Facility: **Wolf Creek** Date of Examination: **Dec 2019**

Examination Level: RO ☒ SRO ☐ Operating Test Number: ____________

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	R,N	**A1 - 2.1.25 [3.9**] Determine dilution volume to stabilize power 1 hour after power reduction.
Conduct of Operations	R,D	**A2 - 2.1.20 [4.6]** Determine Final Accumulator Pressure per OFN EJ-015.
Equipment Control	R,N	**A3 - 2.2.13 [4.1]** Develop a Clearance Order for ‘B’ Containment Cooler.
Radiation Control	R,D	**A4 – 2.3.13 [3.2]** Determine maximum allowed dose per EPP 06-013 and calculate stay time.

NOTE: All items (five total) are required for SROs. RO applicants require only four items unless they are retaking only the administrative topics (which would require all five items).

* Type Codes and Criteria:
4 (C)ontrol room, (S)imulator, or **Class(R)oom**
2 (D)irect from bank (**≤ 3 for ROs**; ≤ 4 for SROs and RO retakes)
2 (N)ew or (M)odified from bank (**≥ 1**)
0 (P)revious 2 exams (**≤ 1**, randomly selected)

Facility: Wolf Creek   Date of Examination: Dec 2019

Examination Level: RO ☐ SRO ☒   Operating Test Number: ______

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	R, N	**A5 - 2.1.37 [4.6]** Given Data and completed 1/M plot during a reactor startup, review and determine any required follow-up actions.
Conduct of Operations	R, M	**A6 - 2.1.25 [4.2]** Given a completed STS SF-002, review and determine any related Technical Specification required actions.
Equipment Control	R, N	**A7 – 2.2.13 [4.3]** Given a prepared Clearance Order for 'B' Containment Cooler (SGN01B), review for approval and identify any errors.
Radiation Control	R, M	**A8 – 2.3.6 [3.8]** Given a prepared LRW Radioactive Release permit, review for approval and identify any errors.
Emergency Plan	R, N	**A9 – 2.4.41 [4.6]** Given plant conditions, classify the event and determine Protective Action Recommendation.

NOTE: All items (five total) are required for SROs. RO applicants require only four items unless they are retaking only the administrative topics (which would require all five items).

* Type Codes and Criteria:
5 (C)ontrol room, (S)imulator, or **Class(R)oom**
0 (D)irect from bank (≤ 3 for ROs; **≤ 4 for SROs** and RO retakes)
3/2 (N)ew or (M)odified from bank (**≥ 1**)
0 (P)revious 2 exams (**≤ 1**, randomly selected)

Facility: WCNOC

Task No: ___________

Task Title: Calculate dilution volume to stabilize power 1 hour after power reduction.

Job Performance Measure No: A1

K/A Reference: 2.1.25 (3.9) Ability to interpret reference materials, such as graphs, curves, tables, etc.

Examinee: ______________________

NRC Examiner: ______________________

Start: ___________ Stop: ____________

Date: ______________________

Result: Satisfactory / Unsatisfactory

Examiner Signature: ______________________

Method of testing: Simulated Performance ____ Actual Performance X

Classroom X Simulator __________ Plant ________

Initial Conditions:	Reactor and Turbine Power have been reduced to 90% at 1%/min due to a steam leak in the Turbine Building. OFN MA-038, RAPID PLANT SHUTDOWN, was used to reduce power. RCS boron concentration is 1420 ppm after the power reduction, T_{avg} is 580ºF and stable. Curator is unavailable for database upgrades.				
Initiating Cue:	The Control Room Supervisor directs you to determine the required dilution amount for one hour after the power reduction.				
Task Standard:	Applicant completes calculation and determined 322.5 +/- 0.5 gallons of water is necessary for the dilution				
Required Materials:	1. WCRX-028, CONTROL ROOM OPERATING CURVES AND TABLE REFERENCE MANUAL, page 7.10 2. WCRX-01, BORATION DILUTION TABLES				
References:	WCRX-28, CONTROL ROOM OPERATING CURVES AND TABLE REFERENCE MANUAL, page 7.10 WCRX-01, BORATION DILUTION TABLES				
Time Critical:	No	Alternate Path:	No	Validation Time:	20 min

START TIME: _______

JPM STEP / PROCEDURE STEP Ȼ - CRITICAL STEP	CUE	STANDARD
1. Applicant refers to Curves and tables book, page 7.10, reactivity Plan for Rapid Downpower		Applicant locates table for Dilution During 1 h Following Reduction **S / U**
2. Dilution ppm required		Applicant referenced the table section for a 1%/min power reduction to 90% and determined 7.0 ppm is required **S / U**
3. ȻCorrect table located in Boron Dilution tables		Applicant used the Boron-Dilution tables and determined T_{avg} to be 580°F for 90% and went to page 154/192 for the correct table **S / U**
4. ȻDilution volume required	**<u>CUE:</u> The JPM is complete.** <u>RECORD STOP TIME BELOW.</u> **<u>Examiner Note:</u> Margin is +/- 0.5 gallons to allow for Applicant to interpolate 5 ppm addition after 2 ppm addition changes boron concentration**	Applicant determined from Boron-Dilution tables that the 2 and 5 ppm values will be used at 1420 initial boron concentration 2 ppm = 92.1 gal of Water 5 ppm = 230.4 gal of Water 92.1 + 230.4 = 322.5 +/- 0.5 gal of Water **S / U**

Terminating cue: The JPM Is complete when the Applicant calculates the amount of water required for the dilution

STOP TIME: _______

Initial Conditions: Reactor and Turbine Power have been reduced to 90% at 1%/min due to a steam leak in the Turbine Building. OFN MA-038, RAPID PLANT SHUTDOWN, was used to reduce power. RCS boron concentration is 1420 ppm after the power reduction, T_{avg} is 580°F and stable. Curator is unavailable for database upgrades

Initiating Cue: The Control Room Supervisor directs you to determine the required dilution amount for one hour after the power reduction

Water Volume Required: ______________________

Facility: WCNOC Task No: ___________

Task Title: Determine Final Accumulator Pressure per OFN EJ-015 Job Performance Measure No: A2

K/A Reference: 2.1.20 (4.6) Ability to interpret and execute procedure steps

Examinee: ____________________ NRC Examiner: ____________________

Start: ___________ Stop: ___________ Date: ____________________

Result: Satisfactory / Unsatisfactory Examiner Signature: ____________________

Method of testing: Simulated Performance ____ Actual Performance X

Classroom X Simulator ________ Plant ________

Initial Conditions:	The unit was stable in MODE 5, at mid-loop, with ‘B’ Train RHR operating when a loss of RCS level occurred. Narrow Range RCS level is <+5 inches. The crew entered OFN EJ-015, LOSS OF RHR COOLING and are preparing to inject Accumulators ‘B’ and ‘C’ to cool the core. RCS Pressure is 5 psig, initial pressure and volume for both accumulators is as follows: ‘B’ SI Accumulator – 612 psig and 47% level ‘C’ SI Accumulator – 620 psig and 51% level				
Initiating Cue:	The Control Room Supervisor directs you to determine final accumulator pressures per OFN EJ-015, LOSS OF RHR COOLING, steps E1 through E4				
Task Standard:	Applicant determined final pressure for ‘B’ and ‘C’ Accumulators per OFN EJ-015, LOSS OF RHR COOLING, steps E1 through E4				
Required Materials:	1. OFN EJ-015, LOSS OF RHR COOLING, ATTACHMENT E				
References:	OFN EJ-015, LOSS OF RHR COOLING				
Time Critical:	No	Alternate Path:	No	Validation Time:	10 min

START TIME: _______

JPM STEP / PROCEDURE STEP Ͼ - CRITICAL STEP	CUE	STANDARD
1. **Step E1.a:** E1. Check if SI Accumulators are Available: a. Check Accumulator Pressures – ANY GREATER THAN RCS PRESSURE b. Check Accumulator Levels – ANY GREATER THAN 0%		Applicant referred to the initial conditions and determined that ‘B’ & ‘C’ accumulator pressures are above RCS pressure **S / U**
2. **Step E1.b:** b. Check Accumulator Levels ANY GREATER THAN 0%		Applicant referred to the initial conditions and determined that ‘B’ & ‘C’ accumulator levels are greater than 0% **S / U**
3. **NOTE:** Initial accumulator pressure and level refer to current accumulator conditions		Applicant read and understood NOTE, place kept and proceeded to the next step **S / U**
4. Ͼ**Step E2.a:** E2. Determine Initial Accumulator Pressure: a. Record initial accumulator pressure (P) in table below:		Applicant records initial accumulator pressure (P) for both ‘B’ & ‘C’ in the table provided Acc. B = **612 psig** Acc. C = **620 psig** **S / U**

5.	☞**Step E2.b:** b. Convert initial pressure (P) to absolute pressure (P1) and record in table above		Applicant converts initial accumulator pressure (P) for both 'B' & 'C' accumulator to absolute pressure (P1) and records in the table provided $P_1 = P + 14.7$ Acc. B = 612 +14.7 = **626.7 psia** Acc. C = 620 +14.7 = **634.7 psia** **S / U**
6.	☞**Step E3.a:** E3. Determine Initial Accumulator Volume: a. Record initial accumulator level (L) in table below		Applicant records initial accumulator level (L) for both 'B' & 'C' in the table provided Acc. B = **47%** Acc. C = **51%** **S / U**

7. **<u>Step E3.b:</u>** b. Convert initial level (L) to initial water volume (Vw) in gallons and record in table above		Applicant converts initial accumulator level (L) for both 'B' & 'C' accumulator to initial water volume (Vw) and records in the table provided Vw = (L x 8.52) + 5931 Acc. B = (47 x 8.52) + 5931 = **6331.44 gallons** Acc. C = (51 x 8.52) +5931 = **6365.52 gallons** **S / U**
8. **<u>Step E3.c:</u>** c. Convert initial water volume (Vw) to initial gas volume (V1) and record in table above		Applicant converts initial water volume (Vw) for both 'B' & 'C' accumulator to initial gas volume (V1) and records in table provided V1 = 10223 – Vw Acc. B = 10223 - 6331.44 = **3891.56 gallons** Acc. C = 10223 – 6365.52 = **3857.48 gallons** **<u>Acceptable range:</u>** B – 3890 – 3894 gallons C – 3856 – 3860 gallons **S / U**

9. **<u>Step E4.a:</u>** E4. Determine Final Accumulator Pressure a. Determine final accumulator pressure (P2) in psia and record in table below:		Applicant determined final accumulator pressure (P2) for both 'B' & 'C' accumulators and records in table provided P2 = P1 x (V1 / 10223) Acc. B = 626.7 x (3891.56/10223) = **238.56 psia** Acc. C = 634.7 x (3857.48/10223) = **239.49 psia** **<u>Acceptable range:</u>** B – 236 – 240 psia C – 237 – 243 psia **S / U**

10. **<u>Step E4.b:</u>** b. Convert final pressure (P2) to minimum pressure (Pm) in psig and record in table above		Applicant determined minimum accumulator pressure (Pm) for both 'B' & 'C' accumulators and records in table provided Pm = P2 – 14.7 Acc. B = 238.56 – 14.7 = **223.86 psig** Acc. C = 239.49 – 14.7 = **224.79 psig** **<u>Acceptable range:</u>** B – 220 – 226 psig C – 221 – 227 psig **S / U**
11. Notify the CRS that final accumulator pressure has been determined	**<u>CUE:</u> The JPM is complete.** <u>RECORD STOP TIME BELOW.</u>	

Terminating cue: The JPM Is complete when the applicant has calculated final pressure in the 'B' & 'C' accumulators

STOP TIME: _______

Initial Conditions: The unit was stable in MODE 5, at mid-loop, with ‘B’ Train RHR operating when a loss of RCS level occurred. Narrow Range RCS level is <+5 inches. The crew entered OFN EJ-015, LOSS OF RHR COOLING and are preparing to inject Accumulators ‘B’ and ‘C’ to cool the core.

