CLOSE.
	ATC	6. **CHECK** RCS ISOLATED: c. Excess letdown isolation valves CLOSED: • FCV-62-54 • FCV-62-55

Op Test No.: NRC 2012-302 Scenario # 1 Event # 6, 7 Page 40 of 45

Event Description: Loss of ALL AC Power, Manually Reset 1A EDG Lockout, Manually Open 1A EDG Cooling Valve

Time	Position	Applicant's Actions or Behavior
	ATC	6. **CHECK** RCS ISOLATED: d. Reactor vessel head vents CLOSED: • FSV-68-394 • FSV-68-395 • FSV-68-396 • FSV-68-397
NOTE		• On loss of auxiliary control air, TD AFW LCVs fail open. • Auxiliary air compressors are powered from 480V C&A Vent Boards 2A1-A and 2B1-B.
	BOP	7. **MONITOR** AFW flow: a. **CHECK** TD AFW pump RUNNING.
	BOP	7. **MONITOR** AFW flow: b. **CONTROL** TD AFW pump **USING** EA-3-1, MCR Operation of TD AFW Pump.
	BOP	Manually adjusts HC-46-57-S (TD AFW speed control) to achieve and maintain at least 440 gpm total AFW flow until at least 1 S/G level is at 10% NR.

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Event Description: Loss of ALL AC Power, Manually Reset 1A EDG Lockout, Manually Open 1A EDG Cooling Valve

Time	Position	Applicant's Actions or Behavior
	BOP	7. **MONITOR** AFW flow: c. **MONITOR** Aux Control Air AVAILABLE: • BOTH Unit 2 Shutdown Boards ENERGIZED • Train A and B Aux Control Air pressure on 1-M-15 (prior to DC load-shedding).
	BOP	7. **MONITOR** AFW flow: d. **MAINTAIN** AFW flow greater than 440 gpm UNTIL narrow range level greater than 10% [25% ADV] in at least one S/G.
	BOP	7. **MONITOR** AFW flow: e. **CONTROL** intact or ruptured S/G narrow range levels between 10% [25% ADV] and 50%.
CAUTION		**DO NOT attempt to start D/Gs if both trains of ERCW are unavailable due to catastrophic event.**

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Event Description: Loss of ALL AC Power, Manually Reset 1A EDG Lockout, Manually Open 1A EDG Cooling Valve

Time	Position	Applicant's Actions or Behavior
	BOP	8. **ATTEMPT** to restore power to any shutdown board on this unit: a. **CHECK** for any of the following: • any D/G on this unit potentially available (capable of supplying power to shutdown board) **OR** • availability of any D/G on this unit is UNKNOWN.
	BOP	8. **ATTEMPT** to restore power to any shutdown board on this unit: b. **RESET** D/G start lockout relays for D/G(s) to be started. [0-M-26]
CRITICAL TASK	BOP	Manually resets 1A-A EDG lockout relay by depressing HS-82-20 on 0-M-26.
	BOP	8. **ATTEMPT** to restore power to any shutdown board on this unit: c. **EMERGENCY START** diesel generators. [M-1 switch and M-26 pushbutton]

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Event Description: Loss of ALL AC Power, Manually Reset 1A EDG Lockout, Manually Open 1A EDG Cooling Valve

Time	Position	Applicant's Actions or Behavior
	BOP	8. **ATTEMPT** to restore power to any shutdown board on this unit: d. **VERIFY** at least one shutdown board ENERGIZED from D/G on this unit.
	BOP	8. **ATTEMPT** to restore power to any shutdown board on this unit: e. **VERIFY** ERCW supply established to running diesel generators. e. **START** ERCW pumps and **ALIGN** ERCW valves as necessary.
CRITICAL TASK	BOP	Places HS-67-66A or 67-68A to OPEN.
		8. **ATTEMPT** to restore power to any shutdown board on this unit: f. **CHECK** at least one shutdown board on this unit ENERGIZED.
		8. **ATTEMPT** to restore power to any shutdown board on this unit: g. **RESUME** FRP implementation.

Op Test No.: NRC 2012-302 Scenario # 1 Event # 6, 7 Page 44 of 45

Event Description: Loss of ALL AC Power, Manually Reset 1A EDG Lockout, Manually Open 1A EDG Cooling Valve

Time	Position	Applicant's Actions or Behavior
		8. **ATTEMPT** to restore power to any shutdown board on this unit: h. **RETURN TO** procedure and step in effect. 
Examiner Note: Lead Examiner may terminate the scenario when ERCW cooling flow has been established to the 1A EDG.		

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Event Description: Critical Task

Critical Tasks:	Critical Task Statement
1	Energize at least one 6.9 kv Shutdown Board by resetting the 1A EDG LO relay prior to completing step 8 of ECA-0.0.
2	Manually establish ERCW flow to the required EDG prior to completing step 8.e of ECA-0.0.

Facility:	Sequoyah	Scenario No.:	3	Op Test No.:	2012-302
Examiners:		Operators:			

Initial Conditions: Unit 1 is in MODE 2, ~2% Reactor Power, A Main Feedwater Pump I/S

Turnover: Continue Plant Startup. Currently at 0-GO-4, Section 5.1 Step 4. Place Feed Regulating valves in AUTO, then increase power to 13-15%.

Target CTs: Manually initiate a Phase B isolation prior to completing ES-0.5 step 13.

Manually stop one Containment Spray Pump prior to completing ES-1.3 step 2

Event No.	Malf. No.	Event Type*	Event Description
1.	N/A	R-ATC	Continue Power Increase from ~2%.
1.a	N/A	N-BOP/SRO	Place feed Reg Valves in AUTO using 0-GO-4.Section 5.1 Step 4.
2.	IMF NI04B	I-ATC/SRO TS-SRO	IR Channel N-36 fails higher than normal, the crew will place N36 Level Trip switch in BYPASS. The SRO will address Tech Specs and enter LCO 3.3.1.1 Action 3 and 3.3.3.7, Action 1.
3.	TH01B	C-ATC/SRO TS-SRO	A Small RCS Leak (~21 gpm) in Loop 2 Hot Leg will develop. The crew will respond using AOP-R.05. The ATC will raise charging flow to control pressurizer level. The SRO will address Tech Specs and determine that RCS Leakage is in excess of LCO requirements.
4.	IMF RX29	C-BOP/SRO	PT-1-33 develops a ramp failure, the BOP will manually close the Steam Dumps using AOP-S.05.
5.	TH01B Pre-insert RP07	M-All C-ATC	The RCS leak increases to a LOCA, the crew will initiate a Reactor Trip and Safety Injection and transitions to E-0. During the performance of E-0, the Hi-Hi Containment pressure logic to initiate Phase B containment isolation fails. The ATC will manually initiate a Phase B using prudent operator actions.
6.	ZDIHS6523A	C-BOP	The EGTS fans fail to AUTO-START, the BOP will manually start the EGTS fans using Prudent Operator Actions or guidance from ES-0.5.
7.		M-All	The crew will transition from E-0 to E-1 and ultimately ES-1.3 to align RHR to the Containment Sump.

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

2012-301 Scenario 3 Summary

EVENT 1 – The crew will assume the shift, place the feed reg valves in AUTO using 0-GO-4.Section 5.1 Step 4 and continue the power increase.

EVENT 2 - When directed by the lead examiner, IR Channel N-36 fails higher than normal, the crew will place N36 Level Trip switch in BYPASS. The SRO will address Tech Specs and enter LCO 3.3.1.1 Action 3b and 3.3.3.7, Action 1a.

EVENT 3 - When directed by the lead examiner, a Small RCS Leak (~21 gpm) in Loop 2 Hot Leg will develop. The crew will respond using AOP-R.05. The ATC will raise charging flow to control pressurizer level. The SRO will address Tech Specs and determine that RCS Leakage is in excess of LCO requirements. The SRO will enter LCO 3.4.6.2.a or b action a.

EVENT 4 - When directed by the lead examiner, PT-1-33 develops a ramp failure, the BOP will manually close the Steam Dumps using AOP-S.05.

EVENT 5 - The RCS leak increases to a LOCA, the crew will initiate a Reactor Trip and Safety Injection and transitions to E-0. During the performance of E-0, the Hi-Hi Containment pressure logic to initiate Phase B containment isolation fails. The ATC will manually initiate a Phase B using prudent operator actions. During the transition to E-1, status tree monitoring will occur. The crew will identify red path condition and implement FR-Z.1 for High Containment Pressure and potentially FR-P.1 for Pressurized Thermal Shock RED Path.

EVENT 6 - During performance of the EOP's, the EGTS fans fail to AUTO-START, the BOP will manually start the EGTS fans using Prudent Operator Actions or guidance in ES-0.5.

EVENT 7 - During performance of the EOP's, the RWST lo-lo level will occur requiring the crew to transition from E-1 to ES-1.3 to align RHR to the Containment Sump.

The scenario terminates as directed by the Lead Examiner upon completion of FR-Z.1 and FR-P-1 if applicable, and when at least one Containment Spray pump has been stopped in ES-1.3..

EOP flow: E-0, E-1, FR-Z.1, FR-P.1, ES-1.3

1201-302 SCN 3 Booth Instructions

BOOTH OPERATOR INSTRUCTIONS

Sim. Setup

1. Reset IC-9 2% power BOL time in core life
2. Perform switch check.
3. Verify control rod step counters reset.
4. Place simulator in RUN.
5. Place Mode 2 placard on panels.
6. Place B Train Week sign on the simulator.
7. Allow the simulator to run for at least 3 minutes before loading SCEN file or starting the exercise. This will initialize ICS.
8. Load SCENS: S-1211 NRC SCN 3
9. Select NR-45 to Startup Channels
10. Ensure 1-M-5 Tave-Tref Recorder re-scaled for MODE 2 values
11. Ensure 1C Pzr B/U Htr Group energized
12. Provide an in-progress copy of 0-GO-4.Section 5.1 Step 4
13. Acknowledge any alarms, allow the plant to stabilize, and freeze the simulator.
14. Perform the SIMULATOR OPERATOR CHECKLIST
15. Place turnover sheets on the operator's desks.
16. Place simulator in RUN before crew enters the simulator.

1201-302 SCN 3 Booth Instructions

EVENT	IC/MF/RF/OR #	DESCRIPTION/EXPECTED ACTIONS/BOOTH FEEDBACK
This override is active when the SCN file is loaded.	IMF RP07 f:1	Failure of Hi-Hi containment pressure logic to initiate Phase B containment isolation.
This override is active when the SCN file is loaded.	IOR ZDIHS6523A f:3 IOR ZLOHS6523A_GREEN f:1 {global95[2481]} DOR ZDIHS6523A {global95[2481]} DOR ZLOHS6523A_GREEN IOR ZDIHS6542A f:3 IOR ZLOHS6542A_GREEN f:1 {global95[2494]} DOR ZDIHS6542A {global95[2494]} DOR ZLOHS6542A_GREEN	Prevents auto start of the EGTS fans.
	N/A	Raise Power to 13-15% in preparation for Main Generator Synchronization
When directed, use **KEY 2** to insert malfunction.	IMF NI04B f:91 k:2	IR Channel N-36 fails high Support staff: *When contacted to evaluate and reset failure, inform the crew that a team will report to the MCR in ~ 45 minutes*
When directed by the Lead Examiner, use **KEY 3** to insert malfunction.	IMF TH01B f:0.003 k:3	RCS Loop 2 Hot Leg Leak ~30 Gpm.
When directed by the Lead Examiner, use **KEY 4** to insert malfunction.	IMF RX29 f:100 r:180 k:4	PT-1-33 slow failure
When directed by the Lead Examiner, modify the malfunction.	MMF TH01B f:12 r:600	Loop #2 LOCA-To Require Rx Trip and Safety Injection.
If directed, insert the remote function.	IRF RHR14 f:1 k:8	RWST To RHR Pp Flow Control Vlv Power, FCV-63-1. Support staff: if dispatched w/ EA-201-1 requested, as AUO, wait 2 minutes respond that electric power is restored to FCV-63-1.

Time: Now Date: Today

- **Unit 1 MCR Checklist** (751-6338 ID 950848) Then Press 2

Part 1 - Completed by Off-going Shift / Reviewed by On-coming Shift	
Mode 2, ~2% Power PSA Risk: Green Grid Risk: Green RCS Leakage ID .02 gpm, UNID .02 gpm	**NRC phone Authentication Code** **Until 0800 XXXX** **After 0800 YYYY**

Common Tech Spec Actions

LCO/TRM	Equipment INOP	Time INOP	Owner	RTS
NONE				

U-1 Tech Spec Actions

LCO/TRM	Equipment INOP	Time INOP	Owner	RTS
NONE				

Protected Equipment

NONE

Shift Priorities

SI/Test in Progress/Planned: (Unit 2 Operator is performing)

- 0-SI-NUC-000-1.0, Estimated Critical Conditions.
- 0-SI-SXX-068-127.0, Minimum Temp for Criticality.

Major Activities/Procedures in Progress/Planned:

- Place Feed Reg Valves in AUTO using 0-GO-4 Section 5.1, step 4.
- Continue with power increase using 0-GO-4 Section 5.2.

Radiological Changes in Plant During Shift:

- Containment dose rate increase with Rx power increase. Contact Rad Con for all RWP details.

Part 2 – Performed by on-coming shift	
☒ Review current TS/TRM/ODCM/FPR Required Actions	☒ Current Qualification Status
☒ Review the current controlling Reactivity Management Plans	☒ Walkdown MCR Control Boards with off-going Operator
☒ SR/PER reviews complete for previous shift (SM/US/STA)	☒ Review Narrative Logs (previous day and carry-over items)
☒ Relief Time:_____	☒ Relief Date:_____

Part 3 – Performed by both off-going and on-coming shift	
☐ Review Operator Workarounds, Burdens, and Challenges (applicable Unit/Station)	☐ Review applicable ODMI actions (first shift of shift week)
☐ Review changes in Standing/Shift orders since last shift worked)	☐ Review changes to TACFs issued (since last shift worked)
☐ Review Control Room Deficiencies (first shift of shift week)	☐ Review Component Deviation Log (Active Procedures)

Time: Now Date: Today

Abnormal Equipment Lineup/Conditions:

MAIN CONTROL ROOM (7690) (593-5409)

Train B Week

Feed Reg Valves in MANUAL

AUXILIARY BUILDING (7775) (593-2469)

All equipment operating or operable.

TURBINE BUILDING 7771

All equipment operating or operable.

OUTSIDE (7666) (593-0122)

All equipment operating or operable.

Time: Now Date: Today

Required Additional Monitoring and Contingencies
(Updated and Maintained by SM)

Issue	Required Action	Expiration Date
ODMI		

TACF	Description
TACF	•

UNIT ONE REACTIVITY BRIEF

Date: Today Time: Now

General Information

RCS Boron: **1570** ppm Today		BA Controller Setpoint: **42 %** *	RCS B-10 Depletion: **0** ppm
Operable BAT: **A**	BAT A Boron: **6850**ppm	BAT C Boron: **6850**ppm	RWST Boron: **2601** ppm
Nominal Gallons per rod step from_____: **N/A** gallons of acid, **N/A** gallons of water			

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

Estimated values for a 1° Change in Tave **

Gallons of acid: **N/A**	Gallons of water: **N/A**	Rod Steps: **N/A**

Estimated rods/boron for emergency step power reduction **

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

Power reduction amount	Estimated Final Rod Position	Estimated boron addition
10%	**N/A** Steps on bank D	**N/A** gallons
30%	**N/A** Steps on bank D	**N/A** gallons
50%	**N/A** Steps on bank D	**N/A** gallons

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

Previous Shift Reactivity Manipulations

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

Current Shift Estimated Reactivity Manipulations

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

Remarks:

Rx Power – 2% MWD/MTU – 150 Xenon – Samarium -971 pcm

0-SO-62-7 Appendix D was completed by the STA.

Next Unit 1 Flux Map is scheduled- 74% RTP

_____

Unit Supervisor: _____

Name/Date

Operations Chemistry Information

Boron Results					
Sample Point	**Units**	**Boron**	**Date / Time**	**Goal**	**Limit**
U1 RCS	ppm	1570	Today / Now	Variable	Variable
U2 RCS	ppm	816	Today / Now	Variable	Variable
U1 RWST	ppm	2601	Today / Now	2550 - 2650	2500 - 2700
U2 RWST	ppm	2569	Today / Now	2550 - 2650	2500 - 2700
BAT A	ppm	6850	Today / Now	Variable	Variable
BAT B	ppm	6850	Today / Now	Variable	Variable
BAT C	ppm	6850	Today / Now	Variable	Variable
U1 CLA #1	ppm	2556	Today / Now	2470-2630	2400-2700
U1 CLA #2	ppm	2575	Today / Now	2470-2630	2400-2700
U1 CLA #3	ppm	2591	Today / Now	2470-2630	2400-2700
U1 CLA #4	ppm	2589	Today / Now	2470-2630	2400-2700
U2 CLA #1	ppm	2531	Today / Now	2470-2630	2400-2700
U2 CLA #2	ppm	2650	Today / Now	2470-2630	2400-2700
U2 CLA #3	ppm	2522	Today / Now	2470-2630	2400-2700
U2 CLA #4	ppm	2526	Today / Now	2470-2630	2400-2700
Spent Fuel Pool	ppm	2547	Today / Now	$\geq$ 2050	$\geq$ 2000
Lithium Results				**Goal**	**Midpoint**
U1 RCS	ppm	1.1	Today / Now	>1	>1
U2 RCS	ppm	2.43	Today / Now	2.18-2.48	2.33

Primary to Secondary Leakrate Information (Total CPM RM-90-99/119)					
Indicator	**Units**	**U1**	**Date / Time**	**U2**	**Date/Time**
SI 50 S/G Leakage?	Yes/No	No	Today / Now	No	Today / Now
SI 137.5 CVE Leakrate	gpd	< 0.1	Today / Now	< 0.1	Today / Now
5 gpd leak equivalent	cpm	115	Today / Now	68	Today / Now
30 gpd leak equivalent	cpm	490	Today / Now	83	Today / Now
50 gpd leak equivalent	cpm	790	Today / Now	206	Today / Now
75 gpd leak equivalent	cpm	1165	Today / Now	455	Today / Now
100 gpd leak equivalent	cpm	1540	Today / Now	662	Today / Now
150 gpd leak equivalent	cpm	2290	Today / Now	870	Today / Now
CVE Air Inleakage	cfm	10	Today / Now	12.5	Today / Now
Bkgd on 99/119	cpm	40	Today / Now	40	Today / Now
Correction Factor 99/119	cpm/gpd	15	Today / Now	7.34	Today / Now

Steady state conditions are necessary for an accurate determination of leak rate using the CVE Rad Monitor

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Precautions

NOTE

Adherence to Precautions and Limitations is referenced in NPG-SPP-01.2.

A. Reactor Engineering should be contacted for guidance on core operating recommendations during unusual power maneuvers such as startup during end of core life. [C.11]

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

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

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

C. During startup, NIS power range indication may be reading significantly higher than true power until calibration adjustments are made. The following should be used to determine the most accurate indication for comparison with NIS:

- When reactor power is less than or equal to 15%, use average loop ΔT (UO485).
- When reactor power is greater than 15%, use LEFM core thermal power indication (U2118). If LEFM is **NOT** available, then continue using average loop ΔT up to 40%. (U1118 will be used above 40% with LEFM unavailable).

D. The boron concentration in the pressurizer should be maintained within 50 ppm of the RCS by use of pressurizer heaters and spray.

E. Pressurizer enclosure temperature should be maintained less than 150°F. Rapid changes in pressurizer enclosure temperature may result in pressurizer safety valve simmer.

3.1 Precautions (continued)

(E) The low pressure turbine steam inlet temperature should be limited to 400°F when unit load is less than 10%. When reducing load, the reheater control valves should be adjusted to limit reheater outlet temperature to a maximum of 400°F within approximately 15 minutes after reaching 10% load.

(G) Do **NOT** pass steam through the turbine with the rotor at rest. The turbine should be on turning gear anytime the main steam lines are pressurized up to turbine stop valves.

(H) Change in load should be controlled in accordance with load changing curves of TI-28, Figures 6 and 7. TI-28, Figure 6 is designed to limit the maximum rotor stress during the entire program of acceleration, synchronizing, holding at minimum load, followed by raising load to full capability. The recommended time periods for each phase of the program are determined by the measured first-stage metal temperature at the time of starting.

(I) The turbine should be operated in 'IMP OUT" control during normal unit operation. "IMP IN" operation results in system swings and should only be used during the performance of valve tests. (W letter GP 89-155, RIMS S57 901-26 972)

(J) The Predictive Maintenance Engineer (PDM) should be contacted following a unit trip so that he may determine if local vibration monitoring of the Turbine-Generator, by the PDM staff should be performed when the unit is restarted. Normally, monitoring is necessary following a refueling outage, a major maintenance outage on the turbine-generator, or after a plant trip which was due to a turbine initiated trip or a generator electrical initiated trip. Two hours lead time prior to the initial turbine roll is necessary to ensure that the PDM staff is onsite to monitor the start-up. The Maintenance Shift Supervisor (MSS) has the telephone numbers and pager numbers for the Predictive Maintenance Engineer and the Supervisor for the PDM staff.

(K) Any off frequency turbine operation is to be reported to the Component Engineering Group Vibration Engineer for record keeping. The report will include duration and magnitude of off-frequency operation.

(L) Operation at off-frequencies is to be avoided in order to prevent the probable occurrence of turbine blade resonance. Prolonged periods of operation at certain off-design frequencies could cause excessive vibratory stresses which could eventually generate fatigue cracking in the blades. Off-frequency operation is permitted to the degree and time limit specified on the chart "Off-Frequency Turbine Operation", Figure 14 of TI-28.

3.1 Precautions (continued)

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

(N) The position of control rod bank D should normally be ≥ 215 steps when power level is steady state at or above 85% RTP. At steady state power levels below 85%, control bank D should normally be ≥ 165 steps. If rod position is more than 2 steps below this guidance for long term, then an impact to safety analysis assumptions may occur. Long term will be defined/determined by Reactor Engineering and the Fuel Vendor.

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

(P) 0-PI-OPS-035-001.0 should be performed prior to turbine restart when recommended by engineering, following maintenance or plant activities in which the generator was depressurized during a forced outage, or after a refueling outage. 0-PI-OPS-035-001.0 provides verification and adjustment of the Seal Oil System normal and backup regulators. (REF PER-04-24237-000)

(Q) The turbine should not be on hold at 1800 rpm for longer than 2 hours when the generator is not synchronized to the grid. Longer than 2 hours will cause overheating of the turbine blading (last row).

3.1 Precautions (continued)

R. Voltage Control

NOTE

Failure to comply with the NERC VAR-002 requirement could result in a Utility Violation and / or monetary penalties.

1. Operation of the Main Generator without Automatic Voltage Control could impact grid voltage requirements. Refer to GOI-6 for MVAR limits.

2. When the Main Generator is connected to the grid, the voltage regulator shall be operated in Automatic, unless coordinated with the Transmission Operator (SELD).

3. Main Generator operation outside of the Transmission Voltage Schedule requires coordination with the Transmission Operator, and notation in the operator's Log of time, reason, and that the Transmission Operator notification was made.

4. When directed to modify voltage, the Generator Operator shall comply (within plant procedural requirements) or provide an explanation of why the schedule cannot be met.

5. While the Main Generator is tied to the grid perform the following:

   a. The Transmission Operator (SELD) shall be notified of any Voltage Regulator automatic trips to Manual or urgent Manual Transfers between AUTO and Manual as soon as practical but notification shall be within 30 minutes.

   b. The Transmission Operator (SELD) shall be notified prior to a planned Voltage Regulator transfers between Manual and Auto.

   c. All position changes (to and from Auto or Manual) of the Voltage Regulator shall be entered into the Narrative Log along with the date, time of position change, reasons, anticipated duration and notifications made.

3.1 Precautions (continued)

5. Reliability Directives and Protective Relay/Equipment Failures

NOTE

Failure to comply with the NERC VAR-002 requirement could result in a Utility Violation and / or monetary penalties.

1. Plant Operations shall notify the Transmission Balancing Authority (BA) or Transmission Operator of protective relay or equipment failures that creates a creditable risk to Plant Generation. A creditable risk to generation represents a potential reduction in transmission system reliability.

2. Reliability Directives to the Generator Operator are via the Balancing Authority or Transmission Operator. Required action time may range from immediate to no longer than 30 minutes. Actions shall be taken without delay. The directives may be associated with preventing or clearing Local System issues, or neighboring system issues.

3. Plant operations shall take timely actions as directed by the Balancing Authority or Transmission Operator to mitigate critical conditions to return the bulk electrical system to a reliable state. Plant operations shall comply with Balancing Authority or Transmission Operator directives unless such actions would violate safety, equipment, or regulatory or statutory requirements.

4. Plant Operations shall immediately inform the Balancing Authority or Transmission Operator of the inability to perform directives so that the TVA Reliability Entities may implement alternate remedial actions.

3.2 Limitations

A. After refueling operations, the NIS indications may be inaccurate until calibration at higher power levels. The NIS calibration procedures will adjust the PRM trip setpoints to ensure that the excore detectors do not contribute to an overpower condition. 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.2]

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

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

D. ICS will automatically monitor pre-conditioned power level as follows:

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

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

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

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

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

E. Any TI-40 power rise limit that is exceeded in any one hour is evaluated in accordance with NPG-SPP-03.1.

F. In the event of a change in the rated thermal power level exceeding 15% in one hour, notify Chemistry to initiate the conditional portions of 0-SI-CEM-030-407.2, 0-SI-CEM-000-050.2 and 0-SI-CEM-030-415.0 due to the thermal power change.

G. The main turbine shall be on turning gear at least one hour prior to rolling with steam.

H. Westinghouse should be contacted if the turbine is operated outside of its operating limits.

3.2 Limitations (continued)

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

1. At loads less than or equal to 30% (350 MW), the maximum permissible backpressure is 1.72 psia. (3.5" Hg). The ICS Computer alarm point UP5007 which will identify the condition of condenser pressure > 1.72 psia in conjunction with MW being < 350.

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

J. Generator voltage shall **NOT** exceed 24.8 kV.

K. The main generator field shall **NOT** be energized at less than 90% rated speed.

L. Do **NOT** allow the generator to become underexcited. The term under excited in this context is of concern when the generator is NOT synchronized to the grid OR operation outside the limits of GOI-6 and the Generator Capability Curve when synchronized to the grid.

M. The #3 Heater Drain Tank should remain drained with LCV-6-105A and B failed open (per 1,2-SO-5-2) until reactor power exceeds ~45-50%. This will prevent intermediate heater string isolations if a turbine trip occurs at lower power levels. If a level is established in the #3 Heater Drain Tank prior to exceeding P-9 setpoint (50% power), a turbine trip will result in Intermediate Pressure Heater string isolation(s).

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

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

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

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

4. Limit temperature differential between any condensers to less than 50°F. Exceeding this limit results in improper bearing loading and misalignment, thus potentially raising main turbine vibration. Limitation is based on the temperature as measured in the LP turbine exhaust hood. (PER 178439)

3.2 Limitations (continued)

15. IF temperature differential between the condensers is greater than or equal to 50°F, based on the temperature as measured in the LP turbine exhaust hood, **THEN TRIP** the turbine.(FSAR 10.2.2, VTD-W120-6510, PER 178439)

16. If Turbine seals have been in service with Turbine Turning Gear secured and unit is to be returned to operation, then both of the following limitations apply:

    1. Turbine is required to be placed on turning gear for 10 times as long as period it was stopped (up to a maximum of 4 hours).

    2. If eccentricity is higher than normal, turbine is required to be left on turning gear until eccentricity indication has reached and has been maintained at its normal minimum value for at least one hour.

17. If relying on the truth dial for determining eccentricity, eccentricity must be verified prior to each turbine roll. Verifying eccentricity before each turbine roll is not required if the truth dial is only being used to verify the installed instrumentation is working properly.

STARTUP XXX Unit 1 Sim Date Today

4.0 PREREQUISITES

NOTE

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

[11] **ENSURE** Instruction to be used is a copy of effective version. J

[12] **ENSURE** Precautions & Limitation of Section 3.0 have been reviewed. J

[13] **ENSURE** Reactor Power is between 1 and 4% ☑

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

Print Name	Initials
[signature]	[initials]

STARTUP xx **Unit** 1 Slm **Date** Today

5.0 INSTRUCTIONS

5.1 Actions To Be Performed Prior To Raising Reactor Power

[1] **ENSURE** Prerequisites complete. JT

NOTE

Steps 5.1[2] through5.1[12] can be performed out of sequence.