RCS Pressure is 5 psig, initial pressure and volume for both accumulators is as follows:

- ‘B’ SI Accumulator – 612 psig and 47% level
- ‘C’ SI Accumulator – 620 psig and 51% level

Initiating Cue: The Control Room Supervisor directs you to determine final accumulator pressures per OFN EJ-015, LOSS OF RHR COOLING, steps E1 through E4

Facility: WCNOC Task No: ___________

Task Title: Develop a Clearance for ‘B’ Containment Cooler. Job Performance Measure No: A3

K/A Reference: 2.2.13 (4.1) Knowledge of tagging and clearance procedures

Examinee: ____________________ NRC Examiner: ____________________

Start: ___________ Stop: ____________ Date: ____________________

Result: Satisfactory / Unsatisfactory Examiner Signature: ____________________

Method of testing: Simulated Performance _____ Actual Performance X

Classroom X Simulator __________ Plant ________

Initial Conditions:	The unit is in MODE 1, 100% power. The ‘B’ Containment Cooler (SGN01B) needs to be tagged out for hydrostatic testing				
Initiating Cue:	Due to computer problems, ESOMS IS NOT AVAILABLE. The Control Room Supervisor directs you to determine the Clearance Order boundary while ESOMS is unavailable DETERMINE the required clearance order item(s), the instructions from the planner are to “Isolate cooling and prevent fan rotation” On the attached worksheet, RECORD the REQUIRED ITEM(S), and the required HANG POSITION				
Task Standard:	**Applicant identified mechanical/electrical isolation:** 1: GN HIS-9, Containment Cooler Fan B Control Switch 2: NG00208, Containment Cooler Fan B Feeder Breaker 3: GNV0002, Containment Cooler B, ESW Outlet Flow Control Valve 4: GNV0040, Containment Cooler B, ESW Supply Isolation				
Required Materials:	1. M-12BL01, P&ID Reactor Makeup Water System 2. M-12GN01, P&ID Containment Cooling System 3. E-13GN02A, Schematic Diagram Containment Cooler Fans B & D 4. E-13NG01A, Low Voltage Class IE 480V 2-Line M&R 5. APF 21E-001-01, Clearance Order 6. APF 21E-001-02, Clearance Order Continuation Sheet 7. AFP 21E-001-06, Work Package Task Addition Sheet 8. APF 21E-001 -11, Clearance Order Summary Sheet				
References:	AP 21E-001, CLEARANCE ORDERS				
Time Critical:	No	Alternate Path:	No	Validation Time:	30 min

START TIME: _______

JPM STEP / PROCEDURE STEP Ȼ - CRITICAL STEP	CUE	STANDARD
1. Refer to the provided prints	**<u>IF</u>** Applicant asks for a work order or clearance order work sheet (COW), **<u>THEN,</u>** **<u>CUE:</u>** All information listed on these documents are included in the initiating cue	Applicant referred to the following provided drawings: o M-12BL01, P&ID Reactor Makeup Water System o M-12GN01, P&ID Containment Cooling System o E-13GN02A, Schematic Diagram Containment Cooler Fans B & D o E-13NG01A, Low Voltage Class IE 480V 2-Line M&R **S / U**
2. Ȼ Determine Mechanical isolation points for Containment Cooler 'B'	**<u>Examiner Note:</u>** • Applicant may identify additional isolation points, including vents and drain valves which exceed minimum requirements. • Component Description column is NOT required to be filled out.	Applicant determines the following valves must be placed in the CLOSED position at a **minimum**: **GNV0002** – 'B' Containment Cooler, ESW Outlet Flow Control Valve **GNV0040** – 'B' Containment Cooler, ESW Supply Isolation **S / U**

JPM STEP / PROCEDURE STEP Ꞓ - CRITICAL STEP	CUE	STANDARD
3. Ꞓ Determine Electrical isolation for Containment Cooler 'B'	**Examiner Note:** Applicant may also include sequence, but this exceeds minimum requirements of this JPM	Applicant determines the following breaker must be OPENED and RACKED OUT **NG00208** – 'B' Containment Cooler Feeder Breaker Applicant determines the following control switch must be placed in PULL-TO-LOCK position at a minimum **GN HIS-9** – 'B' Containment Cooler Fan Control Switch **S / U**
4. Notify the CRS that the clearance is complete	**CUE: The JPM is complete.** RECORD STOP TIME BELOW.	

Terminating cue: The JPM Is complete when the Applicant makes notification that the clearance is complete

STOP TIME: _______

Initial Conditions: The unit is in MODE 1, 100% power. The ‘B’ Containment Cooler (SGN01B) needs to be tagged out for hydrostatic testing

Initiating Cue: Due to computer problems, ESOMS IS NOT AVAILABLE. The Control Room Supervisor directs you to determine the Clearance Order boundary while ESOMS is unavailable

DETERMINE the required clearance order item(s), the instructions from the planner are to “Isolate cooling and prevent fan rotation”

On the attached worksheet, RECORD the REQUIRED ITEM(S), and the required HANG POSITION

Facility: WCNOC Task No: ___________

Task Title: Determine maximum allowed dose per EPP 06-013 and calculate stay time.

Job Performance Measure No: A4

K/A Reference: 2.3.13 (3.2) Knowledge of radiation exposure limits under normal or emergency conditions

Examinee: ______________________ NRC Examiner: ______________________

Start: ___________ Stop: ____________ Date: ______________________

Result: Satisfactory / Unsatisfactory Examiner Signature: ______________________

Method of testing: Simulated Performance ____ Actual Performance X

Classroom X Simulator __________ Plant ________

Initial Conditions:	The unit tripped due to a Small Break Loss of Coolant Accident. Fuel damage has occurred and a Site Area Emergency has been declared. Conditions are continuing to degrade. Your total dose for the year is 1350 mR.				
Initiating Cue:	You have volunteered to assist the Shift Manager. The Shift Manager has asked you to make a Containment entry to determine if debris is blocking Mini-Purge damper GT HZ-041 and if the Mini-Purge line inside containment can be isolated. Radiation Protection reports dose rates are 6 R/hr in the area requiring access. What is the MAXIMUM dose TEDE you are allowed for this entry, and what is the maximum stay time				
Task Standard:	Applicant determined MAXIMUM exposure is 10 REM and the stay time is 1.67 hours or 100 minutes.				
Required Materials:	1. EPP-06-013, EXPOSURE CONTROL AND PERSONNEL PROTECTION				
References:	EPP-06-013, EXPOSURE CONTROL AND PERSONNEL PROTECTION				
Time Critical:	No	Alternate Path:	No	Validation Time:	5 min

START TIME: _______

JPM STEP / PROCEDURE STEP Ⓒ - CRITICAL STEP	CUE	STANDARD
1. Administrative limits do not apply		Applicant determines from precautions and limitations that administrative limits are not in effect during an emergency and does not apply the 1350 mR to the calculation **S / U**
2. Ⓒ MAXIMUM dose allowed		Applicant determined per Attachment A, Corrective or Protective actions = 10 REM TEDE **S / U**
3. Ⓒ Calculate maximum stay time	**<u>CUE:</u> The JPM is complete.** <u>RECORD STOP TIME BELOW.</u>	Applicant calculated stay time based on radiation levels and MAXIMUM allowed dose 10 R / 6 R/hr = 1.67 hour 1.67 hour x 60 min/hr = 100 min **S / U**

Terminating cue: The JPM Is complete when the Applicant determines maximum required dose and stay time

STOP TIME: _______

Initial Conditions: The unit tripped due to a Small Break Loss of Coolant Accident. Fuel damage has occurred and a Site Area Emergency has been declared. Conditions are continuing to degrade. Your total dose for the year is 1350 mR.

Initiating Cue: You have volunteered to assist the Shift Manager. The Shift Manager has asked you to make a Containment entry to determine if debris is blocking Mini-Purge damper GT HZ-041 and if the Mini-Purge line inside containment can be isolated.

Radiation Protection reports dose rates are 6 R/hr in the area requiring access. What is the MAXIMUM dose TEDE you are allowed for this entry, and what is the maximum stay time

MAXIMUM DOSE: ____________________

MAXIMUM stay time: ___________________

Facility: WCNOC

Task No: ___________

Task Title: Given Data and completed 1/M plot during a reactor startup, review and determine any required follow-up actions.

Job Performance Measure No: A5

K/A Reference: 2.1.37 (4.6) Knowledge of procedures, guidelines, or limitations associated with reactivity management

Examinee: ______________________

NRC Examiner: ______________________

Start: ___________ Stop: ___________

Date: ______________________

Result: Satisfactory / Unsatisfactory

Examiner Signature: ______________________

Method of testing: Simulated Performance _____ Actual Performance X

Classroom X Simulator ________ Plant ________

Initial Conditions:	The unit is in Hot Standby following a forced outage at middle of core life. The Crew is performing a reactor startup in accordance with GEN 00-003, HOT STANDBY TO MINIMUM LOAD.
Initiating Cue:	As the Control Room Supervisor review the completed 1/M plot and determine and any/all follow up actions. The following data was used during the startup: Maximum rod height — Bank D at 81 steps Estimated critical position — Bank D at 29 steps Minimum rod height — Bank C at 72 steps Initial Count rate — 520 cps Source Range NI-31 response to rod withdrawal (see table below)
Task Standard:	Applicant reviewed the completed 1/M plot, determined critical rod position at ~60 steps on Control Group 'C,' BELOW minimum rod height (Bank C at 72 steps). Determined follow up actions: • INFORM Reactor Engineering • MAINTAIN stable Reactor Conditions • ENSURE control rod positions and RCS boron concentration are correct • CALCULATE another estimated critical position, using STS RE-002, DETERMINATION OF ESTIMATED CRITICAL POSITION

Source Range NI-31 response to rod withdrawal

Rod Position	A50	A100	B35	B85	B135
Channel NI 31	SR 31	SR 31	SR 31	SR 31	SR 31
Final Counts (Cf)	592	735	852	1120	2600

Required Materials:	1. GEN 00-003, HOT STANDBY TO MINIMUM LOAD 2. Completed GEN 00-003, FIGURE 1, 1/M Plot				
References:	GEN 00-003, HOT STANDBY TO MINIMUM LOAD				
Time Critical:	No	Alternate Path:	No	Validation Time:	20 min

START TIME: _______

JPM STEP / PROCEDURE STEP Ͼ - CRITICAL STEP	CUE	STANDARD
1. Applicant reviews data entered matched data obtained during the startup		Applicant ensured data entered into 1/M plot was accurate **S / U**
2. Applicant calculates 1/M and determines critical rod position		Applicant determines calculations are correct and estimated critical positions are accurate **S / U**
3. ϾApplicant determines follow up actions	**<u>CUE:</u> The JPM is complete.** <u>RECORD STOP TIME BELOW.</u>	Applicant determined that estimated critical position is BELOW minimum rod height (BANK C at 72 steps) AND Count rate has doubled 592 x 2 = 1184 counts Documents actions required per step E.22.5.3 of GEN 00-003 **S / U**

Terminating cue: The JPM Is complete when the Applicant has completed the review and determined follow up actions

STOP TIME: _______

Initial Conditions: The unit is in Hot Standby following a forced outage at middle of core life. The Crew is performing a reactor startup in accordance with GEN 00-003, HOT STANDBY TO MINIMUM LOAD.

Initiating Cue: As the Control Room Supervisor, review the completed 1/M plot and document any/all follow up actions. The following data was used during the startup:

Maximum rod height	Bank D at 81 steps
Estimated critical position	Bank D at 29 steps
Minimum rod height	Bank C at 72 steps
Initial Count rate	520 cps

Source Range NI-31 response to rod withdrawal

Rod Position	A50	A100	B35	B85	B135
Channel NI 31	SR 31	SR 31	SR 31	SR 31	SR 31
Final Counts (Cf)	592	735	852	1120	2600

Follow up actions, if any:

____

____

____

____

____

____

____

____

____

____

____

Facility: WCNOC

Task No: ___________

Task Title: Given a completed STS SF-002, review and determine any related Technical Specification required actions.

Job Performance Measure No: A6

K/A Reference: 2.1.25 (4.2) Ability to interpret reference materials, such as graphs, curves, tables, etc.

Examinee: ___________________________

NRC Examiner: ___________________________

Start: ___________ Stop: ____________

Date: ___________________________

Result: Satisfactory / Unsatisfactory

Examiner Signature: ______________________

Method of testing:

Simulated Performance ____ Actual Performance X

Classroom X Simulator ________ Plant ________

Initial Conditions:	A unit downpower to 90% has just been completed due to the loss of a Main Condensate Pump Core life is 20,142 MWD/MTU NPIS became unavailable following the downpower at 1950. A Reactor Operator has performed STS SF-002, CORE AXIAL FLUX DIFFERENCE. STN RJ-001, VERIFICATION OF COMPUTER OPERABILITY PROCESSES, is being performed at 2116.
Initiating Cue:	Review the completed STS SF-002, CORE AXIAL FLUX DIFFERENCE to verify Technical Specification and Technical Requirements compliance.
Task Standard:	Applicant determined that the Reactor Operator failed to recognize two of the NIs are out of acceptable band in the COLR and that Technical Specification LCO 3.2.3, Condition A applies.
Required Materials:	1. Completed STS SF-002 2. CORE OPERATING LIMIT REPORT (COLR) 3. Technical Specifications

References:	STS SF-002, CORE AXIAL FLUX DIFFERENCE CORE OPERATING LIMIT REPORT (COLR) Technical Specification 3.2.3, Condition A				
Time Critical:	No	Alternate Path:	No	Validation Time:	10 min

START TIME: _______

JPM STEP / PROCEDURE STEP C - CRITICAL STEP	CUE	STANDARD
1. Review completed surveillance		Applicant reviewed steps in procedure and reviewed completion of table in Attachment A, Axial Flux Difference Log **S / U**
2. CDetermine two Nis are unacceptable (NI 41B and NI 42B)		From COLR Figure 2.5, Applicant determined that SE NI-41B and SE NI-42B are UNACCEPTABLE by plotting points on the graph OR By calculating max power range flux: Limit: (29-15)/50% = 0.28/% 0.28/% x 40% = 11.2 At 90%: -29 + 11.2 = -17.8 maximum power range flux difference **S / U**
3. CDetermine LCO 3.2.3, Condition 'A' applies (Reduce power to within 30 minutes to less than 50%)	**CUE: The JPM is complete.** RECORD STOP TIME BELOW.	Applicant determined LCO 3.2.3, Condition A, AFD not within limits, applies. **Required Action:** reduce thermal power to <50% rated thermal power **S / U**

Terminating cue: The JPM Is complete when the Applicant has completed the review and determined Technical Specification applicability

STOP TIME: _______

Initial Conditions: A unit downpower to 90% has just been completed due to the loss of a Main Condensate Pump

Core life is 20,142 MWD/MTU

NPIS became unavailable following the downpower at 1950.