[2] **IF** 0-GO-4, Appendix A, *Mode 2 to Mode 1 Review And Approval* is **NOT** current for this startup,
N/A **THEN**

INITIATE Appendix A, while continuing with this instruction. ☐

[3] **IF** the Mode 3 to Mode 2 to Mode 1 surveillance checklists are **NOT** current for this startup for Mode 1 entry,
N/A **THEN**

REQUEST Periodic Test Coordinator to issue the Mode 3 to Mode 2 to Mode 1 surveillance checklists to the applicable departments.

_____ Initials _____ Time _____ Date

STARTUP XX Unit 1 Slm Date TODAY

5.1 Actions To Be Performed Prior To Raising Reactor Power (continued)

NOTES

(1) MFW Bypass valves will be using single element control, which means the desired SG level setpoint will be compared to the actual SG level until adequate steam and feedwater flow are available. Single Element to Three Element control transition occurs at ~13% RTP (.494E6 LBM/HR steam flow per loop).

(2) MFW Reg valves may have a positive deviation if reactor power is in the upper range of the control band (1-4%) in the following step.

[4] **PERFORM** the following:

[4.1] **ENSURE** four MFW Bypass Reg valves in **AUTO.** ☐

[4.2] **ENSURE** MFW Reg. valves have minimal controller deviation. ☐

[4.3] **ENSURE** MFW Reg. valves are **CLOSED** ☐

[4.4] **PLACE** MFW Reg. valves in **AUTO.** ☐

[4.5] **ENSURE** MFW valve control mode in "3 Element Enabled" (click target located in the center of each screen under the appropriate "Loop # Control" button) ☐

NOTE

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

[5] **ENSURE** Condensate DI polishing operation in accordance with Chemistry recommendations. O

CAUTION

After refueling operation, NIS indications may be inaccurate until calibration at higher power levels has been performed. RTP shall NOT be allowed to exceed 4% prior to the verification of the proper (or conservative) IR and PR setpoints.

N/A [6] **IF** startup is following a refueling, **THEN**

N/A [6.1] **MAINTAIN** reactor power between 3 to 4%. ☐

STARTUP_____ **Unit** _____ **Date** _____

5.1 Actions To Be Performed Prior To Raising Reactor Power (continued)

N/A [6.2] **VERIFY** trip and permissive setpoints are within limits in accordance with 0-PI-NUC-092-082.0. [C.2]

N/A
Rx Engineering _____ Date _____ Time

N/A [6.3] **ENSURE** P-10 actuation setpoint is less than the IR trip power level setpoint. [C.2]

N/A
Rx Engineering _____ Date _____ Time

N/A [6.4] **ENSURE** all applicable portions of 0-RT-NUC-000-001.0 are complete.

N/A
Rx Engineering _____ Date _____ Time

NOTES

1) The relationship between T_{AVG} and reactor power with Steam Dumps in Pressure Mode while maintaining Steam Pressure is 0.52deg. F / %
2) 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.

[7] **MAINTAIN** T_{AVG} stable with the steam dumps in the pressure mode or with the SG atmospheric relief valves set at 84% or 1005 psig. ☑

[8] **ENSURE** 0-SI-NUC-000-038.0 shutdown margin calculation is complete (**N/A** if **NOT** required). _____

[9] **ENSURE** containment air temperatures are within limits in accordance with 1,2-SI-OPS-000-003.D, App. B. (TS 3.6.1.5) _____

N/A [10] **INITIATE** Appendix E , *Preparations for Turbine Roll.* ☐

N/A [11] **INITIATE** Appendix F, *Preparations for Generator Synch.* ☐

STARTUP xxx **Unit** 1 Sum **Date** Today

5.1 Actions To Be Performed Prior To Raising Reactor Power (continued)

[12] **REVIEW** TI-40 to determine applicable Preconditioned Power Levels and Maximum Allowable Rates of Power Rise.

[13] **VERIFY** all applicable action steps in Section 5.1 are complete or initiated.

[14] **ENSURE** Appendix A, *Mode 2 to Mode 1 Review and Approval* completed to verify all restraints to Mode 1 entry have been resolved and approvals for mode change granted.

SM Signature — Today Date — xxxx Time

End of Section

STARTUP XO **Unit** 1 Sim **Date** TODAY

5.2 Reactor Power Ascension To Between 13% And 15% RTP

NOTE

The steam generator level operator is in control of unit startup until the MFW Reg. valves are in **AUTO** and controlling level. [C.5]

[1] **REVIEW** plant parameters and indications, **AND**

VERIFY stability prior to reactor power escalation. ☑

NOTES

1. Adjusting blowdown flow will provide an additional method of controlling SG water inventory. (Close blowdown isolation valves only if level cannot be maintained)
2. Prior to raising reactor power above 5%, SG blowdown should be in service.
3. Maximum blowdown rate is less than or equal to 270 gpm. Each steam generator flow, up to 60 gpm is indicated on panel L-357 located in the A.B. Supply Fan Rm. Minimum blowdown rate equals 5 gpm for each steam generator. Final blowdown rate should be determined by chemical analysis.
4. Computer points require a prefix 0, 1, or 2 be placed in front of the point number; for example, 1F2261A.

[2] **IF** SG blowdown is in service,
THEN
ADJUST FIC-15-43 as desired.
(plant computer pt. F2261A)

J

STARTUP XX Unit 1 Sim Date TODAY

5.2 Reactor Power Ascension To Between 13% And 15% RTP (continued)

NOTES

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

(2) Recommended dilution rate is 50 to 75 gallon batches every 12 to 15 minutes for a steady power rise. Rod movement should be limited to 1/2 step increments approximately every 1 1/2 minutes. Dilution and rod movement rates may be adjusted depending on SG level control stability.

(3) Control Rod withdrawal and / or dilution requirements may be significantly impacted by the change in core reactivity due to changing Xenon concentration.

[3] **INITIATE** a methodical and deliberate reactor power ascent by manual adjustment of the control banks or by diluting the RCS. ☐

MODE 1

[4] **WHEN** reactor power is above 5%,
THEN
LOG Mode 1 entry in the Unit Narrative Log. ☐

[5] **MAINTAIN** the SG levels on program by periodically adjusting the MFW Bypass controller level setpoints using Appendix B and 1, 2-SO-98-1, *Distributed Control System (DCS)*. ☐

[6] **IF** Turbine roll in parallel with power ascent is desired,
THEN
PERFORM Section 5.3 in parallel with the remainder of this section. _____

[7] **IF** the intermediate range rod stop setpoint is reached before P-10 energizes, **THEN**

[7.1] **STOP** the power escalation. ☐

STARTUP_____ **Unit** _____ **Date** _____

5.2 Reactor Power Ascension To Between 13% And 15% RTP (continued)

[7.2] **CONTACT** Reactor Engineering to evaluate power range calibration. [C.3]

_____ _____ _____
Initials Time Date

[8] **WHEN** reactor power is greater than or equal to 10% on at least 2 out of 4 PRMs, **THEN** [C.1] [C.3]

[8.1] **VERIFY** annunciator XA-55-4A, window D-5:

P-10 NUCLEAR AT POWER PERMISSIVE

is **LIT.** ☐

[8.2] **VERIFY** annunciator XA-55-4A, window B-5:

P-7 LOW POWER TRIP BLOCK

is **DARK.** ☐

[8.3] **COMPARE** the highest reading PRM with the highest reading loop ΔT indication to be within 5% of each other. [C.1] [C.3] ☐

[8.4] **IF** the above conditional response is **NOT** attained, **THEN**

[8.4.1] **STOP** the power ascent. ☐

[8.4.2] **NOTIFY** the SRO

_____ _____ _____
Initials Date Time

STARTUP_____ **Unit** _____ **Date** _____

5.2 Reactor Power Ascension To Between 13% And 15% RTP (continued)

NOTE

The following step will block both IR (25%) and PR (25%) low power reactor trips.

[9] **BLOCK** the IR HI FLUX reactor trip and PR LO Range HI FLUX reactor trip by performing the following:

[9.1] **PLACE** IRM TRIP BLOCK P-10 **[HS-92-5003] AND [HS-92-5004]** to **BLOCK**. ☐

[9.2] **VERIFY** annunciator XA-55-4A, window C-2:

INTERMED RANGE TRAINS A & B TRIP BLOCKED

is **LIT**. ☐

[9.3] **RELEASE [HS-92-5003] AND [HS-92-5004]**. ☐

[9.4] **PLACE** PRM LOW POWER TRIP BLOCK P-10 **[HS-92-5005] AND [HS-92-5006]** to **BLOCK**. ☐

[9.5] **VERIFY** annunciator XA-55-4A, window D-1:

POWER RANGE LOW SETPOINT TRAINS A & B TRIP BLOCKED

is **LIT**. ☐

[9.6] **RELEASE [HS-92-5005] AND [HS-92-5006]**. ☐

STARTUP_____ **Unit** _____ **Date** _____

5.2 Reactor Power Ascension To Between 13% And 15% RTP (continued)

NOTES

1) SG MFW Bypass and MFW Reg. valve controllers are controlled by one of the following:
   - Single element control - desired SG level setpoint will be compared to the actual SG level. Control is based only on SG level as the feedback for controlling the valve operation.
   - Three element control - uses SG level, feedwater flow, and steam flow as inputs for controlling the MFW Bypass and MFW Reg. valves. Desired mode of operation.
2) The change from single element to three element control:
   - Observed on the DCS Operator Display monitors by accessing the Feedwater Valve Control screen and looking below the loop Main Feedwater Valve display. The Control Status text will change from "Single Element" to "Three Element".
   - Uses Total Steam Flow demand as the input for three element control. The swap over to three element control may occur before or after the following step.

[10] **WHEN** reactor power is between 13 and 15%,
THEN

[10.1] **STOP** power ascent. ☐

[10.2] **STABILIZE** the plant. ☐

[10.3] **PERFORM** the following:

- **MONITOR** for swap over from single element to three element control in the DCS Feedwater System ☐
- **IF** damping of SG level oscillations is required, **THEN REFER TO** 1, 2-SO-98-1 ☐

[11] **IF** rolling of second MFWP on recirc without pumping forward for testing or maintenance is desired,
THEN
PLACE second MFPT in service by performing the following:

[11.1] **RECORD** which MFPT is to be tested.

_____MFPT _____

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

3.0 PRECAUTIONS AND LIMITATIONS

A. The mode selector switch should be returned to the **AUTO** makeup mode after any dilution or boration operation. The control switch must be turned to **START** in order for the auto makeup to function.

B. At least one Reactor Coolant Pump or one RHR Pump must be in operation during dilution operations. **[C.6]**

C. Maintain Pressurizer boron concentration within 50 ppm of reactor coolant loop boron concentration. This can be accomplished by turning pressurizer heaters on and allowing sprays to maintain RCS pressure within program. If Normal Spray is NOT available, then Auxiliary Spray should be used (1, 2-SO-62-1) in conjunction with pressurizer backup heaters.

D. Axial flux difference should be maintained within limits by using the control bank of rods while changing boron concentration.

E. Prior to making a positive reactivity change, Tech Specs and TRM should be referenced to ensure the unit is not in a LCO action that prohibits a positive reactivity change. **[C.1]**

F. A boron sample should be obtained whenever reactor makeup water is added to the VCT, unless the unit is at power and results of the makeup are as expected.

G. When making an RCS dilution of ≥ 3000 gallons, it should be done in batches with an RCS boron concentration verification at the halfway point (e.g., 1500 gallons). Allow at least 15 minutes between batches. **[C.5]** **[C.7]**

H. Simultaneous makeup to the RWST and the RCS should be avoided to prevent the possibility of injecting unborated (or under borated) water into the core. **[C.4]** **[C.6]** **[C.7]**

I. Reactivity balance calculations are required for any power changes more than 1%, except when immediate boration is required to maintain rods above the insertion limit or as required during an Rapid Shutdown or Load Reduction (AOP-C.03) or dropped/misaligned rod recovery (AOP-C.01). Although stated in the procedure that only one calculation is required for a major change in Reactor Power, calculations should be current and take into account the time dependency of parameters used in the calculation. [e.g. one calculation to reduce RX power to 70% power to remove a MFP is acceptable]. In the event of a large power manipulation (GO startup or shutdown) several calculations will be required. A calculation should be performed for the ascension to 30% Reactor power, another for an ascension to 50%, and so on. These calculations may be correlated to GO plateaus.

3.0 PRECAUTIONS AND LIMITATIONS (CONTINUED)

(K) Boric Acid Controller adjustment is required for B-10 depletion for automatic and manual makeup to improve the accuracy of the blend. The B-10 depletion value for each unit can be obtained from the Rx Eng Information file located on the site intranet. Reactor Eng Information ICON can be found on the control room PC's.

(L) An unanticipated power change greater than 5 MWT, rod motion greater than 1 step (in or out), or T_{AVG} greater than 0.5°F, require an SR and should be evaluated as a potential reactivity management event per NPG-SPP-10.4, *Reactivity Management Program*.

(M) Boron concentration measurement inaccuracies and integrator calibration tolerance may result in a small difference between RCS boron concentration and blend boron concentration. This may result in a small change in Tavg (~1/4°F) and thermal power (by a few megawatts) after makeup.

(N) Manual Makeup (Section 6.5) of approximately 200 gallons or less is preferred over allowing the system to automatically make up in Modes 1 and 2. Performing manual makeup and limiting the volume of makeup is preferred to reduce the impact on reactivity, RCP seal performance (due to reduced pressure/temperature transients) and RCS chemistry (due to reduced VCT pressure changes). During transient conditions, emergencies, or during plant cooldown, automatic makeup may be used as necessary.

(O) The potential exists that the blender piping contains primary water. This will result in a dilution and a small reactivity addition.

(P) Completely emptying the BAT's for all valve work is not required to establish a safe work boundary. The valves on the lower portions the tanks require an empty tank to establish safe conditions. The tank drain, level instrument isolation and pump suction line are all at or near the bottom of the tank. These are listed in the table below:

BAT A	BAT C	BAT B
1-VLV-62-1049	0-VLV-62-1049	2-VLV-62-1049
1-VLV-62-1058	0-VLV-62-1058	2-VLV-62-1058
1-VLV-62-1088	0-VLV-62-1088	2-VLV-62-1088

The other valves associated with the Boric Acid Transfer Pumps can be worked with some level remaining in the tanks. As a margin of safety, a maximum of 85% should be used to establish safe working conditions.

Unit Sim Date TODAY

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** the instruction to be used is a copy of the effective version. X

[2] **ENSURE** Precautions and Limitations, Section 3.0, has been reviewed. X

[3] **REVIEW** the following Status Files for any off-normal alignments that may impact performance:

Status File	✓
Unit 1 Sim	☑
Unit 2	☐
Radwaste	☐

X

[4] **ENSURE** Chemical and Volume Control System is in operation. X

[5] **ENSURE** the operating crew has been briefed for any reactivity changes that will occur due to performance of the applicable procedure section. X

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

ENSURE requirements of TRM L.C.O. 3.1.2.6 are met,
OR
COMPLY with applicable actions. X

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

N/A **ENSURE** requirements of TRM L.C.O. 3.1.2.5 are met,
OR
COMPLY with applicable actions. N/A

[8] **IF** Primary Water required for the evolution to be performed, **THEN**

ENSURE Primary Makeup Water system in service. X

Unit Sim Date TODAY

4.0 PREREQUISITE ACTIONS (Continued)

NOTE The following step is performed at the discretion of the RO and/or SRO.

[9] **WHEN** performing a dilution or boration, **THEN**

[a] **IF** Normal pressurizer spray is available, **THEN** **ENERGIZE** pressurizer heaters so sprays can equalize the boron concentration between the pressurizer and the RCS — O

[b] **IF** Normal pressurizer spray is NOT available, **THEN**
PLACE Auxiliary Spray in service (1, 2-SO-62-1) in conjunction with pressurizer backup heaters. (N/A if not applicable) — N/A

N/A

[10] **ENSURE** appropriate Valve Checklist has been completed (**N/A** if not applicable).

VALVE CHECKLIST	INITIALS
1-62-7.03	O
2-62-7.04	N/A

[11] **ENSURE** appropriate Power Checklist had been completed (**N/A** if not applicable).

POWER CHECKLIST	INITIALS
1-62-7.01	O
2-62-7.02	N/A

[12] **IF** Boric Acid Tank is the borated water source, **THEN**

N/A **ENSURE** Boric acid pump aligned properly in accordance with 0-SO-62-10. — N/A

[13] **IF** using the RWST for the borated water source, **THEN**

N/A **ENSURE** LCV-62-135 and/or LCV-62-136 **OPERABLE**. — N/A

NOTE Step **[14]** may be marked N/A if boration must be immediately initiated to maintain shutdown margin OR if performing a rapid boration using FCV-62-138 in preparation for RCS cooldown.

[14] **IF** reactor is subcritical **AND** an RCS boration or dilution is required, **THEN**

N/A **PERFORM** Appendix D. — N/A

Unit Sim Date Today

4.0 PREREQUISITE ACTIONS (Continued)

NOTE 1 Step **[15]** may be marked N/A for any of the following conditions:

- Minor power changes (Reference Section 3.0)
- If boration must be immediately initiated to maintain control rods above the insertion limit
- During an emergency shutdown (AOP-C.03)
- Recovery of a dropped or misaligned rod (AOP-C.01).
- If initiating a rapid boration using FCV-62-138 immediately prior to reactor shutdown in preparation for RCS cooldown.
- During low power physics testing per 0-RT-NUC-000-003.0 if boration/dilution values have been provided and verified by Reactor Engineering.

NOTE 2 Appendix D and E may be used to verify data provided by Reactor Engineering. IV is not required if Appendices are performed by an SRO to verify Rx. Engineering data.

[15] IF reactor is critical **AND** RCS boration or dilution will be performed, **THEN**

N/A

PERFORM the following:

[a] Appendix E *Reactivity balance calculation.* * N/A

[b] Appendix D *Calculation for amount of boric acid or primary water* (TI-44). * N/A

[16] IF performing a Spent Fuel Pit boration, **THEN**

N/A **ENSURE** Chem Lab has provided supporting data. N/A

[17] IF RCS boron concentration will be changed significantly, **THEN**

N/A **NOTIFY** Chem Lab to evaluate lithium impact and cation bed use. N/A

* Data provided by Rx Engineering and verified by an SRO

Unit 5 1m Date TODAY

4.0 PREREQUISITE ACTIONS (Continued)

[18] **REVIEW** Unit and Radwaste Status Files for any off normal alignments that may impact performance. JO

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

Print Name	Initials
[signature]	JO

[20] **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: _____

End of Section 4.0

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. N/A 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.

J. RPIs and step counters shall be maintained within limits per TS 3.1.3.1 and 3.1.3.2.

K. The Control Rods shall **NOT** be stepped or tripped unless the RCS pressure is at least 100 psig. This pressure ensures the CRDM housing is filled.

L. Rod movement without the CRDM fans aligned to the Reactor Vessel shroud is allowed, provided that the RCS temperatures are less than 350°F.

3.0 PRECAUTIONS AND LIMITATIONS (continued)

M. When RCS temperature is greater than 350°F, 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.

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.

3.0 PRECAUTIONS AND LIMITATIONS (continued)

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 Sim Date TODAY

4.0 PREREQUISITE ACTIONS

NOTE

Throughout this instruction where an **IF/THEN** statement occurs, the step may be **N/A** if the condition does **NOT** exist.

[1] **ENSURE** the instruction to be used is a copy of the effective version.

[2] **ENSURE** Precautions and Limitations, Section 3.0 has been reviewed.

[3] **ENSURE** each performer documents his/her name and initials:

Print Name	Initials

[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: _____

DELTA TIME (hrs)	REACTOR POWER (%)	POWER DEFECT (pcm)	ASSUMED ROD HT (steps)	INSERTED WORTH (pcm)	EXPECTED XENON (pcm)	DELTA RHO BORON (pcm)	BORON CONC (ppm)	DELTA PPM (ppm)	RECOMMEN DILUTION (gal)	RECOMMEN BORATION (gal)	IODINE CONC (% eq)
0	2.0	38.6	159.0	-606.4	-54.7	---	1570.0	---	---	---	0.1
1	6.0	115.0	165.0	-551.9	-53.9	21.0	1566.6	-3.4	360	0	0.5
2	10.0	188.7	171.0	-494.6	-58.2	20.7	1563.3	-3.3	138	0	1.2
3	14.0	259.5	178.0	-426.5	-69.1	13.7	1561.2	-2.2	92	0	2.3
4	18.0	328.2	185.0	-355.3	-87.8	16.1	1558.6	-2.6	108	0	3.6
5	22.0	395.0	194.0	-263.1	-114.9	1.8	1558.3	-0.3	12	0	5.3
6	26.0	459.9	200.0	-199.7	-150.7	37.2	1552.4	-5.9	249	0	7.1
7	30.0	523.7	204.0	-157.1	-195.1	65.6	1541.9	-10.5	441	0	9.2
8	30.0	525.0	208.0	-119.8	-247.0	15.9	1539.4	-2.5	107	0	11.2
9	30.0	525.3	212.0	-82.6	-304.5	20.6	1536.1	-3.3	139	0	13.1
10	30.0	525.7	216.0	-50.7	-365.6	29.7	1531.3	-4.7	201	0	14.7
11	30.0	526.2	216.0	-50.5	-428.9	63.7	1521.2	-10.2	432	0	16.2
12	30.0	527.5	216.0	-50.3	-493.2	65.3	1510.8	-10.4	444	0	17.6
13	30.0	528.7	216.0	-50.1	-557.4	65.3	1500.4	-10.4	446	0	18.8
14	30.0	530.0	216.0	-49.9	-620.9	64.5	1490.1	-10.3	444	0	19.9
15	30.0	531.3	216.0	-49.7	-683.0	63.2	1480.0	-10.1	438	0	20.9
16	30.0	532.6	216.0	-49.4	-743.3	61.4	1470.3	-9.8	428	0	21.8
17	30.0	533.9	216.0	-49.2	-801.4	59.2	1460.8	-9.4	416	0	22.6
18	30.0	535.1	216.0	-49.0	-857.1	56.7	1451.8	-9.0	401	0	23.3
19	30.0	536.3	216.0	-48.8	-910.2	54.1	1443.2	-8.6	384	0	24.0
20	30.0	537.4	216.0	-48.7	-960.6	51.4	1435.0	-8.2	367	0	24.6
								Total	6047	0	

150	MWD/MTU
6820	BAT ppm

Hold Tavg = Tref +/- 1.5F

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

Reason for Maneuver	Reactor/Plant restart following forced outage- 30% hold
Date	Today
RxEng Name	J. Sidekick
Comments	none

Op Test No.: NRC 2012-302 Scenario # 3 Event # 1 Page 1 of 48

Event Description: Raise plant power to 13-15% RTP

Time	Position	Applicant's Actions or Behavior
Booth Operator: No action required for event 1		
Examiner Note: The crew will shift Feed Reg Valves to AUTO using 0-GO-4, Section 5.1 Actions To Be Performed Prior To Raising Reactor Power.		
		5.1 Actions To Be Performed Prior To Raising Reactor Power (continued) **NOTES** 1) MFW Bypass valves will be using single element control, which means the desired SG level setpoint will be compared to the actual SG level until adequate steam and feedwater flow are available. Single Element to Three Element control transition occurs at ~13% RTP (.494E6 LBM/HR steam flow per loop). 2) MFW Reg valves may have a positive deviation if reactor power is in the upper range of the control band (1-4%) in the following step.
	BOP	[4] **PERFORM** the following: [4.1] **ENSURE** four MFW Bypass Reg valves in **AUTO**. ☐ [4.2] **ENSURE** MFW Reg. valves have minimal controller deviation. ☐ [4.3] **ENSURE** MFW Reg. valves are **CLOSED** ☐ [4.4] **PLACE** MFW Reg. valves in **AUTO.** ☐ [4.5] **ENSURE** MFW valve control mode in "3 Element Enabled" (click target located in the center of each screen under the appropriate "Loop # Control" button) ☐
	BOP	Depresses AUTO pushbutton for FIC-3-35, 48, 90 and 103.
	SRO	Direct a load increase in accordance with 0-GO-4, Reactor Power Ascension To Between 13% And 15% RTP, Section 5.2, and 0-SO-62-7 Boron Concentration Control, Section 6.1 or Section 6.2.

Op Test No.: NRC 2012-302 Scenario # 3 Event # 1 Page 2 of 48

Event Description: Raise plant power to 13-15% RTP

Time	Position	Applicant's Actions or Behavior

NOTES

1) Actions effecting reactivity are directed in the following step. 0-SO-62-7 requirements shall be adhered to for reactivity changes (i.e. reactivity balance, amounts of boric acid or water). All appropriate verifications and peer checks shall be utilized during performance.
2) Recommended dilution rate is 50 to 75 gallon batches every 12 to 15 minutes for a steady power rise. Rod movement should be limited to 1/2 step increments approximately every 1 1/2 minutes. Dilution and rod movement rates may be adjusted depending on SG level control stability.
3) Control Rod withdrawal and / or dilution requirements may be significantly impacted by the change in core reactivity due to changing Xenon concentration.

	CREW	[3] **INITIATE** a methodical and deliberate reactor power ascent by manual adjustment of the control banks or by diluting the RCS.

Examiner Note: The following Steps are from 0-SO-62-7 *Boron Concentration Control*, Section 6.2, *Dilute*

CAUTION 1 **When making an RCS dilution of ≥ 3000 gallons, it should be done in batches with an RCS boron concentration verification at the halfway point (e.g., 1500 gallons). Allow at least 15 minutes between batches. [C.5] [C.7]**

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

NOTE 1 If an excessive amount of dilution is required (plant startup), the pressurizer heaters should be energized to cause pressurizer spray operation for equalizing boron concentration in RCS and pressurizer.

NOTE 2 Dilute mode will be used anytime a long-term positive reactivity addition is desired. The operator should use the normal dilute mode whenever conditions permit.

Examiner Note: Dilutions will be performed based on the Reactor Engineering provided Reactivity Spreadsheet; based on 0-GO-4 Notes, recommended dilution rate is 50 to 75 gallon batches every 12 to 15 minutes for a steady power increase. During subsequent power escalation, large volume dilutions will be divided evenly over each hour as determined by the crew [i.e.: one-third, one-quarter of the volume over each hour's period (e.g.: ~60 gallons, 4 times per hour for 240 gallons for the first hour)].

Examiner Note: use time compression as required to facilitate power increase.

	ATC	**[1] ENSURE** unit is NOT in a Tech Spec or TRM action that prohibits positive reactivity additions. **[C.1]**
	NOTE:	HUT level increase of 1% is equal to 1380 gallons (TI-28 fig. 34).

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Event Description: Raise plant power to 13-15% RTP

Time	Position	Applicant's Actions or Behavior
	ATC	**[2] ENSURE** sufficient capacity available in the HUT selected to receive expected amounts of CVCS letdown: (**N/A** if not used)
		HUT / **LEVEL** / **INITIALS** A ____ % ____ B ____ % ____
	ATC	**[3] ENSURE** makeup system is aligned for **AUTO** operation in accordance with Section 5.1.
	ATC	**[4] RECORD** the quantity of dilution water required to achieve desired boron concentration using Appendix D. (**N/A** for minor power changes)
	NOTE	Due to eyeball interpolation the verified calculation may slightly differ from the initial calculation. The following signoff indicates that any differences in the two results have been discussed and are close enough to be considered validated.
	ATC	**[5] PERFORM** Appendix I Independent Verification of Calculation for Amount of Boric Acid or Primary Water. (N/A if App. D was performed by SRO to verify data from Rx Engineering) ***(Step not required provided in shift turnover package)***
	ATC	**[6] PLACE [HS-62-140A]**, Boric Acid Supply to Blender Flow Control Switch to the **STOP** position.
	ATC	**[7] PLACE [HS-62-140B]**, CVCS Makeup Selector Switch to the **DILUTE** position.
	ATC	**[8] ENSURE [HS-62-140D]**, Boric Acid Valve to the Blender is **CLOSED** (Green light is **LIT**).
	ATC	**[9] SET [FQ-62-142]**, Batch Integrator for the desired quantity
	NOTE	Primary Water Flow Controller **[FC-62-142]** receives its reference signal (70 gpm) from setpoint potentiometer (dial indicator) located on panel M-6. A setpoint of 35% corresponds to a 70 gpm primary water flow rate
	ATC	**[10] ADJUST [FC-62-142]**, Primary Makeup Water Flow Controller for the desired flow rate
	ATC	**[11] PLACE [HS-62-140A]**, Boric Acid Supply to Blender Flow Control Switch to the **START** position.
	ATC	**[12] VERIFY** the following;
		[a] Inlet to top of VCT **[FCV-62-128]** is **OPEN**.
		[b] Primary Water flow by **[FI-62-142A] OR [FQ-62-142]**.