A Reactor Operator has performed STS SF-002, CORE AXIAL FLUX DIFFERENCE.

STN RJ-001, VERIFICATION OF COMPUTER OPERABILITY PROCESSES, is being performed at 2116.

Initiating Cue: Review the completed STS SF-002, CORE AXIAL FLUX DIFFERENCE to verify Technical Specification and Technical Requirements compliance

Technical Specification and Technical Requirements Compliance: Yes / No

Applicable Conditions (if any) and actions required:

____

____

____

____

Facility: WCNOC

Task No: ____________

Task Title: Given a prepared Clearance Order for 'B' Containment Cooler (SGN01B), review for approval and identify any errors.

Job Performance Measure No: A7

K/A Reference: 2.2.13 (4.3): Knowledge of tagging and clearance procedures

Examinee: ________________________ NRC Examiner: ________________________

Start: ____________ Stop: ____________ Date: ________________________

Result: Satisfactory / Unsatisfactory Examiner Signature: ________________________

Method of testing: Simulated Performance ____ Actual Performance X

Classroom X Simulator ________ Plant ________

Initial Conditions:	The unit is operating at 100% power. The 'B' Containment Cooler (SGN01B) needs to be tagged out for hydrostatic testing.
Initiating Cue:	Review the completed Clearance Order (CO) proposal for approvals as the Tagging Authority per AP 21E-001, CLEARANCE ORDERS. 1. Identify ALL errors on the CO Tag List, if any, and record on the Cue Sheet. 2. Circle **Approve** or **Disapprove** on the Cue Sheet. The Clearance Order Checklist and the Clearance Order Cover Sheet are provided for REFERENCE ONLY.
Task Standard:	Applicant identified the three critical errors, and disapproves the clearance order per AP 21E-001, CLEARANCE ORDERS. 1. Identify Sequencing Error, GN HIS-9, Containment Cooler Fan B Control Switch must be taken to PTL position prior to racking out NG00208 breaker.

	2. Identify Mechanical Isolation Error, Valve GNV0056 should be CLOSED instead of OPEN. 3. Identify Mechanical Isolation Error, for ESW isolation, Valve GNV0008 should be GNV0040.
Required Materials:	1. M-12BL01, P&ID Reactor Makeup Water System 2. M-12GN01, P&ID Containment Cooling System 3. E-13GN02A, Schematic Diagram Containment Cooler Fans B & D 4. E-13NG01A, Low Voltage Class IE 480V 2-Line M&R 5. Clearance Order Coversheet 6. Clearance Order Tag List 7. APF 21E-001-15, CLEARANCE ORDER CHECKLIST
References:	M-12BL01, P&ID Reactor Makeup Water System M-12GN01, P&ID Containment Cooling System E-13GN02A, Schematic Diagram Containment Cooler Fans B & D E-13NG01A, Low Voltage Class IE 480V 2-Line M&R AP 21E-001, CLEARANCE ORDER

Time Critical:	No	Alternate Path:	No	Validation Time:	20 min

START TIME: _______

JPM STEP / PROCEDURE STEP C - CRITICAL STEP	CUE	STANDARD
1. C Review clearance order for correct component sequencing		Applicant reviews clearance order for correct component sequencing. **Identify correct clearance order:** **1. GN HIS-9, Containment Cooler Fan B Control Switch - needs to be taken to PTL prior to racking NB00208 breaker.** Other clearance order priority may exist and be identified. **S / U**
2. C Review clearance order for correct Placement Configuration		Applicant identified GNV0056 is in the incorrect position **The CO Tag List identifies GNV0056 in the open position and it should be closed** **S / U**
3. C Review clearance order for correct mechanical isolation		Applicant identified GNV0004 is not correct for isolation **The CO Tag List identifies GNV0008 for DANGER tag isolation and it should be GNV0040** **S / U**

JPM STEP / PROCEDURE STEP **C** - CRITICAL STEP	CUE	STANDARD
4. **C** Approve or Disapprove Clearance Order	**CUE: The JPM is complete.** RECORD STOP TIME BELOW.	Circle Disapprove **S / U**

Terminating cue: The JPM Is complete when the Applicant has completed identifying and recording errors and determining approval or disapproval status

STOP TIME: ______

Initial Conditions: The unit is operating at 100% power. The ‘B’ Containment Cooler (SGN01B) needs to be tagged out for hydrostatic testing.

Initiating Cue: Review the completed Clearance Order (CO) proposal for approvals as the Tagging Authority per AP 21E-001, CLEARANCE ORDERS.

1. Identify ALL errors on the CO Tag List, if any, and record on the Cue Sheet.

2. Circle **Approve** or **Disapprove** on the Cue Sheet.

The Clearance Order Checklist and the Clearance Order Cover Sheet are provided for REFERENCE ONLY.

APPROVE / DISAPPROVE

Facility: WCNOC

Task No: ___________

Task Title: Given a prepared LRW Radioactive Release permit, review for approval and identify any errors.

Job Performance Measure No: A8

K/A Reference: 2.3.6 (3.8) Ability to approve release permits.

Examinee: ______________________ NRC Examiner: ______________________

Start:__________ Stop: ____________ Date: ________________________

Result: Satisfactory / Unsatisfactory Examiner Signature: ______________________

Method of testing: Simulated Performance ____ Actual Performance X

Classroom X Simulator _________ Plant _______

Initial Conditions:	The unit is operating at 100% power. Preparation are being made to release Secondary Liquid Waste Monitor Tank, THF04B.				
Initiating Cue:	As the Shift Manager, review the provided Secondary Liquid Waste Monitor Tank B (THF04B) Release Permit. Identify ALL errors, if any, and specify whether or not you would authorize this release				
Task Standard:	Applicant reviewed a prepared release permit and identified the following errors and circle "Not Authorized:" 1. In RELEASE CONDITIONS Section, Expected Monitor Response (HFL456) is greater than the Low Setpoint. 2. In AUTHORIZATION/RELEASE DATA SECTION, Check Source Test has not been completed				
Required Materials:	1. Completed APF 07B-001-02-13.				
References:	AI 07B-019, INSTRUCTIONS FOR LIQUID RELEASE PERMITS				
Time Critical:	No	Alternate Path:	No	Validation Time:	15 Min

START TIME: __________

JPM STEP / PROCEDURE STEP Ͼ - CRITICAL STEP	CUE	STANDARD
1. Ͼ Reviews the presented APF 07B-001-02-13 THF04 Release Permit for authorization. RELEASE CONDITIONS Section.		Applicant identified that the Expected Monitor Response (HFL456) is higher than the Low Setpoint **S / U**
2. Ͼ Reviews the presented AFP 07B-001-02-13 THF04 Release Permit for authorization. AUTHORIZATION / RELEASE DATA Section		Applicant identified Check Source Test has not been completed **S / U**
3. Ͼ Release Authorization	**<u>CUE:</u> The JPM is complete.** <u>RECORD STOP TIME BELOW.</u>	Applicant determined based on the errors identified to NOT authorize the release **S / U**

Terminating cue: The JPM Is complete when the Applicant authorizes/does not authorize the Release and any/all errors have been identified

STOP TIME: ______

Initial Conditions: The unit is operating at 100% power. Preparation are being made to release Secondary Liquid Waste Monitor Tank, THF04B.

Initiating Cue: As the Shift Manager, review the provided Secondary Liquid Waste Monitor Tank 'B' (THF04B) Release Permit. Identify ALL errors, if any, and specify whether or not you would authorize this release. Record ALL errors, if any, in the space provided below

Release permit is (CIRCLE ONE):

Authorized / NOT Authorized

Facility: WCNOC

Task No: ___________

Task Title: Given plant conditions, classify the event and determine Protective Action Recommendation.

Job Performance Measure No: A9

K/A Reference: 2.4.41 (4.6) Knowledge of emergency action level thresholds and classifications

Examinee: ________________________ NRC Examiner: ________________________

Start: ____________ Stop: ____________ Date: ________________________

Result: Satisfactory / Unsatisfactory Examiner Signature: ________________________

Method of testing: Simulated Performance ____ Actual Performance X

Classroom X Simulator ________ Plant ________

Initial Conditions:	The unit was operating at 100% power, when a tornado passed through the Wolf Creek Switchyard. Conditions as follows: • A complete loss of off-site power occurred. • ‘A’ Emergency Diesel Generator is tagged out for governor replacement. • ‘B’ Emergency Diesel Generator came up to speed and immediately tripped, two unsuccessful attempts have been made to restart it. • The Control Room Supervisor has declared an ELAP condition. • No RED or ORANGE path conditions exist • Meteorological Conditions: Stability Class = D, Wind at 10 mph, Wind from 150^{o} to 330^{o}

Initiating Cue:	THIS IS A TIME CRITCIAL JPM As the Shift Manager, 1. Determine Emergency Classification. Once classification is determined, present to examiner for time critical action assessment. 2. Once handed EPF 06-007-02, WCGS IMMEDIATE EMERGENCY NOTIFICATION, correctly (without errors) complete the form to include identifying the correct Protective Action Recommendations, if any				
Task Standard:	Applicant determines a General Emergency exists per APF 06-002-02 / 03, EMERGENCY ACTION LEVELS TECHNICAL BASIS / EAL CLASSIFICATION MATRIX. Applicant classified SG1.1 and made Protective action Recommendation to Evacuate JRR, CCL, and CTR				
Required Materials:	1. EPP 06-005, EMERGENCY CLASSIFICATION 2. EPP 06-006, PROTECTIVE ACTION RECOMMENDATIONS 3. APF 06-002-03, EAL CLASSIFICATION MATRIX 4. APF 06-002-02, EMERGENCY ACTION LEVELS TECHNICAL BASIS 5. EPF 06-007-02, WCGS IMMEDIATE EMERGENCY NOTIFICATION				
References:	EPP 06-001, CONTROL ROOM OPERATIONS EPP 06-005, EMERGENCY CLASSIFICATION EPP 06-006, PROTECTIVE ACTION RECOMMENDATIONS APF 06-002-03, EAL CLASSIFICATION MATRIX APF 06-002-02, EMERGENCY ACTION LEVELS TECHNICAL BASIS EPF 06-007-02, WCGS IMMEDIATE EMERGENCY NOTIFICATION				
Time Critical:	Yes	Alternate Path:	No	Validation Time:	15 min

START TIME: ________

JPM STEP / PROCEDURE STEP Ͼ - CRITICAL STEP	CUE	STANDARD
1. Record Time T-0 when cue sheet is provided.	**<u>Cue:</u>** (Hand Applicant the cue sheet) Time Critical Action starts Now. **<u>Examiner Note:</u>** Record Time T-0 (Start Time) when cue sheet provided to Applicant. Time T-0____________	**<u>Examiner Note:</u>** Time Zero (T-0) for the 15 minute requirement to complete the declaration begins when the cue sheet is provided
2. ϾPer EPP 06-005, APF 06-002-02 and APF 06-002-03, determine correct Emergency Classification.	**<u>Examiner Note:</u>** When the Applicant determines Emergency Classification, Record Time T-1 (Classification Time) Time T-1 ____________	Applicant determines classification is a GENERAL EMERGENCY SG1.1 **S / U**
3. ϾApplicant Classified within the required time frame.	**<u>Examiner:</u>** Record Classification time. T1 - T0 = __________min	**<u>Examiner Note:</u>** The Applicant must classify correctly within **15 minutes** from Start Time to meet Time Critical Action for Classification. **S / U**

JPM STEP / PROCEDURE STEP Ͼ - CRITICAL STEP	CUE	STANDARD
4. Record Time T-2 when second cue and notification worksheet is provided.	**Cue:** (Hand Applicant the second cue sheet and notification form) Time Critical Action starts Now. **Examiner:** Record Time T-2 (Start Time) when cue sheet and blank form provided to Applicant. Time T-2__________	**Examiner Note:** Time T-2 for the 15 minute requirement to complete the Notification Form begins when the cue sheet and blank form is provided. Applicant completed the Immediate Emergency Notification form, with the following attributes completed accurately: (KEY provided) o Message # o Actual or Drill appropriately indicated. o Code Word o Date and Time of Classification – correct for event o Emergency Classification – correct level o Stability Class o Wind Speed o Wind Direction o Release data – correct for conditions o Appropriate PAR for event **S / U**

JPM STEP / PROCEDURE STEP C - CRITICAL STEP	CUE	STANDARD
5. C Applicant completed Immediate Emergency Notification Form within the required time frame.	**Examiner:** Record Notification time. T3 - T2 = __________min **CUE: The JPM is complete.** RECORD STOP TIME BELOW.	**Examiner Note:** The Applicant must fill out Emergency Notification Form, with PARs, correctly within **15 minutes** from Classification Time to meet Time Critical Action for Notification. **S / U**

Terminating cue: The JPM Is complete when the Applicant has classified the event and completed the Immediate Notification form to include PARs

STOP TIME: ______

Initial Conditions:

The unit was operating at 100% power, when a tornado passed through the Wolf Creek Switchyard. Conditions as follows:

- A complete loss of off-site power occurred.
- ‘A’ Emergency Diesel Generator is tagged out for governor replacement.
- ‘B’ Emergency Diesel Generator came up to speed and immediately tripped, two unsuccessful attempts have been made to restart it.
- The Control Room Supervisor has declared an ELAP condition.
- No RED or ORANGE path conditions exist
- Meteorological Conditions: Stability Class = D, Wind at 10 mph, Wind from 150^o to 330^o

1st Initiating Cue:

THIS IS A TIME CRITCIAL JPM

As the Shift Manager, determine Emergency Classification. Once classification is determined, present to the examiner for time critical action assessment.

Record the Emergency Classification in the space provided below:

Emergency Classification: ____________________________

2nd Initiating Cue:

THIS IS A TIME CRITICAL JPM

Once handed a blank EPF 06-007-02, WCGS IMMEDIATE EMERGENCY NOTIFICATION, correctly (without errors) complete the form with the previously identified information to include identification of the correct Protective Action Recommendations (PARs), if any.

Facility: **Wolf Creek** Date of Examination: **Dec 2019**

Exam Level: RO ☒ SRO-I ☒ SRO-U ☒ Operating Test Number: ____

Control Room Systems * 8 for RO, 7 for SRO-I, and 2 or 3 for SRO-U

System/JPM Title	Type Code*	Safety Function
S1 Perform a Manual Dilution per SYS BG-200 to maintain temperature during startup.	**L, M, S**	**1**
S2 Manually align Containment Spray per EMG E-0, ATT F, Step F12 [Previous use on 2017 NRC S6]	**A, D, E, EN, P, S**	**5**
S3 Establish Hot Leg Recirculation per EMG ES-13.	A, E, EN, N, S	2
S4 Start up ‘A’ Train CCW and transfer Service Loop per SYS EG-201, Section 6.1	N, S	8
S5 Cycle PORV Block Valve per STS BB-201A, Section 8.1	D, L, S	3
S6 Restore AFW after LSP Actuation per ALR 00-127A	A, D, E, EN, S	4S
S7 Restore RCP Cooling per OFN BB-005	A, D, E, S	4P
S8 Change RM11 Process Rad Monitor Setpoint	*M, S*	*9*

In-Plant Systems:* 3 for RO, 3 for SRO-I, and 3 or 2 for SRO-U

System/JPM Title	Type Code*	Safety Function
P1 Line up ‘A’ EDG for Autostart per SYS KJ-121, Section 6.1	**A, D, EN**	**6**
P2 Open Reactor Trip Breakers as directed by EMG FR-S1	**E, N, R**	**7**
P3 Locally close valves to Isolate RCP Seals per EMG C-0, Step 16.	**D, E, R**	**4P**

* All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions, all five SRO-U systems must serve different safety functions, and in-plant systems and functions may overlap those tested in the control room.

* Type Codes	Criteria for **RO** /SRO-I/SRO-U

(A)lternate path **5**	**4–6**/4–6 /2–3
(C)ontrol room	
(D)irect from bank **6**	≤ **9**/≤ 8/≤ 4
(E)mergency or abnormal in-plant **6**	≥ **1**/≥ 1/≥ 1
(EN)gineered safety feature **4**	≥ **1**/≥ 1/≥ 1 (control room system)
(L)ow-Power/Shutdown **2**	≥ **1**/≥ 1/≥ 1
(N)ew or (M)odified from bank including 1(A) **5**	≥ **2**/≥ 2/≥ 1
(P)revious 2 exams **1**	≤ **3**/≤ 3/≤ 2 (randomly selected)
(R)CA **2**	≥ **1**/≥ 1/≥ 1
(S)imulator **8**	

S1: The unit in MODE 2 at approximately 4% power. The applicant is tasked with performing a manual dilution in accordance with the Reactivity Plan. The applicant must correctly operate the Chemical and Volume Control System to add 120 gallons of water to the Volume Control Tank in accordance with SYS BG-200, REACTOR MAKEUP CONTROL SYSTEM NORMAL OPERATION, Step 6.2.

S2: A Large Break LOCA resulted in a Reactor Trip and Safety Injection Actuation. The applicant is tasked with performing EMG E-0, REACTOR TRIP OR SAFETY INJECTION, Attachment F, to verify proper automatic actuations. The applicant must recognize the ‘A’ Train of Containment Spray System failed to Auto Actuate and take proper action manually align the system for operation per step F12.

S3: The unit is aligned for Cold Leg Recirculation due to a Large Break LOCA and Safety Injection Actuation, which occurred 10 hours earlier. The applicant is tasked with performing Steps 1-8 of EMG ES-13, TRANSFER HOT LEG RECIRCULATION. During performance of this task, EJ HV-8840, RHR HOT LEG RECIRC VLV, will not open. The applicant must re-align the Residual Heat Removal System for Cold Leg Recirculation while proceeding to align the Safety Injection System for Hot Leg Recirculation.

S4: The unit operating at 100% power with Yellow Train equipment in service when corrective maintenance on the ‘A’ Centrifugal Charging Pump is complete and a post-maintenance test run is required. The applicant is tasked with starting up the ‘A’ Train of Component Cooling Water System and transferring the Service Loop to the ‘A’ train per SYS EG-201, TRANSFERRING SUPPLY OF CCW SERVICE LOOP AND CCW TRAIN SHUTDOWN, Step 6.1, to support the ‘A’ Centrifugal Charging pump run.

S5: The unit is in MODE 2 at approximately 4% power. The applicant is tasked to perform an operability test of the ‘B’ Power Operated Relief Valve Block Valve per STS BB-201A, CYCLE TEST OF PORV BLOCK VALVE.

S6: A Tornado has gone through the protected area causing a Unit Trip and damage to the Condensate Water Storage Tank. The applicant is tasked with performing ALR 00-127A, AFP SUCT PRESS LO. While performing this task, the applicant will discover the ‘A’ Train of Low Suction Pressure failed to actuate, requiring the applicant to manually align ESW to the ‘A” MD AFW Pump Suction.

S7: The unit is operating at 100% power when the crew entered OFN BB-005, RCP MALFUNCTIONS due to numerous alarms associated with the Reactor Coolant Pump thermal barriers. The applicant is tasked with performing Steps 7 & 8. The applicant will discover that one of the Component Cooling Water containment isolation valves has closed, requiring the action to bypass the valve to restore flow before Reactor Coolant Pump trip criteria is met

S8: The unit is operating at 100% power, when Chemistry issued a Gas Release Permit which requires a change to the Radwaste Effluent Radiation Monitor setpoints. The applicant is tasked to change the setpoint per given release permit, APF 07B-001-11-07, and SYS SP-121, OPERATION OF THE G.A. MONITOR SYSTEM, Step 6.3.

P1: The unit is in MODE 4, and a surveillance run of the ‘A’ Emergency Diesel Generator has just been completed. The applicant is tasked with aligning the ‘A’ Emergency Diesel Generator for automatic operation per SYS KJ-121, DIESEL GENERATOR NE01 AND NE02 LINEUP FOR AUTOMATIC OPERATION, Step 6.1. The applicant will discover that the lockout relays will require manual reset and that the Engine Driven Jacket Water Pump Air isolation must be opened to properly align the Emergency Diesel Generator for Automatic Operation.

P2: A Turbine Trip occurred from 100% power, but the Reactor failed to trip in both Automatic and Manual. The crew is performing EMG FR-S1, RESPONSE TO NUCLEAR POWER GENERATION/ATWS. The applicant is tasked to locally open the Reactor Trip and Bypass Breakers. The applicant will locate and open the breakers.

P3: The unit tripped due to a complete loss of AC power and the crew is responding per EMG C-0, LOSS OF ALL AC POWER. The applicant is tasked with performing EMG C-0, Step 16 to isolate the Reactor Coolant Pump Seals. The applicant will enter the RCA to locate and close the five valves specified in the procedure step.

Facility: WCNOC Task No: ___________

Task Title: Perform manual dilution per SYS BG-200 to maintain temperature during startup.

Job Performance Measure No: S1

K/A Reference: 004/A4.07 (3.9/3.7): Ability to manually operate and/or monitor in the control room: Boration/dilution

Examinee: ____________________ NRC Examiner: ____________________

Start: ________ Stop: ________ Date: ____________________

Result: Satisfactory / Unsatisfactory Examiner Signature: ____________________

Method of testing: Simulated Performance ____ Actual Performance X

Classroom ________ Simulator X Plant ________

Initial Conditions:	Power ascension is in progress following a Reactor Startup. The Unit is in MODE 2, Reactor power is ~4%. Per the Reactivity Maneuver Plan, 420 gallons of water will need to be added over the next hour.				
Initiating Cue:	The Control Room Supervisor directs you to add 120 gallons of water at 80 gpm, per SYS BG-200, REACTOR MAKEUP CONTROL SYSTEM NORMAL OPERATION, step 6.2. All pre-requisites are complete.				
Task Standard:	The Applicant added 120 gallons of water to the VCT per SYS BG-200, Section 6.2.				
Required Materials:	SYS BG-200, REACTOR MAKEUP CONTROL SYSTEM NORMAL OPERATION, Section 6.2 **Simulator Setup: IC 306, IC 245, 103D/103E Alarms written on the White Board for FW HTR DUMP VLV OPEN and HEATER DRN TK DUMP as Startup of the secondary plant is in progress** **JPM Initial Conditions set to run concurrently with S5 JPM** **BG FY-111B thumbwheel must be verified at random value prior to performance**				
References:	SYS BG-200, REACTOR MAKEUP CONTROL SYSTEM NORMAL OPERATION				
Time Critical:	No	Alternate Path:	No	Validation Time:	15 min

START TIME: ________

	JPM STEP / PROCEDURE STEP Ͼ - CRITICAL STEP	CUE	STANDARD
1.	**Step 6.2.1:** 1. **IF** frequent dilutions are being performed that could exceed motor start limits, **THEN** START the second Reactor Makeup Water Transfer Pump * BL HIS-3 – NORMAL-AFTER-RUN * BL HIS-4 – NORMAL-AFTER-RUN	**IF** Applicant asks if frequent dilutions will be performed, **THEN:** **CUE:** Frequent dilutions will be performed	On Panel RL001, Applicant determined that both Reactor Makeup Water Transfer Pump(s) are running (BL HIS-3/4) (RED light LIT, GREEN light OUT) **S / U**
2.	**Step 6.2.2:** 2. **(ρ) IF** required to ensure RCS and Pressurizer Boron Concentrations are within 50 ppm, **THEN** TURN on PZR HTR B/U GROUP A and/or PZR HTR B/U GROUP B, using SYS BB-203, PRESSURIZER BACKUP HEATER OPERATIONS, to mix Reactor Coolant System with Pressurizer water	**IF** Applicant asks if RCS and Pressurizer Boron Concentrations are within 50 ppm, **THEN:** **CUE:** Concentrations are within 50 ppm	On Panel RL002, Applicant recognized that **BOTH** pressurizer heater groups were already energized and proceeded to the next step **S / U**
3.	**Step 6.2.3:** 3. Momentarily PLACE BG HS-26, RCS M/U CTRL in stop and spring return to normal o BG HS-26 – IN STOP AND SPRING RETURN TO NORMAL		On Panel RL002, Applicant located and placed BG HS-26 in STOP and allowed to spring return to normal **S / U**

JPM STEP / PROCEDURE STEP Ȼ - CRITICAL STEP	CUE	STANDARD
4. Ȼ**Step 6.2.4:** 4. PLACE BG HS-25, RCS M/U CTRL SEL in dilute position o BG HS-25 – IN DILUTE		On Panel RL002, Applicant located and placed BG HS-25 in DILUTE **S / U**
5. **NOTES:** o When the Dilute Mode is used with 120 gpm Letdown inservice it is recommended that a maximum dilution rate of 90 gpm be set on BG FK-111. This is based on observation that insufficient pump head is available to provide 120 gpm flow against the higher letdown line back pressure and system resistance o For low volume dilutions, consider using a low flow rate to provide more time to respond to system abnormalities		Applicant read and understood NOTES, place kept and proceeded to next step **S / U**
6. Ȼ**Step 6.2.5:** 5. SET BG FK-111, REACTOR M/U WTR FLOW CTRL potentiometer equal to desired dilution flow rate (1 turn = 16 gpm) o BG FK-111 – SET AT DESIRED FLOW RATE		On Panel RL002, Applicant located BG FK-111, and set to 80 gpm per the initiating cue Potentiometer set to 5.0 **S / U**