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Event Description: Raise plant power to 13-15% RTP

Time	Position	Applicant's Actions or Behavior
	NOTE	Alternate dilution in small amounts is acceptable on a regular basis, provided no significant changes in seal water temperature or seal leakoff are indicated. Batches of 5 to 10 gallons may be added through FCV-62-144 on a frequency not to exceed once per 30 minutes. ICS points for No. 1 seal leakoffs and seal water temperatures on the RCPs should be monitored during and after dilution.
	ATC	**[13] IF** primary water addition to the bottom of the VCT **[FCV-62-144]** is desired, **THEN**
	ATC	**[a] CLOSE [FCV-62-128]** with **[HS-62-128]**.
	ATC	**[b] OPEN [FCV-62-144]** with **[HS-62-144]**.
	ATC	**[c] VERIFY** Primary Water flow by **[FI-62-142A] OR [FQ-62-142]**.
	NOTE	It may take approximately 15 minutes before any changes to reactivity are indicated on nuclear instrumentation or RCS temperature indication.
	ATC	**[14] MONITOR** nuclear instrumentation and reactor coolant temperature to ensure the proper response from dilution.
	ATC	**[15] IF [LI-62-129]**, Volume Control Tank Level, increases to 63 percent, **THEN ENSURE [LCV-62-118]**, Volume Control Tank Divert Valve **OPENS** to divert excess water to the Holdup Tanks.
	ATC	**[16] WHEN** dilution is complete, **THEN**
	ATC	**[a] PLACE [HS-62-140A]**, Boric Acid to Blender Flow Control Switch to the **STOP** position.
	ATC	**[b] IF [FCV-62-144]** was previously **OPENED**, **THEN CLOSE [FCV-62-144]** with **[HS-62-144]**.
	ATC	**[c] VERIFY** no primary water flow on either **[FI-62-142A] OR [FQ-62-142]**.
	ATC	**[d] ENSURE [FCV-62-128]** is **CLOSED**
	ATC	**[17] IF** power increase in progress and additional dilutions will be required, **THEN** use this table to re-perform steps **[4]** through **[18]** (next page)

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Event Description: Raise plant power to 13-15% RTP

Unit_____ Date_____

6.2 Dilute (Continued)

[17] IF power ascension in progress and additional dilutions will be required, **THEN** use this table to re-perform steps **[4]** through **[18]**.

STEP	1st	2nd	3rd
[4] RECORD the quantity of dilution water required to achieve desired boron concentration using Appendix D.	Quantity	Quantity	Quantity
[5] PERFORM Appendix I, *IV of Calculation for amount of BA or PW.*	SRO	SRO	SRO
[6] PLACE [HS-62-140A], Boric Acid Supply to Blender Flow Control Switch to the **STOP** position.	/ 1st CV	/ 1st CV	/ 1st CV
[7] PLACE [HS-62-140B], CVCS Makeup Selector Switch to the **DILUTE** position.	☐	☐	☐
[8] ENSURE [HS-62-140D] Boric Acid Valve to Blender is **CLOSED** (Green light LIT).	☐	☐	☐
[9] SET [FQ-62-142], Batch Integrator for the desired quantity.	/ 1st CV	/ 1st CV	/ 1st CV
[10] ADJUST [FC-62-142], Primary Makeup Water Flow Controller for the desired flow rate.	/ 1st CV	/ 1st CV	/ 1st CV
[11] PLACE [HS-62-140A], BA Supply to Blender Flow Control Switch to **START**.	/ 1st CV	/ 1st CV	/ 1st CV
[12] VERIFY the following:			
[a] Inlet to top of VCT **[FCV-62-128]** is **OPEN**.	☐	☐	☐
[b] Primary Water flow by **[FI-62-142A]** or **[FQ-62-142]**.	☐	☐	☐
[13] IF PW addition to top of VCT **[FCV-62-128]** is not warranted, but PW addition to the bottom of the VCT **[FCV-62-144]** is desired, **THEN**			
[a] CLOSE [FCV-62-128]with **[HS-62-128]**	☐	☐	☐
[b] OPEN [FCV-62-144] with **[HS-62-144]**.	☐	☐	☐
[c] VERIFY Primary Water flow by **[FI-62-142A]** or **[FQ-62-142]**.	☐	☐	☐
[14] MONITOR nuclear instrumentation and reactor coolant temperature to ensure the proper response from dilution.	☐	☐	☐
[15] IF [LI-62-129], VCT level, rises to 63 percent, **THEN ENSURE [LCV-62-118]**, VCT Divert Valve, **OPENS** to divert excess water to the HUTs.	☐	☐	☐
[16] WHEN dilution is complete, **THEN**			
[a] PLACE [HS-62-140A], Boric Acid to Blender Flow Control Switch to **STOP**	/ 1st CV	/ 1st CV	/ 1st CV
[b] IF [FCV-62-144] was previously **OPENED**, **THEN CLOSE [FCV-62-144]** with **[HS-62-144]**.	☐	☐	☐
[c] VERIFY no primary water flow on either **[FI-62-142A]** or **[FQ-62-142]**.	☐	☐	☐
[d] ENSURE [FCV-62-128] is **CLOSED**.	☐	☐	☐

[18] IF Step **[17]** will be repeated, **THEN**
PERFORM the following:

[a] PLACE [HS-62-140B], CVCS Makeup Selector Switch to the **AUTO** position. _____/_____ 1st CV

[b] PLACE [HS-62-140A], BA to Blender Flow Control Switch to **START** position. ☐

[c] ENSURE dilution is logged in Unit Narrative Log. ☐

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Event Description: Raise plant power to 13-15% RTP			

Time	Position	Applicant's Actions or Behavior
	ATC	**[19]** **REALIGN** the blender controls for **AUTO** makeup to the CVCS in accordance with Section 5.1.
	ATC	**[20]** **ENSURE** dilution(s) is logged in Unit Narrative Log.
	NOTE	Sample may be obtained at normal RCS sample intervals provided the unit is at power and the unit response following the dilution is as expected.
	ATC	**[21]** **IF** RCS boron sample is required, **THEN NOTIFY** Chem Lab to obtain RCS boron sample.

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Event Description: Raise plant power to 13-15% RTP			

Time	Position	Applicant's Actions or behavior
0-SO-85-1, Control Rod Drive System, Section 6.4, Transferring from Manual to Auto Rod Control; & Section 6.5, Transferring from Auto to Manual Rod Control		
Examiner Note:		As stated in each section's procedural Step 1 Note 1, the operators will use a laminated copy of Sections 6.4 & 6.5 available on the book desk under the glass at 1-M-4. It has been verified as current, in-effect revision routinely to assure currency.
		NOTES 1) A laminated copy of this section can be maintained in the Unit Control Room for repetitive use for routine rod manipulations. 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. 3) This Section may be N/A if Rod Control is being returned to AUTO in response to a transient (runback) condition.
	ATC	**[1] ENSURE** turbine power is greater than 15 percent.
	ATC	**[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**.
	ATC	**[3] ENSURE** less than 1 degree Tavg/Tref mismatch.
	ATC	**[4] PLACE [HS-85-5110]**, Rod Control Mode Selector in the **AUTO** position.
	ATC	**[5] VERIFY** Rod Speed Indicator **[SI-412]**, indicates 8 Steps/minute.
		End of Section 6.4

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Event Description: Raise plant power to 13-15% RTP

Time	Position	Applicant's Actions or behavior
		Section 6.5, Transferring from Auto to Manual Rod Control
		NOTES 1) A laminated copy of this section can be maintained in the Unit Control Room for repetitive use for routine rod manipulations. 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
	ATC	**[1] PLACE [HS-85-5110]**, Rod Control Mode Selector in the **MANUAL** position.
	ATC	**[2] VERIFY** Rod Speed Indicator **[SI-412]**, indicates 48 Steps/minute.
	ATC	**[3] IF** control rod movement is required, **THEN ADJUST** position using **[HS-85-5111]**, Rod Control Switch.
	ATC	**[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.
	ATC	**[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

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Event Description: Raise plant power to 13-15% RTP

Time	Position	Applicant's Actions or Behavior
	0-GO-4, Section 5.2 Reactor Power Ascension To Between 13% And 15% RTP	
Examiner Note: Crew will coordinate control rod withdrawal and dilutions based on the Reactor Engineering provided Reactivity Spreadsheet and would coordinate rod withdrawal and dilutions observing the guidance the Step 3 NOTES above.		
		MODE 1
Examiner Note: Mode change call is made using Loop ΔT indications on the MCB and ICS, not NIs; NIs may be referred to during the MODE change determination Refer to 0-GO-4 Section 3.1, Precaution C, specifically bullets 2 & 3 (below): C. During startup, NIS power range indication may be reading significantly higher than true power until calibration adjustments are made. The following should be used to determine the most accurate indication for comparison with NIS: • When reactor power is less than or equal to 15%, use average loop ΔT (UO485). • When reactor power is greater than 15%, use LEFM core thermal power indication (U2118). If LEFM is **NOT** available, then continue using average loop ΔT up to 40%. (U1118 will be used above 40% with LEFM unavailable).		
	ATC	[4] **WHEN** reactor power is above 5%, **THEN LOG** Mode 1 entry in the Unit Narrative Log.
	SRO	ATC would be monitoring the mode change; any crew member may make the initial identification however the SRO should announce transition to MODE 1 based on Loop ΔT indication. Normally, both MCB and ICS indications are reviewed for MODE transition verification. Crew member replaces the MODE 2 sign with MODE 1 sign on 1-M-4 under the clock.
	BOP	[5] **MAINTAIN** the SG levels on program by periodically adjusting the MFW Bypass controller level setpoints using Appendix B and 1, 2-SO-98-1, *Distributed Control System (DCS).*
Examiner Note: According to turnover information, the crew will not prepare for nor perform MT roll; Step 6 is N/A for this exam.		

Op Test No.: NRC 2012-302	Scenario # 3	Event # 1	Page 10 of 48
Event Description: Raise plant power to 13-15% RTP			

Time	Position	Applicant's Actions or Behavior
	N/A	[6] **IF** Turbine Roll in parallel with power increase is desired, **THEN PERFORM** Section 5.3 in parallel with the remainder of this section.
	ATC	[7] **IF** the intermediate range rod stop setpoint is reached before P-10 energizes, **THEN**
		[7.1] **STOP** the power escalation.
		[7.2] **CONTACT** Reactor Engineering to evaluate power range calibration. **[C.3]**
When the crew has sufficiently raised power the Lead examiner may proceed to Event 2.		

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Event Description: Raise plant power to 13-15% RTP			

Examiner note: The following 5 pages are the guidance for maintaining S/G levels using the DCS (Digital Feed Control).

6.1 Changing MFW Bypass Reg Valve Controller Setpoint With Hand Controller Using the JOG Method

NOTES

1) With the MFW Bypass Reg Valve controller in auto, SG level setpoints are digitally limited to between 30 and 50%. This action prevents an inadvertent setpoint insertion by the operator from causing too much of a level swing.
2) MFW Bypass Reg Valve controller setpoint can **NOT** be changed when the Turbine Impulse program is in control. Turbine Impulse program will take control above ~27% during a power rise and reset at less than ~23% for a power reduction.
3) SG setpoints can be changed from either the DCS Operator Display monitor or the hand controller station.
4) Two handed operation will be required to change the SG controller setpoint, when using the hand controller.
5) Setpoint push button will change from gray to red on the Hand Controller and the DCS Operator Display monitor.

[1] **PRESS** and **HOLD** SETPOINT push button for applicable Bypass Reg Valve (N/A valves not operated):

S/G	UNID	INITIALS
1	1-LIC-3-35	_____
2	1-LIC-3-48	_____
3	1-LIC-3-90	_____
4	1-LIC-3-103	_____

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Event Description: Raise plant power to 13-15% RTP

NOTE

The following method (JOG method) will cause the setpoint to change in 0.5% increments each time the button is pressed. The push buttons are momentary contact closure type, so continuously holding the push button down will **NOT** change the setpoint. The push button will have to be released and then pressed again to change the setpoint.

[2] **PRESS** either the raise (≫) or the lower (≪) push buttons to obtain the desired setpoint (N/A valves not operated):

S/G	UNID	INITIALS
1	1-LIC-3-35	_____
2	1-LIC-3-48	_____
3	1-LIC-3-90	_____
4	1-LIC-3-103	_____

[3] **RELEASE** the SETPOINT push button. (N/A valves not operated).

S/G	UNID	INITIALS
1	1-LIC-3-35	_____
2	1-LIC-3-48	_____
3	1-LIC-3-90	_____
4	1-LIC-3-103	_____

[4] **REPEAT** Steps 6.1[1]-6.1[3] as necessary to maintain S/G level in desired range.

End of Section

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Event Description: Raise plant power to 13-15% RTP			

6.2 Changing MFW Bypass Reg Valve Controller Setpoint With DCS Operator Display Monitor

NOTES

1) With the MFW Bypass Reg Valve controller in auto, SG level setpoints are digitally limited to between 30 and 50%. This action prevents an inadvertent setpoint insertion by the operator from causing too much of a level swing.
2) MFW Bypass Reg Valve controller setpoint can **NOT** be changed when the Turbine Impulse program is in control. Turbine Impulse program will take control above ~27% during a power rise and reset at less than ~23% for a power reduction.
3) SG setpoints can be changed from either the DCS Operator Display monitor or the hand controller station.
4) Setpoint push button will change from gray to red on the Hand Controller and the DCS Operator Display monitor.

[1] **SELECT** the appropriate feedwater controller display screen from either DCS Operator Display monitors (N/A valves not operated).

LOOP	UNID	INITIALS
1	1-LIC-3-35	_____
2	1-LIC-3-48	_____
3	1-LIC-3-90	_____
4	1-LIC-3-103	_____

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Event Description: Raise plant power to 13-15% RTP			

6.2 Changing MFW Bypass Reg Valve Controller Setpoint With DCS Operator Display Monitor (continued)

[2] **SELECT** the SETPOINT push button for applicable Bypass Reg Valve (N/A others).

LOOP	UNID	INITIALS
1	1-LIC-3-35	_____
2	1-LIC-3-48	_____
3	1-LIC-3-90	_____
4	1-LIC-3-103	_____

NOTE

Using the JOG method will cause the setpoint to change in 0.5% increments each time the button is pressed. The push buttons are momentary contact closure type, so continuously holding the push button down will **NOT** change the setpoint. The push button will have to be released and then pressed again to change the setpoint.