JPM STEP / PROCEDURE STEP Ͼ - CRITICAL STEP	CUE	STANDARD
7. **Step 6.2.6:** VERFY BG FK-111, REACTOR M/U WTR FLOW CTRL in automatic o BG FK-111 – IN AUTOMATIC		On Panel RL002, Applicant located BG FK-111 and verified it was in automatic (RED AUTO light LIT, RED MAN Light OUT) **S / U**
8. **CAUTION:** BG FY-111B, COMBINED M/U & BA COUNTER is set in 1 gallon increments. There are no tenth of a gallon increments on this counter		Applicant read and understood CAUTION, place kept and proceeded to next step **S / U**
9. Ͼ**Step 6.2.7:** SET BG FY-111B, COMBINED M/U & BA COUNTER equal to the desired number of gallons to be added using thumbwheels o BG FY-111B – SET AT DESIRED GALLON VALUE		On Panel RL002, Applicant located BG FY-111B and set the counter to 120 gallons **S / U**
10. **Step 6.2.8:** 8. RESET BG FY-111B, COMBINED M/U & BA COUNTER lower register o BG FY-111B – RESET		On Panel RL002, Applicant located BG FY-111B and reset the counter **S / U**

JPM STEP / PROCEDURE STEP ₢ - CRITICAL STEP	CUE	STANDARD
11. **₢<u>Step 6.2.9:</u>** 9. **(ρ)** Momentarily PLACE BG HS-26, RCS M/U CTRL in run and spring return to normal ○ BG HS-26 – IN RUN AND SPRING RETURN TO NORMAL		On Panel RL002, Applicant located BG HS-26, placed it in RUN and allowed it to SPRING RETURN to NORMAL **S / U**
12. **<u>Step 6.2.10.1:</u>** 10. VERIFY proper Reactor Makeup Water Control System operation: 1. **<u>IF</u>** NOT already running, **<u>THEN</u>** ENSURE at least one REACTOR MAKEUP WATER TRANSFER PUMP starts * BL HIS-3 – STARTED * BL HIS-4 – STARTED		Applicant recognized from step 6.2.1 that both REACTOR MAKEUP WATER TRANSFER PUMP(S) were running On Panel RL001, Applicant verified both REACTOR MAKEUP WATER TRANSFER PUMP(S) are running (RED light LIT, GREEN light OUT) **S / U**
13. **<u>Step 6.2.10.2:</u>** 2. BG HIS-111B, MAKEUP TO VCT INLET opens BG HIS-111B - OPEN		On Panel RL001, Applicant located and verified BG HIS-111B OPEN (RED light LIT, GREEN Light OUT) **S / U**

JPM STEP / PROCEDURE STEP Ꞓ - CRITICAL STEP	CUE	STANDARD
14. **<u>Step 6.2.10.3:</u>** 3. BG HIS-111A, REACTOR M/U WTR TO BA BLENDING TEE THROTTLES ○ BG HIS-111A – THROTTLED		On Panel RL001, Applicant located BG HIS-111A and verified throttled (RED light LIT AND GREEN LIGHT LIT) **S / U**
15. **Ꞓ<u>Step 6.2.10.4:</u>** 4. VERIFY proper dilution flow rate on BG FR-110, BA BLENDING FLOW RECORDER ○ BG FR-110 – AT PROPER DILUTION FLOW RATE		On Panel RL002, Applicant located BG FR-110, and verified TOTAL MAKEUP FLOW ~80 gpm **S / U**
16. **<u>NOTE:</u>** When the Dilute Mode is used with 120 gpm letdown inservice, it is recommended that a maximum dilution rate of 90 gpm be set on BG FK-111. This is based on observation that insufficient pump head is available to provide 120 gpm flow against the higher Letdown line back pressure and system resistance		Applicant read and understood NOTE, place kept and proceeded to next step **S / U**

JPM STEP / PROCEDURE STEP **C** - CRITICAL STEP	CUE	STANDARD
17. **C** **Step 6.2.10.5:** **IF** proper dilution flow rate is NOT obtained, **THEN** ADJUST BG FK-111, REACTOR M/U WTR FLOW CTRL potentiometer, as necessary, to obtain desired flow rate o BG FK-111 – SET AT DESIRED FLOW RATE		At Panel RL002, Applicant located BG FK-111 and adjusted as necessary to maintain 80 gpm of flow **S / U**
18. 120 gallons of Makeup water being added to the RCS at 80 gpm	**CUE: The JPM is complete.** RECORD STOP TIME BELOW.	

Terminating cue: The JPM Is complete when the Applicant has established and verified 80 gpm of makeup water flow

STOP TIME: _______

Initial Conditions: Power ascension is in progress following a Reactor Startup. The Unit is in MODE 2, Reactor power is ~4%. Per the Reactivity Maneuver Plan, 420 gallons of water will need to be added over the next hour.

Initiating Cue: The Control Room Supervisor directs you to add 120 gallons of water at 80 gpm, per SYS BG-200, REACTOR MAKEUP CONTROL SYSTEM NORMAL OPERATION, step 6.2. All pre-requisites are complete.

Facility: WCNOC

Task No: ________

Task Title: Manually align Containment Spray per EMG E-0, ATT F, Step F12.

Job Performance Measure No: S2

K/A Reference: 026/A4.01 (4.5/4.3): Ability to manually operate and/or monitor in the control room: CSS controls

Examinee: ____________________ NRC Examiner: ____________________

Start: __________ Stop: __________ Date: ____________________

Result: Satisfactory / Unsatisfactory Examiner Signature: ____________________

Method of testing: Simulated Performance ____ Actual Performance X

Classroom ________ Simulator X Plant ________

Initial Conditions:	A Large Break LOCA has occurred. The crew is performing EMG E-0, REACTOR TRIP OR SAFETY INJECTION.				
Initiating Cue:	You are the Reactor Operator and were directed to complete EMG E-0 attachment F, AUTOMATIC SIGNAL VERIFICATION. You are on step F12.				
Task Standard:	Applicant manually aligns Containment Spray System by starting 'A' Containment Spray Pump (EN HIS-3), opening discharge valve (EN HIS-6) and opening containment spray additive supply isolation valve (EN HIS-15).				
Required Materials:	1. EMG E-0 ATTACHMENT F, AUTOMATIC SINGAL VERIFICATION, Step F12 **Simulator Setup: IC 307, IC 30, IMF mBB05A i:0 f:29, IMF mSA15A f: AUTO/MAN, RCPs have been manually tripped**				
References:	EMG E-0, REACTOR TRIP OR SAFETY INJECTION				
Time Critical:	No	Alternate Path:	Yes	Validation Time:	5 min

START TIME: ______

JPM STEP / PROCEDURE STEP Ͼ - CRITICAL STEP	CUE	STANDARD
1. **<u>Step F12.a:</u>** F12. Verify Containment Spray Not Required a. Containment pressure – HAS REMAINED LESS THAN 27 PSIG: ○ Annunciator 00-59A, CSAS – NOT LIT ○ Annunciator 00-59B, CSIB – NOT LIT ○ GN PR-934		Applicant recognizes that both Annunciator 00-59A & 0059B are both LIT, transitions to RNO steps. **S / U**
2. **<u>Step F.12.1 RNO:</u>** Perform the following: 1. Stop all RCPs		On panel RL021, Applicant recognizes that all RCPs have already been tripped. **S / U**
3. **<u>Step F.12.2 RNO:</u>** 2. <u>IF</u> containment spray has <u>NOT</u> actuated, <u>THEN</u> manually actuate containment spray. ○ SB HS-43 <u>AND</u> SB HS-45 ○ SB HS-44 <u>AND</u> SB HS-46 **<u>*Commence Alternate Path*</u>** **<u>‘A’ Containment Spray Pump not aligned and running</u>**	**<u>Examiner Note</u>**: Actuation of CSAS is a two-handed operation, switches must be turned simultaneously.	On panel RL018, Applicant attempted to manually initiate containment spray by placing the following switches to ‘ACTUATE’ ○ SB HS-43 <u>AND</u> SB HS-45 ○ SB HS-44 <u>AND</u> SB HS-46 **S / U**

4. **<u>Step F.12.3 RNO:</u>** 3. Check ESFAS status panel CSAS section – ALL WHITE LIGHTS LIT ○ Red Train ○ Yellow Train		On ESF SYS STATUS INDICATION SA 066-Y Applicant recognizes that the YELLOW Train lights are LIT On ESF SYS STATUS INDICATION SA 066-X Applicant recognizes that the RED Train lights are NOT LIT and continues to the next step **S / U**
5. **C<u>Step F.12.4 RNO:</u>** 4. <u>IF</u> any CSAS component <u>NOT</u> properly aligned, <u>THEN</u> manually align associated component	**<u>Examiner Note:</u>** Applicant **<u>MAY</u>** place ESF PANEL SA-066X MODE SEL SA HS-23 in Pull-To-Lock in order to see White Light indication of repositioned ESF equipment during the alignment. **<u>CUE:</u> The JPM is complete.** <u>RECORD STOP TIME BELOW.</u>	On panel RL017, Applicant recognized that the 'A' train of Containment Spray did not align and manually aligned them: STARTS CTMT SPRAY PUMP A ○ EN HIS-3 – PLACED IN RUN (Red light ON, Green light OFF) OPENS CTMT SPRAY PUMP A DISCH VLV ○ EN HIS-6 – OPEN (Red light ON, Green light OFF) OPENS CTMT SPRAY A ADDITIVE SPLY ○ EN HIS-15 – OPEN (Red light ON, Green light OFF) **S / U**

Terminating cue: The JPM Is complete when the Applicant has manually aligned 'A' Containment Spray Pump for operation.

STOP TIME: _______

Initial Conditions: A Large Break LOCA has occurred. The crew is performing EMG E-0, REACTOR TRIP OR SAFETY INJECTION.

Initiating Cue: You are the Reactor Operator and were directed to complete EMG E-0 attachment F, AUTOMATIC SIGNAL VERIFICATION. You are on Step F12.

Facility: WCNOC Task No: ___________

Task Title: Establish Hot Leg Recirculation per EMG ES-13 Job Performance Measure No: S3

K/A Reference: 006/A4.02 (4.0/3.08): Ability to manually operate and/or monitor in the control room

Examinee: ________________________ NRC Examiner: ________________________

Start: ___________ Stop: ____________ Date: ________________________

Result: Satisfactory / Unsatisfactory Examiner Signature: ______________________

Method of testing: Simulated Performance _____ Actual Performance X

Classroom ____________ Simulator X Plant ________

Initial Conditions:	A Large Break LOCA has occurred. Cold Leg Recirculation has been aligned, and 10 hours have elapsed since the Safety Injection Actuation.				
Initiating Cue:	The Control Room Supervisor directs you to perform steps 1-8 of EMG ES-13, TRANSFER TO HOT LEG RECIRCULATION.				
Task Standard:	The Applicant aligned Hot Leg recirculation for the Safety Injection pumps per EMG ES-13.				
Required Materials:	1. EMG ES-13, TRANSFER TO HOT LEG RECIRCULATION **Simulator Setup: IC 308, IC 30, IMF mBB06A f:27.5 ICM movEJHV8840.cmf t:2, all actions of EMG E-0 and E-1 to this point have been taken, EMG ES-12 actions have been completed**				
References:	EMG ES-13, TRANSFER TO HOT LEG RECIRCULATION				
Time Critical:	No	Alternate Path:	Yes	Validation Time:	20 min

START TIME: _______

JPM STEP / PROCEDURE STEP C - CRITICAL STEP	CUE	STANDARD
1. **NOTE:** Foldout page shall be monitored throughout this procedure		Applicant read and understood NOTE, place kept and proceeded to next step **S / U**
2. **Step 1.a:** 1. Align Red Train RHR for Hot Leg Recirculation: a. Place power lockout for EJ HV-8809A in NON-ISO position ○ EJ HIS-8809AA		On Panel RL017, Applicant depressed EJ HIS-8809AA NON-ISO pushbutton, verified locked down with WHITE light lit **S / U**
3. **Step 1.b:** 1.b. Close RHR to Accumulator Injection Loops 1 & 2 valve ○ EJ HIS-8809A		On Panel RL017, Applicant depressed CLOSE pushbutton on EJ HIS-8809A (GREEN light LIT, RED light OUT) **S / U**
4. **Step 1.c:** 1.c. Place power lockout for EJ HV-8809A in ISO position ○ EJ HIS-8809AA		On Panel RL017, Applicant depressed EJ HIS-8809AA ISO pushbutton, verified NON-ISO button released and WHITE light NOT lit **S / U**

JPM STEP / PROCEDURE STEP Ⓒ - CRITICAL STEP	CUE	STANDARD
5. **Step 1.d:** 1.d. Open RHR Train A Hot Leg Recirc valve o EJ HIS-8716A		On Panel RL017, Applicant depressed OPEN pushbutton on EJ HIS-8716A (RED light LIT, GREEN light OUT) **S / U**
6. **Step 2.a:** 2. Align Yellow Train RHR for Hot Leg Recirculation: a. Place power lockout for EJ HV-8809B in NON-ISO position o EJ HIS-8809BA		On Panel RL017, Applicant depressed EJ HIS-8809BA NON-ISO pushbutton, verified locked down with WHITE light lit **S / U**
7. **Step 2.b:** 2.b. Close RHR to Accumulator Injection Loops 3 & 4 valve o EJ HIS-8809B		On Panel RL017, Applicant depressed CLOSE pushbutton on EJ HIS-8809B (GREEN light LIT, RED light OUT) **S / U**
8. **Step 2.c:** 2.c. Place power lockout for EJ HV-8809B in ISO position o EJ HIS-8809BA		On Panel RL017, Applicant depressed EJ HIS-8809BA ISO pushbutton, verified NON-ISO button released and WHITE light NOT lit **S / U**