[3] **IF** using the JOG method (preferred), **THEN**
SELECT either the raise (▷) or the lower (◁) push buttons to obtain the desired setpoint. ☐

NOTES

1) The RAMP method of changing Bypass Reg Valve setpoints is **NOT** preferred. This is due to the large rate of change in valve position.
2) Using the RAMP push button along with the raise (▷▷) or the lower (◁◁) push buttons will cause the setpoint to change at a rate of 1.67% per second. A change of 0%-100% would take approximately 1 minute.

[4] **IF** using the RAMP method, **THEN**
SELECT the raise (▷▷) or the lower (◁◁) push button to obtain the desired setpoint. ☐

[5] **WHEN** the desired setpoint is obtained, **THEN**
CONFIRM SETPOINT is correctly displayed on the screen. ☐

[6] **SELECT** the SETPOINT push button. ☐

[7] **CONFIRM** SETPOINT push button changes from red to gray. ☐

End of Section

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Event Description: IR Channel B Instrument N-36 Fails

Time	Position	Applicant's Actions or Behavior
Booth Instructor: When directed, initiate Event 2 IR Channel N-36 Fails		
Indications available: • 4B B2 IPRS NIS Intermediate Range HI FLUX LVL ROD WITHDRAWAL STOP • Control Rod motion stops, if in progress. • Intermediate Range Instrument N-36 is greater than N-35		
		IRS **INTERMED RANGE** **HI FLUX LVL ROD** **WITHDRAWAL** **STOP** **NOTE** Control rods will not withdraw in manual or automatic. **Corrective Actions** [1] **CHECK** reactor power level. [2] **REDUCE** reactor power to < 20%. [3] **BLOCK** intermediate range high flux trip and power range high flux trip (low setpoint). [4] **IF** Intermediate Range channel failed, **THEN** GO TO AOP-I.01, *Nuclear Instrument Malfunction.*
Examiner Note: Several steps, notes, and cautions in the Annunciator response procedure do not apply to this failure. Only those that are applicable are listed in this event guide.		
	ATC	Responds to alarm using ARP 1-AR-M4B, B2
	ATC	May take action using ARP to block the Low Power PR and IR NI Trip.
	SRO	Transitions to AOP-I.01, Nuclear Instrument Malfunction.
		1. **DIAGNOSE** the failure: **IF...** / **GO TO SECTION** / **PAGE** Intermediate Range Failure / 2.2 / 9
	SRO	Directs actions using AOP-I.01, Nuclear Instrument Malfunction.

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Event Description: IR Channel B Instrument N-36 Fails

Time	Position	Applicant's Actions or Behavior
CAUTION 1	**If reactor power is below P-6 (10^{-4} %), Tech Specs require restoring inoperable channel prior to raising power above P-6.**	
CAUTION 2	**If reactor power is above P-6 but below 5% power, Tech Specs require restoring inoperable channel prior to raising power above 5%.**	
NOTE 1	If Intermediate Range channel is failed high, reducing reactor power to less than P-10 (10%) will result in a reactor trip. If control power is available, this condition will be corrected when the channel is bypassed in Step 6.	
NOTE 2	If any IR channel has failed high, then automatic re-enabling of Source Range indication may be disabled. (SRMs may require manual reinstating in ES-0.1.)	
NOTE 3	Failure of Intermediate Range Channel may affect associated Source Range Channel.	
	SRO	1. **IF** unit is in Mode 2, **THEN** **STABILIZE** reactor power at current level.
	SRO	2. **EVALUATE** the following Tech Specs for applicability: • 3.3.1.1 (3.3.1), Reactor Trip System Instrumentation • 3.3.3.5, Remote Shutdown Instrumentation • 3.3.3.7, Accident Monitoring Instrumentation • 3.9.2, Refueling Operations Instrumentation
	SRO	Enters LCO 3.3.1.1 Action 3 and 3.3.3.7, Action 1, enters LCO 3.3.1.1 Action 8a if still in MODE 2.
	ATC	3. **CHECK** at least one Intermediate Range channel OPERABLE.
CAUTIONS:	• **Loss of instrument OR control power will cause a single channel reactor trip signal.** • **For loss of control power only, the reactor trip signal cannot be bypassed. Reducing reactor power below P-10 will result in a reactor trip.**	

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Event Description: IR Channel B Instrument N-36 Fails

Time	Position	Applicant's Actions or Behavior
NOTE: The following table lists Intermediate Range NIS power supplies:		

NIS CHANNEL	INSTRUMENT POWER	CONTROL POWER
N-35	VIPB 1-I (2-I) Bkr 3	VIPB 1-I (2-I) Bkr 4
N-36	VIPB 1-II (2-II) Bkr 3	VIPB 1-II (2-II) Bkr 4

	ATC	4. **CHECK** power available to failed Intermediate Range channel: [M-13] • INSTRUMENT POWER ON indicator LIT **AND** • CONTROL POWER ON indicator LIT
	ATC	5. **IF** required to monitor IR channel on NR-45 recorder, **THEN** **ENSURE** OPERABLE IR channel selected on NR-45 Recorder. [M-4]
	ATC	6. **PLACE** Level Trip switch for failed channel in BYPASS [M-13, N35/N36].
	ATC	Places N-36 Trip Level Bypass switch to BYPASS.
		7. **IF** control power is available, **THEN** **PERFORM** the following: a. **VERIFY** NIS TRIP BYPASS annunciator LIT [M-6A, A-1]. b. **VERIFY** appropriate annunciator LIT: • INTERMEDIATE RANGE TRIP BYPASS CHANNEL I [M-4A, A-2] **OR** • INTERMEDIATE RANGE TRIP BYPASS CHANNEL II [M-4A, B-2]

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Event Description: IR Channel B Instrument N-36 Fails

Time	Position	Applicant's Actions or Behavior
		8. **CHECK** associated Source Range Channel NOT affected.
		9. **GO TO** appropriate plant procedure. 
	Crew	**Performs a Crew Brief** as time allows.
	Crew	**Notifications** should be addressed as applicable if not specifically addressed by the procedure or in the crew brief. Operations Management - Typically Shift Manager. Maintenance Personnel – Typically Maintenance Shift Supervisor (MSS). (**Note:** Maintenance notification may be delegated to the Shift Manager).
Lead Examiner may cue next event when N-36 Trip Level switch has been placed in bypass.		

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Event Description: Small RCS Leak inside containment (Hot Leg Loop 2)

Time	Position	Applicant's Actions or Behavior
Simulator Operator: When directed, initiate Event 3 RCS Loop 2 Hot Leg Leak ~21 gpm.		
Indications/Alarms **Indications** **1-M-5** • **1-LR-68-339, RCS PZR LEVEL actual level deviating low from program level indication** • **1-FI-62-93A, CHARGING HDR FLOW increasing flow** **1-M-6** • **1-LI-62-129, VCT LEVEL decreasing** • **1-PDIR-30-133, CNTMT ANN increasing trend** **0-M-12** • **1-RR-90-106A, CNTMT LOWER COMPT PARTICULATE RADMON recorder shows increasing trend** • **1-RI-90-106B, CNTMT LOWER COMPT RADMON-TOTAL GAS increasing counts** • **1-RM-90-112B, CNTMT UPPER COMPT RADMON- TOTAL GAS increasing counts**		
Examiner Note: Several steps, notes, and cautions in the Annunciator response procedure do not apply to this failure. Only those that are applicable are listed in this event guide.		
	ATC	Identifies Pzr below program, Charging flow increasing w/ VCT level decreasing.
	BOP	Checks rad monitors, determines increasing trend on containment monitors
	SRO	Transitions to AOP-R.05, RCS Leak and Leak Source Identification

Time	Position	Applicant's Actions or Behavior
		1. **IF** leak results in radiological hazard or safety hazard, **THEN** **EVACUATE** unnecessary personnel from affected areas. 2. **DIAGNOSE** the failure:

IF...	GO TO SECTION	PAGE
ANY of the following indications with RCS temperature greater than 375°F: • Pressurizer level dropping unexpectedly • Charging flow rising unexpectedly with stable pzr level • VCT level dropping with Aux Bldg or Containment radiation rising • High Energy Line Break recorder indicating unexpected rise in temperature • other indications of RCS leak (local or MCR)	2.1	4

	ATC	1. **CONTROL** charging flow using one CCP: • **ADJUST** FCV-62-93 and FCV-62-89 as necessary to maintain pzr level on program. • **MAINTAIN** seal injection flow at least 6 gpm to each RCP.
	ATC	Places HIC-62-93A Charging Flow Control, in MANUAL and raises FCV-62-93 and while adjusting FCV-62-89 as necessary to maintain pzr level on program.

Examiner Note: Crew may implement RNO at this time to isolate letdown; Crew may return to perform RNO for Trip Rx and initiate SI later when Leak increases.

Examiner Note: Since this is a **"MONITOR"** step, the crew may continue in the procedure while developing a Pzr/RCS level trend. If so, steps 3, 4 or 5 could be the decision point and therefore initiate the reactor trip and E-0 implementation. If a loss of Pzr level is imminent, the crew may decide to trip the reactor and transition to E-0 based on this step.

Time	Position	Applicant's Actions or Behavior
	ATC	2. **MONITOR** pressurizer level STABLE or RISING. **IF** sufficient time is available, **THEN** **ISOLATE** normal and excess letdown: a. **ENSURE** FCV-62-72, 73, and 74 CLOSED. b. **CLOSE** FCV-62-69 and 70. c. **ENSURE** FCV-62-54 and 55 CLOSED. **IF** loss of pressurizer level is imminent **OR** low pressure reactor trip (1970 psig) is imminent, **THEN** **PERFORM** the following: a. **TRIP** the reactor. b. **INITIATE** Safety Injection. c. **GO TO** E-0, Reactor Trip or Safety Injection.
	ATC	Places HS-62-73A Letdown Orifice B Isol 75 gpm and HS-62-69A Letdown Isol Loop 3 and HS-62-70A Letdown Isol Loop 4 to CLOSE when Pressurizer Level cannot be maintained.
	ATC	3. **MONITOR** containment pressure STABLE or DROPPING. **IF** containment pressure is approaching 1.5 psig, **THEN** **PERFORM** the following: a. **TRIP** the reactor. b. **INITIATE** Safety Injection. c. **GO TO** E-0, Reactor Trip or Safety Injection.
CAUTION:		**If Unit is in Mode 3 with low pressurizer pressure SI NOT blocked, SI should NOT be manually blocked to prevent safety injection.**
		4. **MONITOR** RCS pressure STABLE or RISING.

Time	Position	Applicant's Actions or Behavior
Examiner Note: RCS leak will progress into a LBLOCA. As the crew responds using AOP-R.05 Section 2.1, the lowering Pzr level and increased charging flow may result in a challenge to VCT Make-up capability. Subsequently the crew may initiate a reactor trip and enter E-0 based on this step.		
		5. **MAINTAIN** VCT level greater than 13% **USING** automatic or manual makeup.
NOTE 1: Appendix I or J may be used to estimate RCS leak rate. **NOTE 2:** If letdown was isolated in Step 2, the leak rate may have exceeded capacity of one CCP in the normal charging alignment (EAL 1.2.2P).		
	SRO	6. **EVALUATE** EPIP-1, Emergency Plan Classification Matrix. 7. **EVALUATE** Tech Spec/TRM LCOs **USING** Appendix K, Evaluating Tech Specs and TRM.
	SRO	3.4.6.2 Reactor Coolant System leakage shall be limited to: a. No PRESSURE BOUNDARY LEAKAGE, b. 1 GPM UNIDENTIFIED LEAKAGE, c. 150 gallons per day of primary-to-secondary leakage through any one steam generator, and d. 10 GPM IDENTIFIED LEAKAGE from the Reactor Coolant System. APPLICABILITY: MODES 1, 2, 3 and 4 ACTION: a. With any PRESSURE BOUNDARY LEAKAGE or with primary-to-secondary leakage not within limits, be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours. b. With any Reactor Coolant System leakage greater than any one of the above limits, excluding PRESSURE BOUNDARY LEAKAGE or primary-to-secondary leakage, reduce the leakage rate to within limits within 4 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
	SRO	Enters LCO 3.4.6.2 Action B
Lead Examiner may cue next event when Tech Specs have been addressed.		

SQN	RCS LEAK AND LEAK SOURCE IDENTIFICATION	AOP-R.05 Rev. 14

APPENDIX I

ESTIMATING RCS LEAK RATE USING CVCS FLOW BALANCE

NOTE 1 This method is recommended when leak requires rise in charging flow greater than ~10 gpm. Appendix J is more accurate for smaller leak rates.

NOTE 2 This appendix assumes RCS temperature and charging flow are approximately constant.

	INITIAL	FINAL	CHANGE
PZR Level			[1] (negative for level decrease)
Time			[2]
Charging Flow	[3]		
Letdown Flow	[4]		
Total RCP Seal Return Flow	[5]		

Pressurizer Level Conversion

Pressurizer level change ____ % (step [1] above) X conversion factor 62 gal / % ÷ Time Change ____ min (step [2] above) = Pzr Level Rate of Change (positive for level rising) ____ gpm [6]

Leak Rate Calculation

Charging Flow ____ (step [3] above) − Letdown Flow ____ (step [4] above) − Seal Return Flow ____ (step [5] above) − Pzr Level Rate of Change ____ (step [6] above) + Instrument error correction factor 3 gpm = RCS Leak Rate ____ gpm

SQN	RCS LEAK AND LEAK SOURCE IDENTIFICATION	AOP-R.05 Rev. 14

APPENDIX J
ESTIMATING RCS LEAK RATE USING VCT AND PZR LEVEL

CAUTION **This appendix CANNOT be used during VCT makeup, boration, or dilution.**

NOTE This appendix assumes RCS temperature is approximately constant.

	VCT LEVEL (%)	PZR LEVEL (%)	TIME (min)
INITIAL			
FINAL			
CHANGE	[1] (positive for level decrease)	[2] (positive for level decrease)	[3]

VCT Level Conversion

VCT level change		conversion factor		Time Change		VCT Level Rate of Change (positive for level lowering)
____ %	X	20 gal / %	÷	____ min	=	____ gpm
step [1] above				step [3] above		[4]

Pressurizer Level Conversion

Pressurizer level change		conversion factor		Time Change		Pzr Level Rate of Change (positive for level lowering)
____ %	X	62 gal / %	÷	____ min	=	____ gpm
step [2] above				step [3] above		[5]

Leak Rate Calculation

VCT Level Rate of Change		Pzr Level Rate of Change		RCS Leak Rate
step [4] above	+	step [5] above	=	____ gpm

Op Test No.: NRC 2012-302 Scenario # 3 Event # 4 Page 25 of 48

Event Description: PT-1-33 develops a slow failure, the BOP will manually close the the Steam Dumps using AOP-S.05

Time	Position	Applicant's Actions or Behavior

Simulator Operator: When directed, initiate Event 4 PT-1-33 Slow Failure

Alarms

1-M-5

- **5A C-6 "TS-68-2P/Q REAC COOL LOOPS T REF T AUCT HIGH-LOW"**

Indications

1-M-4

- **SG STEAM FLOW** indicating increasing flow.