JPM STEP / PROCEDURE STEP Ͼ - CRITICAL STEP	CUE	STANDARD
9. **Step 2.d:** 2.d. Open RHR Train A Hot Leg Recirc valve o EJ HIS-8716B		On Panel RL017, Applicant depressed OPEN pushbutton on EJ HIS-8716B (RED light LIT, GREEN light OUT) **S / U**
10. **Step 3.a:** 3. Establish RHR Hot Leg Recirculation: a. Place power lockout for EJ HV-8840 in NON-ISO position o EJ HIS-8840A		On Panel RL017, Applicant depressed EJ HIS-8840A NON-ISO pushbutton, verified locked down with WHITE light lit **S / U**
11. **Step 3.b:** 3.b. Open RHR Hot Leg Recirc Valve o EJ HIS-8840		On panel RL017, Applicant depressed OPEN pushbutton on EJ HIS-8840 Recognized valve does not respond, proceeded to RNO step **S / U**
12. ***COMMENCE ALTERNATE PATH**** **RNO Step 3.b.1:** RNO 3.b. Perform the following: 1) IF radiation levels permit, THEN locally open valve EJ HV-8840 (2000' AUX BLDG. SOUTH PIPE PEN ROOM FAR RIGHT HAND CORNER)	**WHEN** Applicant discusses contacting RP or CRS about radiation levels, **THEN:** **Cue:** TSC reports radiation levels are too high to permit local valve operation of EJ HV-8840	Applicant contacted RP or CRS and determined that radiation levels were too high for local operation and proceeded to next RNO step **S / U**

JPM STEP / PROCEDURE STEP ₢ - CRITICAL STEP	CUE	STANDARD
13. ₢**RNO Step 3.b.2.a:** RNO 2) If RHR hot leg recirculation can NOT be established, THEN reestablish RHR cold leg recirculation: a) Place power lockout for EJ HV-8809A/B switches in NON-ISO position ○ EJ HIS-8809AA ○ EJ HIS-8809BA		On Panel RL017, Applicant depressed EJ HIS-8809AA NON-ISO pushbutton, verified locked down with WHITE light lit Depressed EJ HIS-8809BA NON-ISO pushbutton, verified locked down with WHITE light lit **S / U**
14. ₢**RNO Step 3.b.2.b:** RNO b) Open RHR to Accumulator Injection Loops 1 & 2 and 3 & 4 valves ○ EJ HIS-8809A ○ EJ HIS-8809B		On Panel RL017, Applicant depressed OPEN pushbutton on EJ HIS-8809A (RED light LIT, GREEN light OUT) Depressed OPEN pushbutton on EJ HIS-8809B (RED light LIT, GREEN light OUT) **S / U**
15. **RNO Step 3.b.2.c:** RNO c) Place power lockout for EJ HV-8809A/B switches in ISO position ○ EJ HIS-8809AA ○ EJ HIS-8809BA		On Panel RL017, Applicant depressed EJ HV-8809AA ISO pushbutton, verified NON-ISO button released with WHITE light NOT lit Depressed EJ HV-8809BA ISO pushbutton, verified NON-ISO button released with WHITE light NOT lit **S / U**

JPM STEP / PROCEDURE STEP Ȼ - CRITICAL STEP	CUE	STANDARD
16. Ȼ**RNO Step 3.b.2.d:** RNO d) Close RHR train A Hot Leg Recirc valve ○ EJ HIS-8716A		On Panel RL017, Applicant depressed CLOSE pushbutton on EJ HIS-8716A (GREEN light LIT, RED light OUT) **S / U**
17. Ȼ**RNO Step 3.b.2.e:** RNO e) Close RHR train B Hot Leg Recirc Isolation valve ○ EJ HIS-8716B		On Panel RL017, Applicant depressed CLOSE pushbutton on EJ HIS-8716B (GREEN light LIT, RED light OUT) **S / U**
18. **Step 3.c:** c. Place power lockout for EJ HV-8840 in ISO position ○ EJ HIS-8840A	**IF** Applicant reports failure and asks for direction, **THEN:** **Cue:** Acknowledge report and continue with procedure	On Panel RL017, Applicant depressed EJ HV-8840 ISO pushbutton, verified NON-ISO button released with WHITE light NOT lit **S / U**
19. **Step 4:** 4. Check RHR Hot Leg Recirc Flow – FLOW INDICATED ○ EJ FI-988	**IF** Applicant reports failure and asks for direction, **THEN:** **Cue:** Acknowledge report and continue with procedure	Applicant recognized that no flow exists from actions taken on previous steps and proceeds to RNO step **S / U**
20. **RNO Step 4.a:** Perform the following RNO a. Start pumps and align valves, as necessary, to establish RHR hot leg recirculation flow	**IF** Applicant reports failure and asks for direction, **THEN:** **Cue:** Acknowledge report and continue with procedure	Applicant recognized that this was attempted during step 3, and could not be established and proceeds to next RNO step **S / U**

JPM STEP / PROCEDURE STEP Ͼ - CRITICAL STEP	CUE	STANDARD
21. **RNO Step 4.b:** b. IF RHR hot leg recirculation can NOT be established, THEN start pumps and align valves, as necessary, to establish RHR cold leg recirculation	**IF** Applicant reports failure and asks for direction, **THEN:** **Cue:** Acknowledge report and continue with procedure	Applicant recognized that this was completed during step 3 RNO, and proceeded to next procedure step **S / U**
22. Ͼ**Step 5.a:** 5. Align Red Train SI for Hot Leg Recirculation: a. Stop SI pump A ○ EM HIS-4		On Panel RL017, Applicant placed EM HIS-4 in NORMAL-AFTER-STOP (GREEN light LIT, RED light OUT) **S / U**
23. Ͼ**Step 5.b:** 5.b. Close SI Pump A discharge to Cold Leg Injection valve ○ EM HIS-8821A		On Panel RL017, Applicant depressed CLOSE pushbutton on EM HIS-8821A (GREEN light LIT, RED light OUT) **S / U**
24. Ͼ**Step 5.c:** 5.c. Place power lockout for EM HV-8802A in NON-ISO position ○ EM HIS-8802AA		On Panel RL017, Applicant depressed EM HV-8802A NON-ISO pushbutton, verified locked down with WHITE light LIT **S / U**
25. Ͼ**Step 5.d:** 5.d. Open SI Pump A discharge to Hot Leg Injection valve ○ EM HIS-8802A		On Panel RL017, Applicant depressed OPEN pushbutton on EM HIS-8802A (RED light LIT, GREEN light OUT) **S / U**

JPM STEP / PROCEDURE STEP Ͼ - CRITICAL STEP	CUE	STANDARD
26. Ͼ**Step 5.e:** 5.e. Place power lockout for EM HV-8802A in ISO position ○ EM HIS-8802AA		On Panel RL017, Applicant depressed EM HV-8802A ISO pushbutton, verified NON-ISO button released with WHITE light NOT lit **S / U**
27. Ͼ**Step 5.f:** 5.f. Start SI pump A ○ EM HIS-4		On Panel RL017, Applicant placed EM HIS-4 in NORMAL-AFTER-RUN (RED light LIT, GREEN light OUT) Verified flow and pressure on EM FI-918 and EM PI-919 **S / U**
28. Ͼ**Step 6.a:** 6. Align Yellow Train SI for Hot Leg Recirculation: a. Stop SI pump B ○ EM HIS-5		On Panel RL017, Applicant placed EM HIS-5 in NORMAL-AFTER-STOP (GREEN light LIT, RED light OUT) **S / U**
29. Ͼ**Step 6.b:** 6.b. Close SI Pump B discharge to Cold Leg Injection valve ○ EM HIS-8821B		On Panel RL017, Applicant depressed CLOSE pushbutton on EM HIS-8821B (GREEN light LIT, RED light OUT) **S / U**

JPM STEP / PROCEDURE STEP Ͼ - CRITICAL STEP	CUE	STANDARD
30. Ͼ**Step 6.c:** 6.c. Place power lockout for EM HV-8802B in NON-ISO position o EM HIS-8802BA		On Panel RL017, Applicant depressed EM HV-8802B NON-ISO pushbutton, verified locked down with WHITE light LIT **S / U**
31. Ͼ**Step 6.d:** 6.d. Open SI Pump B discharge to Hot Leg Injection valve o EM HIS-8802B		On Panel RL017, Applicant depressed OPEN pushbutton on EM HIS-8802B (RED light LIT, GREEN light OUT) **S / U**
32. Ͼ**Step 6.e:** 6.e. Place power lockout for EM HV-8802B in ISO position o EM HIS-8802BA		On Panel RL017, Applicant depressed EM HV-8802B ISO pushbutton, verified NON-ISO button released with WHITE light NOT lit **S / U**
33. Ͼ**Step 6.f:** 6.f. Start SI pump B o EM HIS-5		On Panel RL017, Applicant placed EM HIS-5 in NORMAL-AFTER-RUN (RED light LIT, GREEN light OUT) Verified flow and pressure on EM FI-918 and EM PI-919 **S / U**

JPM STEP / PROCEDURE STEP Ȼ - CRITICAL STEP	CUE	STANDARD
34. Ȼ**Step 7.a:** 7. Isolate SI Pump Cold Leg Injection: a. Place the power lockout for EM HV-8835 in NON-ISO position ○ EM HIS-8835A		On Panel RL017, Applicant depressed EM HIS-8835A NON-ISO pushbutton, verified locked down with WHITE light lit **S / U**
35. Ȼ**Step 7.b:** 7.b. Close SI Pumps To Cold Leg Injection valve ○ EM HIS-8835		On Panel RL017, Applicant depressed CLOSE pushbutton on EM HIS-8835 (GREEN light LIT, RED light OUT) **S / U**
36. Ȼ**Step 7.c:** 7.c. Place power lockout for EM HV-8835 in ISO position ○ EM HIS-8835A		On Panel RL017, Applicant depressed EM HIS-8835A ISO pushbutton, verified NON-ISO button released with WHITE light NOT lit **S / U**
37. **Step 8:** 8. Check SI Pump Discharge Flow – FLOW INDICATED ○ EM FI-918 ○ EM HI-922	**CUE: The JPM is complete.** RECORD STOP TIME BELOW.	On Panel RL017, Applicant checked EM FI-918 and EM FI-922, SI Pump Discharge flow indicated **S / U**

Terminating cue: The JPM is complete when the Applicant established Hot Leg Recirculation using the Safety Injection pumps and verified flow

STOP TIME: _______

Initial Conditions: A Large Break LOCA has occurred. Cold Leg Recirculation has been aligned, and 10 hours have elapsed since the Safety Injection Actuation.

Initiating Cue: The Control Room Supervisor directs you to perform steps 1-8 of EMG ES-13, TRANSFER TO HOT LEG RECIRCULATION.

Facility: WCNOC Task No: ___________

Task Title: Start up 'A' Train CCW and transfer Service Loop per SYS EG-201, Section 6.1.