Time	Position	Applicant's Actions or Behavior

TS-68-2P/Q
REAC COOL LOOPS
T REF T AUCT
HIGH-LOW

[1] **COMPARE** plant indicators to verify validity of alarm.

NOTE 1 IF annunciation is an expected response during the performance of 1-RT-MOD-520-003.0, *20% Load Step Change*, rods should be left in AUTO.

NOTE 2 IF a rapid load reduction is in progress and automatic rod control is functional, AOP-C.03 allows reducing turbine load rate prior to placing rod control in manual.

[2] **IF** AOP-C.03, *Rapid Shutdown or Load rejection,* is in progress, **THEN**
[a] REFER to AOP-C.03 guidance for rod control operation.
[b] GO TO step **[4].**

[3] **IF** controls are in AUTO when alarm occurs, **THEN**
PLACE rod control system (1-HS-85-5110) in manual and match Tavg with Tref.

[4] **IF** rod control system is malfunctioning, or there is indication of a failure of the Tref signal to the rod control system, **THEN**
GO TO AOP-C.01, *Rod Control System Malfunctions.*

[5] **IF** a boron concentration change is suspected, **THEN**
GO TO AOP-C.02, *Uncontrolled RCS Boron Concentration Changes.*

[6] **IF** a steam line or feedwater line break or leak is suspected, **THEN**
GO TO AOP-S.05, *Steam Line or Feedwater Line Break/Leak.*

[7] **IF** Tavg channel failed, **THEN**
GO TO AOP-I.02, *RCS Loop RTD Instrument Malfunction.*

Examiner Note: Several steps, notes, and cautions in the Annunciator response procedure do not apply to this failure. Only those that are applicable are listed in this event guide.

Op Test No.: NRC 2012-302 Scenario # 3 Event # 4 Page 26 of 48

Event Description: PT-1-33 develops a slow failure, the BOP will manually close the the Steam Dumps using AOP-S.05

Time	Position	Applicant's Actions or Behavior
	ATC	Responds to alarm using ARP 1-AR-M5A, A6 or M-6A-E2
	BOP	Places PIC-1-33, STEAM DUMP PRESSURE CONTROL to MANUAL and reduce output or places HS-1-103A and 103B Steam Dump FSV to OFF based on prudent operations actions.
	SRO	Transitions to AOP-S.05, Steam Or Feedwater Leak
	SRO	1. **MONITOR** personnel safety: a. **IF** steam or feedwater lines need to be immediately isolated to protect personnel, **THEN** **PERFORM** the following:
	BOP	2. **MONITOR** steam generator levels STABLE on program.
	BOP	3. **CHECK** the following: • S/G atmospheric relief valves CLOSED • steam dumps CLOSED. **IF** any S/G atmospheric relief valve or steam dump is leaking or failed open, **THEN** **CLOSE** valve(s) **USING** MCR switch.
	BOP	Places PIC-1-33, STEAM DUUMP PRESSURE CONTROL to MANUAL and reduce output or places HS-1-103A and 103B Steam Dump FSV to OFF.

Lead Examiner may cue next event when Steam Dumps are closed or if the Reactor trips.

Op Test No.: NRC 2012-302	Scenario # 5	Event # 5	Page 27 of 48
Event Description: Large Break LOCA/Failure of Phase B to Actuate.			

Time	Position	Applicant's Actions or Behavior
Simulator Operator: When directed, initiate Event 5 Loop #2 LOCA-To Require Rx Trip and Safety Injection.		
Indications available: **1-M-4:** • **1-LI-68-339A, 335A, 320A, RCS PZR LEVEL indicators trending down (<5%)** **1-M-5:** • **1-PR-68-340, RCS PZR PRESS Recorder trending down;** • **1-LR-68-339, RCS PZR LEVEL Recorder trending down;** **1-M-6:** • **1-LI-62-129, VCT LEVEL Indicator trending down w/ VCT M-U in progress;** • **1-PI-68-62, RCS HL Press WR indicator trending to actuation pressure value.** • **1-PI-68-69, RCS HL Press WR indicator trending to actuation pressure value.** • **1-PDI-30-42, 43, 44, 45, CNTMT PRESSURE WIDE RANGE Indicators trending up (1.5 psi-SI Actuation)**		
	SRO	Direct Manual Reactor Trip and Safety Injection based on one of several monitor steps in AOP-R.05 for either Pressurizer level, Containment Pressure or RCS Pressure.
	ATC	Manually Trip the Reactor and Initiate SI.
	SRO	Enter and Direct performance of E-0, Reactor Trip Or Safety Injection.
Examiner Note: following IOA performance, prior to Steps 1-4 immediate action verification, ATC/BOP surveys MCBs for any expected automatic system response that failed to occur. Upon discovery, they may take manual action(s) to align plant systems as expected for the event in progress. (Ref. EPM-4, Prudent Operator Actions)		
Examiner Note: MONITOR status trees, the crew will implement status tree monitoring via ICS. When a RED or ORANGE path status tree is observed, the SRO will designate one of the Board operators (typically the BOP) to verify status tree conditions using 1-FR-0, UNIT 1 STATUS TREES. Once verified, the SRO should direct the crew to transition to the appropriate RED and/or ORANGE path procedure(s).		

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Event Description: Large Break LOCA/Failure of Phase B to Actuate.

Time	Position	Applicant's Actions or Behavior
	CREW	Performs the first four steps of E-0 unprompted.
	SRO	Directs performance of E-0
NOTE 1	Steps 1 through 4 are immediate action steps.	
NOTE 2	This procedure has a foldout page.	
CRITICAL TASK	BOP	Places HS-30-64A and 64B Phase B and CNTMT Vent Isol to ACTUATE as a prudent operator action.
	ATC	1. **VERIFY** reactor TRIPPED: • Reactor trip breakers OPEN • Reactor trip bypass breakers DISCONNECTED or OPEN • Rod bottom lights LIT • Rod position indicators less than or equal to 12 steps. • Neutron flux DROPPING
	BOP	2. **VERIFY** turbine TRIPPED: • Turbine stop valves CLOSED.
	BOP	3. **VERIFY** at least one 6.9KV shutdown board ENERGIZED on this unit.
	ATC	4. **DETERMINE** if SI actuated: • ECCS pumps RUNNING. • Any SI alarm LIT [M-4D].
	BOP	5. **PERFORM** ES-0.5, Equipment Verifications WHILE continuing in this procedure.
	SRO/ATC	Continue with the performance of E-0 REACTOR TRIP OR SAFETY INJECTION
	BOP	Performs ES-0.5, Equipment Verifications go to page 42 for details
	SRO	Addresses foldout page, see next page for details.
	ATC	Manually places HS 68-8A, 31A, 50A, and 73A RCP's to STOP based on FOP actions.

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Event Description: Large Break LOCA/Failure of Phase B to Actuate.

FOLDOUT PAGE

RCP TRIP CRITERIA

IF any of the following conditions occurs:

- RCS pressure less than 1250 psig **AND** at least one CCP or SI pump running
  OR
- Phase B isolation,

THEN
STOP all RCPs.

EVENT DIAGNOSTICS

- **IF** any S/G pressure is dropping uncontrolled, **THEN**
  PERFORM the following:

  a. **CLOSE** MSIVs and MSIV bypass valves.

  b. **IF** any S/G pressure continues to drop uncontrolled, **THEN**
  PERFORM the following:

  1) **ENSURE** SI actuated.

  2) **IF** at least one S/G is intact (S/G pressure controlled or rising),
  THEN
  ISOLATE AFW to faulted S/G(s):

  - **CLOSE** AFW level control valves for faulted S/G(s)
  - **IF** any AFW valve for faulted S/G CANNOT be CLOSED, **THEN**
  PERFORM Appendix E, Isolating AFW to Faulted S/G.

  3) **ENSURE** at least one of the following conditions met:
  - total AFW flow greater than 440 gpm
  OR
  - Narrow Range level greater than 10% [25% ADV] in at least one intact S/G.

- **IF** both trains of shutdown boards de-energized, **THEN**
  GO TO ECA-0.0, Loss of All AC Power.

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.

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Event Description: Large Break LOCA/Failure of Phase B to Actuate.

Time	Position	Applicant's Actions or Behavior
	ATC	6. **DETERMINE** if secondary heat sink available: a. **CHECK** total AFW flow greater than 440 gpm. b. **CHECK** narrow range level greater than 10% [25% ADV] in at least one S/G. b. **MAINTAIN** total feed flow greater than 440 gpm UNTIL narrow range level greater than 10% [25% ADV] in at least one S/G. c. **CONTROL** feed flow to maintain narrow range level between 10% [25% ADV] and 50% in intact or ruptured S/Gs.
	ATC/BOP	Manually controls AFW flow to maintain total AFW flow greater than 440 gpm until S/G are greater than 25% NR.
	ATC	7. **CHECK** if main steam lines should be isolated: a. **CHECK** if any of the following conditions have occurred: • Any S/G pressure less than 600 psig **OR** • Any S/G pressure dropping UNCONTROLLED **OR** • Phase B actuation. a. **GO TO** Step 8.

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Event Description: Large Break LOCA/Failure of Phase B to Actuate.

Time	Position	Applicant's Actions or Behavior
	ATC	8. **CHECK** RCP trip criteria: a. **CHECK** the following: • RCS pressure less than 1250 psig **AND** • At least one CCP **OR** SI pump RUNNING. b. **STOP** RCPs.
	ATC	Manually places HS 68-8A, 31A, 50A, and 73A RCP's to STOP if not already performed.
	ATC/BOP	9. **MONITOR** RCS temperatures: • **IF** any RCP running, **THEN** **CHECK** T-avg stable at or trending to between 547°F and 552°F. **OR** • **IF** RCPs stopped, **THEN** **CHECK** T-cold stable at or trending to between 547°F and 552°F. **IF** temperature less than 547°F and dropping, **THEN** **PERFORM** the following: a. **ENSURE** steam dumps and atmospheric reliefs CLOSED. b. **IF** cooldown continues, **THEN** **CONTROL** total feed flow: 1) **ENSURE** total AFW flow less than or equal to 600 gpm. 2) **MAINTAIN** total AFW flow greater than 440 gpm UNTIL narrow range level is greater than 10% [25% ADV] in at least one S/G. c. **IF** cooldown continues after AFW flow is controlled, **THEN** **CLOSE** MSIVs and MSIV bypass valves.

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Event Description: Large Break LOCA/Failure of Phase B to Actuate.

Time	Position	Applicant's Actions or Behavior
	ATC/BOP	Manually controls AFW flow to maintain total AFW flow greater than 440 gpm and less than 600 gpm until S/G are greater than 25% NR.
	ATC	10. **CHECK** pressurizer PORVs, safeties, and spray valves: a. Pressurizer PORVs CLOSED. b. Pressurizer safety valves CLOSED. c. Normal spray valves CLOSED. d. Power to at least one block valve AVAILABLE. e. At least one block valve OPEN.
	ATC	11. **DETERMINE** if S/G secondary pressure boundaries are INTACT: • **CHECK** all S/G pressures CONTROLLED or RISING. • **CHECK** all S/G pressures greater than 140 psig.
	ATC	12. **DETERMINE** if S/G tubes are INTACT: • All S/G narrow range levels CONTROLLED or DROPPING • Secondary radiation NORMAL **USING** Appendix A, Secondary Rad Monitors. (App. A performed in ES-0.5).
	ATC	13. **DETERMINE** if RCS is INTACT: • Containment pressure NORMAL • Containment sump level NORMAL • LOWER COMPT TEMP HIGH alarm DARK. [M-5C, B1] • Containment radiation NORMAL **USING** Appendix B, Containment Rad Monitors. (App. B performed in ES-0.5) **PERFORM** the following: a. **INITIATE** ES-0.5 Appendix D, Hydrogen Mitigation Actions. b. **MONITOR** status trees. c. **GO TO** E-1, Loss of Reactor or Secondary Coolant.

Examiner Note: MONITOR status trees, the crew will implement status tree monitoring via SPDS. When a RED or ORANGE path status tree is observed, the SRO will designate one of the Board operators (typically the BOP) to verify status tree conditions using **1-FR-0, UNIT 1 STATUS TREES**. Once verified, the SRO should direct the crew to transition to the appropriate RED and/or ORANGE path procedure(s).

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Event Description: Large Break LOCA/Failure of Phase B to Actuate.

Time	Position	Applicant's Actions or Behavior
When an ORANGE Path for Containment is evident on SPDS, the SRO will transition to FR-Z.1, go to page 38 for details When a RED Path is for PTS evident on SPDS, the SRO will transition to FR-P.1, go to page 40 for details		
E-1, LOSS OF REACTOR OR SECONDARY COOLANT		
NOTE This procedure has a foldout page. See next page for details		
	ATC	1. **CHECK** RCP trip criteria: a. **CHECK** the following: • At least one CCP **OR** SI pump RUNNING **AND** • RCS pressure less than 1250 psig. a. **GO TO** Step 2. b. **STOP** RCPs.
	ATC	Manually places HS 68-8A, 31A, 50A, and 73A RCP's to STOP if not already performed.
	BOP	2. **CHECK** S/G secondary pressure boundaries INTACT: • S/G pressures CONTROLLED or RISING • S/G pressures greater than 140 psig.
	BOP	3. **MAINTAIN** Intact S/G narrow range levels: a. Greater than 10% [25% ADV]. b. Between 10% [25% ADV] and 50%.

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Event Description: Large Break LOCA/Failure of Phase B to Actuate.			

FOLDOUT PAGE

RCP TRIP CRITERIA

IF any of the following conditions occurs:

- RCS pressure less than 1250 psig **AND** at least one CCP or SI pump running
  OR
- Phase B isolation,

THEN
STOP all RCPs.

SI REINITIATION CRITERIA

IF any 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
RAISE ECCS flow by performing one or both of the following as necessary:

- **ESTABLISH** CCPIT flow **USING** Appendix C
- **START** CCPs or SI pumps manually.

EVENT DIAGNOSTICS

- **IF** both trains of shutdown boards de-energized,
  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,
  THEN
  GO TO E-2, Faulted Steam Generator Isolation.
- **IF** any S/G has level rising in uncontrolled manner or has abnormal radiation,
  THEN:
  a. **RAISE** ECCS flow by performing one or both of the following as necessary:
     - **ESTABLISH** CCPIT flow **USING** Appendix C
     - **START** CCPs or SI pumps manually.
  b. **GO TO** E-3, Steam Generator Tube Rupture.

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.

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Event Description: Large Break LOCA/Failure of Phase B to Actuate.

Time	Position	Applicant's Actions or Behavior
	ATC	4. **VERIFY** secondary radiation NORMAL: a. **CHECK** secondary radiation NORMAL **USING** Appendix A, Secondary Rad Monitors. b. **NOTIFY** Chem Lab to take S/G activity samples. c. **WHEN** Chem Lab is ready to sample S/Gs, **THEN** **PERFORM** the following: 1) **ENSURE** FCV-15-43 Blowdown Flow Control valve CLOSED. 2) **ENSURE** Phase A RESET. 3) **OPEN** blowdown isolation valves. d. **NOTIFY** RADCON to survey main steam lines and S/G blowdown. e. **WHEN** S/G samples completed, **THEN** **CLOSE** blowdown isolation valves.
CAUTION		**Any time a pressurizer PORV opens, there is a possibility that it may stick open.**
	ATC	5. **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, 480V 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.

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Event Description: Large Break LOCA/Failure of Phase B to Actuate.

Time	Position	Applicant's Actions or Behavior
	ATC	6. **MONITOR** SI termination criteria: a. RCS subcooling based on core exit T/Cs greater than 40°F. — a. **GO TO** Step 7.
Examiner Note: When alarm M6E-E4 is on the crew will transition to ES-1.3 Transfer To RHR Containment Sump		
		LS-63-50A RWST LVL LO **Corrective Actions** [1] IF SIS has occurred with RWST level decreasing to ~ 27%, THEN **PERFORM** ES-1.3, *Transfer to RHR Containment Sump,* as applicable.
	SRO	Transitions to ES-1.3 Transfer To RHR Containment Sump.
	CREW	1. **SUSPEND** FRP implementation.
	ATC	2. **DETERMINE** if containment spray should be stopped: a. **CHECK** any containment spray pump RUNNING. b. **ENSURE** the following: • one Cntmt Spray pump in PULL-TO-LOCK • remaining Cntmt Spray pump RUNNING. d. **MONITOR** one cntmt spray pump RUNNING and delivering flow.
CRITICAL TASK	ATC	Places the A **OR** B Containment Spray 1-HS-72-27A or 1-HS-72-10A handswitch in PULL-TO-LOCK.

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Event Description: Large Break LOCA/Failure of Phase B to Actuate.

Time	Position	Applicant's Actions or Behavior
Examiner Note: If Containment pressure is less 2.0 psig than then go to step 2c RNO.		
Examiner Note: If Containment pressure is still greater than 2.0 psig, then go to step 2 d		
	ATC	2. **DETERMINE** if containment spray should be stopped: c. **CHECK** containment pressure greater than or equal to 2.0 psig. c. **PERFORM** the following: 1) **RESET** containment spray signal. 2) **ENSURE** both cntmt spray pumps STOPPED and **PLACE** in A-AUTO. 3) **CLOSE** cntmt spray discharge valves FCV-72-39 and FCV-72-2. 4) **GO TO** Step 3.
	ATC	Places both Containment Spray reset pushbuttons 1-HS-72 43 and 1-HS-72 42 to RESET.
	ATC	Places the remaining running Containment Spray Pump handswitch to STOP, both Containment Spray Pump handswitches to A-AUTO, places Containment Spray discharge valve handswitches FCV-72-39 and FCV-72-2 to close and proceeds to step 3.
	ATC	2. **DETERMINE** if containment spray should be stopped: d. **MONITOR** one cntmt spray pump RUNNING and delivering flow.
Scenario may be terminated when the crew completes ES-1.3 step 2 or earlier, at discretion of Lead Examiner.		

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Event Description: Large Break LOCA/Failure of Phase B to Actuate.

Time	Position	Applicant's Actions or Behavior
FR-Z.1 Actions		
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.
	ATC/BOP	1. **MONITOR** RWST level greater than 27%.
	ATC/BOP	2. **VERIFY** Phase B valves CLOSED: • Panel 6K PHASE B GREEN • Panel 6L PHASE B GREEN.
	ATC/BOP	3. **ENSURE** RCPs STOPPED.
	ATC/BOP	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.
	ATC/BOP	5. **VERIFY** containment spray operation: 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. c. **CHECK** RWST level greater than 27%.

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Event Description: Large Break LOCA/Failure of Phase B to Actuate.

Time	Position	Applicant's Actions or Behavior
	ATC/BOP	5. d. **VERIFY** containment spray suction ALIGNED to RWST: • FCV-72-22 OPEN • FCV-72-21 OPEN. e. **VERIFY** containment spray discharge valves OPEN: • FCV-72-39 • FCV-72-2. f. **VERIFY** containment spray recirc valves CLOSED: • FCV-72-34 • FCV-72-13. g. **VERIFY** containment spray flow greater than 4750 gpm on each train.
	ATC/BOP	6. **MONITOR** containment air return fans: • **WHEN** at least 10 minutes have elapsed from Phase B, **THEN** **ENSURE** containment air return fans RUNNING.
	ATC/BOP	7. **VERIFY** containment ventilation dampers CLOSED: • Panel 6K CNTMT VENT GREEN • Panel 6L CNTMT VENT GREEN.
	ATC/BOP	8. **VERIFY** Phase A valves CLOSED: • Panel 6K PHASE A GREEN • Panel 6L PHASE A GREEN.
	ATC/BOP	9. **VERIFY** cntmnt vacuum relief isolation valves CLOSED: [Pnl 6K MANUAL] • FCV-30-46 • FCV-30-47 • FCV-30-48.
	ATC/BOP	10. **VERIFY** MSIVs and MSIV bypass valves CLOSED.

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Event Description: Large Break LOCA/Failure of Phase B to Actuate.

Time	Position	Applicant's Actions or Behavior
	ATC/BOP	11. **DETERMINE** if any S/G Intact: a. **CHECK** at least one S/G pressure: • CONTROLLED or RISING **AND** • Greater than 140 psig.
CAUTION		**Isolating all S/Gs will result in a loss of secondary heat sink.**
	ATC/BOP	12. **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 13.
	ATC/BOP	13. **MONITOR** if RHR spray should be placed in service: a. **CHECK** the following: • Containment pressure greater than 9.5 psig a. **GO TO** Step 14.
	ATC/BOP	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.
	ATC/BOP	15. **RETURN TO** procedure and step in effect. **END**
FR-P.1 Actions		
	ATC/BOP	1. **MONITOR** RWST level greater than 27%.

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Event Description: Large Break LOCA/Failure of Phase B to Actuate.

Time	Position	Applicant's Actions or Behavior
	ATC/BOP	2. **MONITOR** CST level greater than 5%.
	ATC/BOP	3. **CHECK** RCS pressure greater than 300 psig. **IF** any of the following conditions exist: • RHR injection flow on FI-63-91A or FI-63-92A greater than 1000 gpm **OR** • both RHR pumps STOPPED **AND** sump recirc capability has been lost **THEN** **RETURN TO** procedure and step in effect.
	SRO	Transitions to E-1 (go to page 33).

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Event Description: Equipment Verifications

Time	Position	Applicant's Actions or Behavior
ES-0.5 Actions		
	BOP	1. **VERIFY** D/Gs RUNNING.
	BOP	2. **VERIFY** D/G ERCW supply valves OPEN.
	BOP	3. **VERIFY** at least four ERCW pumps RUNNING.
	BOP	4. **VERIFY** CCS pumps RUNNING: • Pump 1A-A (2A-A) • Pump 1B-B (2B-B) • Pump C-S.
	BOP	5. **VERIFY** EGTS fans RUNNING.
	BOP	Places 0-HS-65-23A and/or 0-HS-65-42A to START.
	BOP	6. **VERIFY** generator breakers OPEN.
	BOP	7. **NOTIFY** at least two AUOs to report to MCR to be available for local actions.
	BOP	8. **VERIFY** AFW pumps RUNNING: a. MD AFW pumps b. TD AFW pump.
NOTE	AFW level control valves should NOT be repositioned if manual action has been taken to control S/G levels, to establish flow due to failure, or to isolate a faulted S/G.	

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Event Description: Equipment Verifications

Time	Position	Applicant's Actions or Behavior
	BOP	9. **CHECK** AFW valve alignment: a. **VERIFY** MD AFW LCVs in AUTO. b. **VERIFY** TD AFW LCVs OPEN. c. **VERIFY** MD AFW pump recirculation valves FCV-3-400 and FCV-3-401 CLOSED.
	BOP	10. **VERIFY** MFW Isolation: a. **CHECK** MFW pumps TRIPPED. b. **ENSURE** the following: • MFW regulating valves CLOSED • MFW regulating bypass valve controllers in MANUAL with output ZERO • MFW isolation valves CLOSED.
	BOP	Manually closes Feed Reg Valves.
	BOP	11. **MONITOR** ECCS operation: a. **VERIFY** ECCS pumps RUNNING: • CCPs • RHR pumps • SI pumps b. **VERIFY** CCP flow through CCPIT. c. **CHECK** RCS pressure less than 1500 psig.

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Event Description: Equipment Verifications

Time	Position	Applicant's Actions or Behavior
		d. **VERIFY** SI pump flow. e. **CHECK** RCS pressure less than 300 psig. e. **GO TO** Step 12. f. **VERIFY** RHR pump flow.
	BOP	12. **VERIFY** ESF systems ALIGNED: a. Phase A ACTUATED: • PHASE A TRAIN A alarm LIT [M-6C, B5]. • PHASE A TRAIN B alarm LIT [M-6C, B6]. b. Cntmt Vent Isolation ACTUATED: • CNTMT VENT ISOLATION TRAIN A alarm LIT [M-6C, C5]. • CNTMT VENT ISOLATION TRAIN B alarm LIT [M-6C, C6]. c. Status monitor panels: • 6C DARK • 6D DARK • 6E LIT OUTSIDE outlined area • 6H DARK • 6J LIT. d. Train A status panel 6K: • CNTMT VENT GREEN • PHASE A GREEN e. Train B status panel 6L: • CNTMT VENT GREEN • PHASE A GREEN

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Event Description: Equipment Verifications

Time	Position	Applicant's Actions or Behavior
	BOP	13. **MONITOR** for containment spray and Phase B actuation: a. **CHECK** for any of the following: • Phase B ACTUATED **OR** • Containment pressure greater than 2.8 psig. b. **VERIFY** containment spray INITIATED: 1) Containment spray pumps RUNNING. 2) Containment spray header isolation valves FCV-72-39 and FCV-72-2 OPEN. 3) Containment spray recirculation valves to RWST FCV-72-34 and FCV-72-13 CLOSED. 4) Containment spray header flow greater than 4750 gpm per train. 5) Panel 6E LIT.
		c. **VERIFY** Phase B ACTUATED: • PHASE B TRAIN A alarm LIT [M-6C, A5]. • PHASE B TRAIN B alarm LIT [M-6C, A6]. d. **ENSURE** RCPs STOPPED. e. **VERIFY** Phase B valves CLOSED: • Panel 6K PHASE B GREEN. • Panel 6L PHASE B GREEN. f. **WHEN** 10 minutes have elapsed, **THEN** **ENSURE** containment air return fans RUNNING.
CRITICAL TASK	BOP	Places HS-30-64A and 64B Phase B and CNTMT Vent Isol to ACTUATE

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Event Description: Equipment Verifications

Time	Position	Applicant's Actions or Behavior
NOTE	The continuous action in Step 14 remains applicable if containment pressure rises above 1.5 psig after ES-0.5 is completed.	
	BOP	14. **MONITOR** if containment vacuum relief isolation valves should be closed: a. **CHECK** containment pressure greater than 1.5 psig. — a. **GO TO** Step 15.
	BOP	15. **CHECK** secondary and containment rad monitors **USING** the following: • Appendix A, Secondary Rad Monitors • Appendix B, Containment Rad Monitors.
		APPENDIX A **SECONDARY RAD MONITORS** 1. **IF** SI occurred on Unit 1, **THEN** **CHECK** following rad monitors including available trends prior to isolation: • Condenser exhaust recorder 1-RR-90-119 • S/G blowdown recorder 1-RR-90-120 • Unit 1 Main steam line rad monitors [1-M-30] • Post-Accident rad recorder 1-RR-90-268B points 3 (blue), 4 (violet), 5 (black), and 6 (turquoise). [1-M-31 (back of 1-M-30)] 3. **NOTIFY** Unit Supervisor whether secondary radiation is NORMAL or HIGH.

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Event Description: Equipment Verifications

Time	Position	Applicant's Actions or Behavior
	BOP	**APPENDIX B** **CONTAINMENT RAD MONITORS** 1. **IF** SI occurred on Unit 1, **THEN** **CHECK** following rad monitors: • Upper containment post-accident rad monitors 1-RM-90-271A and 1-RM-90-272A NORMAL [1-M-30] • Lower containment post-accident rad monitors 1-RM-90-273A and 1-RM-90-274A NORMAL [1-M-30] • Containment rad recorders 1-RR-90-112 and 1-RR-90-106 NORMAL [0-M-12] (prior to isolation).
	BOP	16. **WHEN** directed by E-0, **THEN** **PERFORM** Appendix D, Hydrogen Mitigation Actions.
	BOP	17. **CHECK** pocket sump pumps STOPPED: [M-15, upper left corner] • HS-77-410, Rx Bldg Aux Floor and Equipment Drain Sump pump A • HS-77-411, Rx Bldg Aux Floor and Equipment Drain Sump pump B.
	BOP	18. **DISPATCH** personnel to perform EA-0-1, Equipment Checks Following ESF Actuation.
	BOP	19. **ENSURE** plant announcement has been made regarding Reactor Trip and SI.
	BOP	20. **PERFORM** Appendix E, Spent Fuel Cooling Actions, as time permits.

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Event Description: Critical Task

Critical Tasks:	Critical Task Statement
1.	Manually initiate a Phase B isolation prior to completing ES-0.5 step 13.
2.	Manually stop one Containment Spray Pump prior to completing ES-1.3 step 2