Job Performance Measure No: S4

K/A Reference: 008/A4.01 (3.3/3.1): Ability to manually operate and/or monitor in the control room: CCW indications and controls

Examinee: ______________ NRC Examiner: ______________

Start: ___________ Stop: ___________ Date: ______________

Result: Satisfactory / Unsatisfactory Examiner Signature: ______________

Method of testing: Simulated Performance _____ Actual Performance X

Classroom ______ Simulator X Plant ______

Initial Conditions:	The unit is operating at 100% power. Yellow Train in service. Emergent maintenance was just completed on the 'A' Centrifugal Charging Pump (CCP) and a test run is required.				
Initiating Cue:	The Control Room Supervisor directs you to transfer the Component Cooling Water (CCW) Service Loop to Train 'A' per SYS EG-201, TRANSFERRING SUPPLY OF CCW SERVICE LOOP AND CCW TRAIN SHUTDOWN, step 6.1. to support 'A' CCP post maintenance testing. 'A' CCW pump shall be started. All prerequisites are complete.				
Task Standard:	The Applicant started the 'A' CCW pump and transferred the Service Loop to the 'A' train per SYS EG-201, Section 6.1.				
Required Materials:	1. SYS EG-201, TRANSFERRING SUPPLY OF CCW SERVICE LOOP AND CCW TRAIN SHUTDOWN, Section 6.1 **Simulator Setup: <u>IC 309</u>, IC31** **JPM Initial Conditions set to run concurrently with S8 JPM**				
References:	SYS EG-201, TRANSFERRING SUPPLY OF CCW SERVICE LOOP AND CCW TRAIN SHUTDOWN				
Time Critical:	No	Alternate Path:	No	Validation Time:	20 min

START TIME: _______

JPM STEP / PROCEDURE STEP C - CRITICAL STEP	CUE	STANDARD
1. **NOTE:** Bypassing Demins during BTRS operation, may cause the BTRS Chiller to trip on low suction pressure due to the reduced heat load		Applicant read and understood NOTE, place kept and proceeded to the next step **S / U**
2. **Step 6.1.1:** 1. **IF** desired, **THEN** PLACE BG HIS-129, CVCS DEMIN INLET DIVERT VLV TO VCT POSTION o BG HIS-129 – VCT	**WHEN** Applicant asks CRS if desired, **THEN:** **CUE:** CRS does not desire placing BG HIS-129 in VCT position	Applicant determines placing valve in VCT position is not desired and proceeds to next step **S / U**
3. **Step 6.1.2.1:** 2. **IF** a train A CCW Pump is NOT running, **THEN** START desired Train A CCW Pump: 1. TURN OFF motor space heater supply breaker for CCW Pump to be started * TURN OFF PG19NJF118, COMP COOLING WATER PUMP SPACE HEATER DPEG01A	**WHEN** Applicant requests building operator to turn off the motor space heater supply breaker, **THEN:** **CUE:** Space heater is OFF	Applicant recognized from initial conditions that the ‘A’ CCW pump is to be started and requested building operator turn off the motor space heater supply breaker for that pump **S / U**

4. **NOTE:** The trend is monitored prior to and during pump starts, to ensure any indication of voiding, such as unexpected fluctuating parameters is observed and compensatory measures can be accomplished prior to damage occurring		Applicant read and understood NOTE, place kept and proceeded to the next step **S / U**
5. **Step 6.1.2.2:** 2. Prior to starting an A Train CCW Pump, a NPIS computer trend shall be STARTED and MONITORED to ensure proper pump operation and system response. The following are points that need to be monitored. Any other available points that monitor pump operation may be monitored * CCW PUMP A: o EGI009 CCW Pump A Amp o EGF0095 CCW PMP A DISCH FLOW o EGP0077 A CCW DISCH PRESS o EGE0023 CCW PMP C STATUS		At a NPIS terminal, Applicant brought up and displayed points to monitor the 'A CCW pump **Examiner Note:** Applicant may bring up additional data points but the 4 listed must be displayed at a minimum **S / U**

6.	**<u>Step 6.1.2.3:</u>** 3. RECORD EG LI-1, CCW SURGE TANK A LEV **<u>OR</u>** NPIS computer point EGL0001 *EG LI-1 - ___________ *EGL0001 - __________		On Panel RL019, Applicant located EG LI-1 and recorded level (~58%) **<u>OR</u>** At a NPIS terminal, Applicant brought up computer point EGL0001 and recorded level (~58%) **S / U**
7.	**<u>NOTE:</u>** Annunciators 00-052B, CCW PMP A/C PRESS LO and 00-51C, CCW PMP A FLOW LO or 00-052C, CCW PMP C FLOW LO will alarm upon pump start and should clear once pump is running		Applicant read and understood NOTE, place kept and proceeded to the next step **S / U**
8.	**<u>CStep 6.1.2.4:</u>** 4. START desired CCW Pump *START PEG01A, using EG HIS-21, CCW PUMP A ○ EG HIS-21 – AUTO-AFTER-RUN		On Panel RL019, Applicant placed EG HIS-21 in AUTO-AFTER-RUN, and verified pump start (RED light LIT, GREEN light OUT) **S / U**

9. **<u>Step 6.1.2.5:</u>** 5. VERIFY operating CCW Pump discharge flow is greater than 1.5 E6 lbs/hr (3000 gpm) *EG FI-95 Or EGF0095 For CCW Pump A – GREATER THAN 1.5 e6 LBS/HR (3000 GPM)	**<u>IF</u>** Applicant contacts building operator for flow indication, **<u>THEN:</u>** **<u>CUE:</u>** Indicated flow is 2.3 E6 LBS/HR	Applicant contacted building operator and requested flow indication on EG FI-95 Or At a NPIS terminal, Applicant brought up computer point EGF0095 And verified greater than 1.5 E6 LBS/HR **S / U**
10. **<u>Step 6.1.2.7:</u>** 7. RECORD EG LI-1, CCW SURGE TANK A LEV **<u>OR</u>** NPIS computer point EGL0001 *EG LI-1 - ___________ *EGL0001 - ___________		On Panel RL019, Applicant located EG LI-1 and recorded level (~58%) **<u>OR</u>** At a NPIS terminal, Applicant brought up computer point EGL0001 and recorded level (~58%) **S / U**
11. **<u>Step 6.1.3:</u>** 3. Locally VERIFY CCW Train A Pump Room Cooler running ○ SGL11A - RUNNING	**<u>WHEN</u>** Applicant requests building operator to verify room cooler operation, **<u>THEN:</u>** **<u>CUE:</u>** Room Cooler is running	Applicant contacted building operator and verified CCW Train A Pump Room Cooler is running **S / U**

12.	**<u>Step 6.1.4.1 / 2:</u>** 4. **<u>IF</u>** CCW Pump A was started, **<u>THEN</u>** VERIFY proper room cooler damper alignment: 1. Locally CHECK GL-D156, CCW Pump A Room Cooler 11A Discharge Isolation Damper open ○ GL-D156 – OPEN 2. Locally CHECK GL-D157, CCW Pump C Room Cooler 11A Discharge Isolation Damper Closed ○ GL-D157 - CLOSED	**<u>WHEN</u>** Applicant requests building operator to proper room cooler damper alignment, **<u>THEN:</u>** **<u>CUE:</u>** Dampers are properly aligned	Applicant contacted building operator and verified proper room cooler damper alignment **S / U**
13.	**<u>Step 6.1.5.1 / 2:</u>** 5. **<u>IF</u>** CCW Pump C was started, **<u>THEN</u>** VERIFY proper room cooler damper alignment:		Applicant recognizes from initial conditions and previous steps that the 'C' CCW pump was NOT started and proceeded to the next step **S / U**
14.	**<u>NOTE:</u>** Rad Monitor EG RE-9 may see a reduced flow rate when a low differential pressure exists across the CCW Heat Exchanger. This condition is most common during the winter months when temperature control valve EG TV-029 is full open. EG RE-9 will perform its design function during low flow conditions		Applicant read and understood NOTE, place kept and proceeded to the next step **S / U**

15. **Step 6.1.6:** ENSURE EG RE-9, CCW Train A Process Radiation Monitor inservice EG RE-9 – INSERVICE	**WHEN** Applicant reads step, **THEN:** **CUE:** EG RE-9 is INSERVICE	Applicant ensured EG RE-9 is in service **S / U**
16. **Step 6.1.7:** 7. **IF** RHR Train B is NOT inservice, **THEN** ENSURE EC HV-12 is open, using EC HIS-12, SFP HX B CCW OUTLET VLV, to provide a flow path for CCW Train B ○ EC HIS-12 – OPEN		On Panel RL021, Applicant located EC HIS-12 and ensured it was open (RED light LIT, GREEN light OUT) **S / U**
17. **Step 6.1.8:** 8. **IF** RHR Train A is inservice **AND** SFP Hx A is NOT inservice, **THEN** ENSURE EC HV-11 is closed, using EC HIS-11, SFP HX A CCW OUTLET VLV, if desired to prevent CCW low flow alarms ○ EC HIS-11 – CLOSED		Applicant determined that RHR Train A is NOT inservice and proceeded to the next step **S / U**
18. C**Step 6.1.9:** 9. CLOSE CCW Surge Tank A and B Vent Valves CLOSE EG RV-9, using EG HIS-9, CCW SURGE TANK A VENT VALVE ○ EG HIS-9 – CLOSED CLOSE EG RV-10, using EG HIS-10, CCW SURGE TANK B VENT VLV ○ EG HIS-10 – CLOSED		On Panel RL019, Applicant located EG HIS-9 and 10 Applicant depressed CLOSE pushbutton(s), verified valve is/are closed (GREEN light LIT, RED light OUT) **S / U**

19. **<u>NOTES:</u>** ○ Annunciator 00-051F, CCW SPLY RTN VLVS MISALIGN will alarm until Step 6.1.11 is completed ○ If the RCP thermal barriers isolate and Seal Injection is available, thermal barrier cooling should be established after the trains have been swapped and flows are stable ○ RCP thermal barriers are NOT expected to close on flow oscillations. A condition report should be initiated if thermal barriers isolate ○ Refer to TS 3.7.7 to determine if Tech Spec entry is required on loss of power to BB HV-13/14/15/16, RCP THERMAL BARRIER CCW RETURN ISO'S		Applicant read and understood NOTEs, place kept and proceeded to the next step **S / U**
20. **C<u>Step 6.1.10:</u>** 10. **(ρ)** OPEN CCW TRN A SPLY/RETURN VLVS, using EG HS-15, CCW TRN A SPLY/RETURN VLVS ○ EG HS-15 – OPEN		On Panel RL019, Applicant located EG HIS-15 and depressed OPEN pushbutton, verified EG ZL-53 and 15 OPEN (RED light LIT, GREEN light OUT) **S / U**

21. **C** **<u>Step 6.1.11:</u>** 11. CLOSE CCW TRN B SPLY/RETURN VLVS, using EG HS-16, CCW TRN B SPLY/RETURN VLVS ○ EG HS-16		On Panel RL019, Applicant located EG HIS-16 and depressed CLOSE pushbutton, verified EG ZL-54 and 16 CLOSED (GREEN light LIT, RED light OUT) **S / U**
22. **<u>Step 6.1.12:</u>** 12. VERIFY EG FI-55A, CCW TO RW & RCS FLOW indication ○ EG FI-55A – BETWEEN 1.6 E6 AND 4.3 E6 LBM/HR		On Panel RL019, Applicant located flow indication EG FI-55A, and verified flow between 1.6 E6 – 4.3 E6 lbm/hr (~3.1 - 3.2 E6 lbm/hr) **S / U**
23. **C** **<u>Step 6.1.13:</u>** 13. OPEN CCW Surge Tank A and B Vent Valves OPEN EG RV-9, using EG HIS-9, CCW SURGE TANK A VENT VLV ○ EG HIS-9 – OPEN OPEN EG RV-10, using EG HIS-10, CCW SURGE TANK B VENT VLV ○ EG HIS-10 – OPEN		On Panel RL019, Applicant located EG HIS-9 and 10 Applicant depressed OPEN pushbutton until valve(s) indicated OPEN (RED light LIT, GREEN light OUT) **S / U**
24. **<u>Step 6.1.14:</u>** 14. **<u>IF</u>** CCW Cooling to Radwaste is required, **<u>THEN</u>** PERFORM the following:		Applicant recognized that radwaste cooling is required and proceeded to the next stp **S / U**

25. **NOTE:** Steps should be performed concurrently		Applicant read and understood NOTE, place kept and proceeded to the next step **S / U**
26. **Step 6.1.14.1:** 1. **IF** desired, **THEN** ENSURE CCW TO RW SPLY/RETURN VLVS are open ○ EG HS-69 – OPEN ○ EG HS-70 – OPEN		On Panel RL019, Applicant ensured EG HS-69 & 70 were both open (RED light LIT, GREEN light OUT) **S / U**
27. **Step 6.1.14.2:** 2. WHEN flows have stabilized, THEN ENSURE EG HV-2 is open, using EG HIS-62, CCW from RCS INNER CTMT ISO VLV ○ EG HIS-62 – OPEN		Applicant recognized that flow is stabilized and on Panel RL019 ensured EG HIS-62 was open (RED light LIT, GREEN light OUT) **S / U**
28. **Step 6.1.14.3:** 3. **WHEN** flows have stabilized, **THEN** ENSURE CCW from RCP Thermal Barriers are open ○ BB HIS-13 – OPEN ○ BB HIS-14 – OPEN ○ BB HIS-15 – OPEN ○ BB HIS-16 – OPEN		Applicant recognized that flow is stabilized and on Panel RL021 ensured CCW from RCP thermal barrier valves open: ○ BB HIS-13 ○ BB HIS-14 ○ BB HIS-15 ○ BB HIS-16 (RED light LIT, GREEN light OUT) **S / U**

29. **<u>NOTE:</u>** EG-V439, CCW TO RADWASTE BYPASS LINE THROTTLE VALVE throttle position is between 18.5 and 20.25 turns open		Applicant read and understood NOTE, place kept and proceeded to the next step **S / U**
30. **<u>Step 6.1.14.4:</u>** 4. IF required, THEN THROTTLE EG-V439, CCW TO RADWASTE BYPASS LINE THROTTLE VALVE to restore EG FI-55A, CCW TO RW & RCS FLOW		Applicant recognized that flow was balanced and throttle is not necessary, proceeded to the next step
31. **<u>Step 6.1.15:</u>** 15. (p) IF desired to place Mix Bed Demin inservice, THEN PLACE BG HIS-129, CVCS DEMIN INLET DIVERT VLV in DEMIN position o BG HIS-129 – DEMIN	**<u>CUE:</u> The JPM is complete.** <u>RECORD STOP TIME BELOW.</u>	Applicant determined that this step is not required as the valve was not repositioned **S / U**

Terminating cue: The JPM Is complete when the Applicant completes step 6.1 of SYS EG-201

STOP TIME: _______

Initial Conditions: The unit is operating at 100% power. Yellow Train in service. Emergent maintenance was just completed on the ‘A’ Centrifugal Charging Pump (CCP) and a test run is required.

Initiating Cue: The Control Room Supervisor directs you to transfer the Component Cooling Water (CCW) Service Loop to Train ‘A’ per SYS EG-201, TRANSFERRING SUPPLY OF CCW SERVICE LOOP AND CCW TRAIN SHUTDOWN, step 6.1. to support ‘A’ CCP post maintenance testing.

- ‘A’ CCW pump shall be started.
- All prerequisites are complete.

Facility: WCNOC

Task No: ______

Task Title: Perform PORV Block Valve Cycle test per STS BB-201A, Section 8.1.

Job Performance Measure No: S5

K/A Reference: 010/A4.03 (4.3/3.8): Ability to manually operate and/or monitor in the control room: PORV and block valves

Examinee: ______ NRC Examiner: ______

Start: ______ Stop: ______ Date: ______

Result: Satisfactory / Unsatisfactory Examiner Signature: ______

Method of testing: Simulated Performance ____ Actual Performance X

Classroom ______ Simulator X Plant ______

Initial Conditions:	The Unit is in MODE 2, Reactor power is ~4%.				
Initiating Cue:	The Control Room Supervisor directs you to test the operability of BB HV-8000A using STS BB-201A, CYCLE TEST OF PORV BLOCK VALVE, Section 8.1, All prerequisites have been completed.				
Task Standard:	The Applicant tested the operability of BB HV-8000A by completing STS BB-201A, Section 8.1.				
Required Materials:	STS BB-201A, CYCLE TEST OF PORV BLOCK VALVE **Simulator Setup: IC 306, IC 245, 103D/103E Alarms written on the White Board for FW HTR DUMP VLV OPEN and HEATER DRN TK DUMP as Startup of the secondary plant is in progress** **JPM Initial Conditions set to run concurrently with S1 JPM**				
References:	STS BB-201A, CYCLE TEST OF PORV BLOCK VALVE				
Time Critical:	No	Alternate Path:	No	Validation Time:	10 min

START TIME: ______

JPM STEP / PROCEDURE STEP Ͼ - CRITICAL STEP	CUE	STANDARD
1. **Step 8.1.1:** 8.1 Cycle of B HV-8000A, PORV BLOCK VALVE 8.1.1 Verify BB PCV-455A is closed, using BB HIS 455A, PZR PORV o BB HIS-455A - CLOSED		On Panel RL021, Applicant verified BB PCV-455A is closed using BB HIS 455A (GREEN light LIT, RED light OUT) **S / U**
2. **NOTES:** o When BB HV-8000A, PORV BLOCK VALVE is closed, placing BB HS-8000A to ARM will cause annunciator 00-046A, COLD O/P BLOCK VLV NOT OPEN to alarm o BB PCV-455A, PZR POWER OPERATED RELIEF VALVE should remain closed after COLD O/P PROTECTION is ARMED		Applicant read and understood NOTE(s), place kept and proceeded to the next step **S / U**
3. Ͼ**Step 8.1.2:** 8.1.2 PLACE BB HS-8000A, TRN A COLD O/P BLOCK/ARM in ARM o BB HS-8000A - ARM		On Panel RL021, Applicant depressed ARM pushbutton for BB HS-8000A **S / U**
4. **Step 8.1.3:** 8.1.3 ENSURE BB HV-8000A is open, using BB HIS-8000A, PORV BLOCK VALVE o BB HIS-8000A - OPEN		On Panel RL021, Applicant ensured BB HV-8000A was OPEN using BB HIS-8000A (RED light LIT, GREEN light OUT) **S / U**

JPM STEP / PROCEDURE STEP Ⓒ - CRITICAL STEP	CUE	STANDARD
5. **Step 8.1.4:** 8.1.4 CHECK the following open indications: o Green light on BB HIS-8000A is NOT lit o Red light on BB HIS-8000A is lit o Computer point BBD8000A indicates open		On Panel RL021, Applicant checked GREEN light on BB HIS-8000A is NOT lit Red light on BB HIS-8000A is lit On a NPIS terminal, Applicant checked computer point BBD8000A indicated OPEN **S / U**
6. **NOTE:** Closing BB HIS-8000A will cause annunciator 00-034C, PZR PORV BLOCK alarm		Applicant read and understood NOTE, place kept and proceeded to the next step **S / U**
7. Ⓒ**Step 8.1.5:** 8.1.5 CLOSE BB HV-8000A, using BB HIS-8000A, PORV BLOCK VALVE o BB HIS-8000A – CLOSED		On Panel RL021, Applicant depressed closed pushbutton on BB HIS-8000A and verified valve closed (GREEN light LIT, RED light OUT) **S / U**

JPM STEP / PROCEDURE STEP Ꞓ - CRITICAL STEP	CUE	STANDARD
8. **Step 8.1.6:** 8.1.6 CHECK the following closed indications: o Green light on BB HIS-8000A is lit o Red light on BB HIS-8000A is NOT lit o Computer point BBD8000A indicates NOPEN		On Panel RL021, Applicant checked GREEN light on BB HIS-8000A is lit Red light on BB HIS-8000A is NOT lit On a NPIS terminal, Applicant checked computer point BBD8000A indicated NOPEN **S / U**
9. Ꞓ**Step 8.1.7:** 8.1.7 OPEN BB HV-8000A, by placing BB HIS-8000A, PORV BLOCK VALVE in auto o BB HIS-8000A – AUTO	**WHEN** Applicant asks for an IV, **THEN:** **Cue:** another Applicant has IV'd the valve	On Panel RL021, Applicant depressed AUTO pushbutton on BB HIS-8000A **S / U**
10. **Step 8.1.8:** 8.1.8 VERIFY BB HV-8000A is open, using BB HIS-8000A, PORV BLOCK VALVE	**WHEN** Applicant asks for an IV, **THEN:** **Cue:** another Applicant has IV'd the valve	On Panel RL021, Applicant verified BB HV-8000A is open, using BB HIS-8000A (RED light LIT, GREEN light OUT) **S / U**
11. Ꞓ**Step 8.1.9:** 8.1.9 IF the BB HS-8000A, TRN A COLD O/P BLOCK/ARM was found in BLOCK in step 7.1, THEN PLACE TRN A COLD O/P BLOCK/ARM in the BLOCK o BB HS-8000A - BLOCK	**Cue:** BB HS-8000A was found in BLOCK in step 7.1 **WHEN** Applicant asks for an IV, **THEN:** **Cue:** another Applicant has IV'd the valve	On Panel RL021, Applicant depressed BLOCK pushbutton on BB HS-8000A **S / U**

JPM STEP / PROCEDURE STEP **C** - CRITICAL STEP	CUE	STANDARD
12. Applicant completed section 8.1 of STS BB-201A	**CUE: The JPM is complete.** RECORD STOP TIME BELOW.	

Terminating cue: The JPM is complete when the Applicant completes Section 8.1 of STS BB-201A

STOP TIME: ______

Initial Conditions: The Unit is in MODE 2, Reactor power is ~4%.

Initiating Cue: The Control Room Supervisor directs you to test the operability of BB HV-8000A using STS BB-201A, CYCLE TEST OF PORV BLOCK VALVE, Section 8.1, All prerequisites have been completed.

Facility: WCNOC Task No: ___________

Task Title: Restore AFW after LSP per ALR 00-127A Job Performance Measure No: S6

K/A Reference: 061/A2.04 (3.4/3.8): Ability to (a) predict the impacts of the following malfunctions or operations on the AFW; and (b) based on those predications, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: pump failure or improper operations

Examinee: ____________________ NRC Examiner: ____________________

Start: ___________ Stop: ___________ Date: ____________________

Result: Satisfactory / Unsatisfactory Examiner Signature: ____________________

Method of testing: Simulated Performance _____ Actual Performance X

Classroom _____________ Simulator X Plant ________

Initial Conditions:	A tornado has gone through the protected area east of the Turbine Building causing a Unit Trip. The crew has completed actions of EMG E-0, REACTOR TRIP OR SAFETY INJECTION, and have transitioned to EMG ES-02. REACTOR TRIP RESPONSE. Reports from Site Security indicate large amounts of water outside the Turbine Building on the east side.				
Initiating Cue:	The Control Room Supervisor directs you to respond to ALR 00-127A, AFP SUCT PRESS LO.				
Task Standard:	The Applicant manually aligned ESW to supply 'A' train of Auxiliary Feedwater per ALR 00-127A, AFP SUCT PRESS LO				
Required Materials:	1. ALR 00-127A, AFP SUCT PRESS LO **Simulator Setup: IC 310, IC31, Isolate make up sources to CST, IRF rAL20 f:0, IRF rAP01 f:0. Insert malfunction IMF mSA25A. Reactor manually tripped, CST damaged until empty, IMF mAP01**				
References:	ALR 00-127A, AFP SUCT PRESS LO				
Time Critical:	No	Alternate Path:	Yes	Validation Time:	15 min

START TIME: _______

JPM STEP / PROCEDURE STEP Ȼ - CRITICAL STEP	CUE	STANDARD
1. **Step 1:** 1. Determine Affected Auxiliary Feedwater Pump(s): o Check AFW pump suction pressure - LESS THAN 12.1 PSIA *AL PI-24A for pump B *AL PI-25A for pump A *AL PI-26A for TD AFW pump		On Panel RL005, Applicant determined 'A' pump suction pressure on Al PI-25A is less than 12.1 psia **S / U**
2. **Step 2:** 2. Verify Affected AFW Pump Suction Pressure Low: o Check affected AFW pump(s) Discharge Pressure – LOW for the current status of the affected pump(s) *AL PI-15A for pump B *AL PI-18A for pump A *AL PI-21A for TD AFW pump		On Panel RL005, Applicant determined discharge pressure for 'A' MDAFWP is low and oscillating on AL PI-18A **S / U**
3. Ȼ**Step 3:** 3. Secure affected Auxiliary Feedwater Pump(s): *Place affected Motor Driven AFW pump in Pull-to-lock *AL HIS-23A for Pump A		On Panel RL005, Applicant placed AL HIS-23A in Pull-to-Lock (ALL LIGHTS OUT) **S / U**

JPM STEP / PROCEDURE STEP C - CRITICAL STEP	CUE	STANDARD
4. **Step 4:** 4. Refer to Technical Specification 3.7.5	**IF** Applicant informs CRS about Technical Specifications, **THEN:** **Cue:** acknowledge report	Applicant informs CRS of Tech Spec reference **S / U**
5. **Step 5.a:** 5. Determine desired AFW pump suction alignment: a. Check either of the following: *EMGs – IN EFFECT OR *AFAS - ACTUATED		Applicant determined form initial conditions that EMGs are in effect OR Applicant determined from ESAS status panels that AFAS has actuated **S / U**
6. **Step 5.b:** 5.b. Check CST To AFP Suction Header Pressure – GREATER THAN 2.6 PSIG o AL PI-37 o AL PI-38 o AL PI-39		On Panel RL026, Applicant checked ALL CST to AFP suction header pressure LESS than 2.6 PSIG and proceeded to RNO step **S / U**

JPM STEP / PROCEDURE STEP Ⓒ - CRITICAL STEP	CUE	STANDARD
7. ***COMMENCE ALTERNATE PATH**** Ⓒ**RNO Step 5.b.1:** RNO 5.b Ensure ESW supply to affected AFW pumps: 1) Ensure ESW to affected pump suction valve – OPEN *AL HIS-30A for pump B *AL HIS-31A for pump A *AL HIS-32A or AL HIS-33A for TD pump	**Examiner Note:** Even though ESW is being supplied to the TDAFWP via the 'B' train, Applicant may open the 'A' train ESW supply to the TDAFWP as well per the procedure step	On Panel RL005, Applicant depressed OPEN pushbutton on AL HIS-31A and ensured valve OPEN Applicant may open AL HIS-32A for the TDAFWP, ***this does not represent a critical task*** (RED light(s) LIT, GREEN light(s) OUT) **S / U**
8. Ⓒ**RNO Step 5.b.2:** RNO 5.b.2) Ensure ESW pumps – RUNNING		On Panel RL019, Applicant ensured 'A' & 'B' ESW pump running 'A' ESW is not running (GREEN light LIT, RED light OUT), placed EF HIS-55A in RUN and ensured running (RED light LIT, GREEN light OUT) **S / U**
9. **RNO Step 5.b.3:** RNO 5.b.3) Go to Step 6		Applicant proceeded to step 6 **S / U**

JPM STEP / PROCEDURE STEP Ⓒ - CRITICAL STEP	CUE	STANDARD
10. **Step 6:** 6. Locally vent affected Auxiliary Feedwater Pump(s) suction and discharge	**WHEN** Applicant contacts building Applicant to vent Auxiliary Feedwater Pump 'A' suction and discharge, **THEN:** **Cue:** Time compression is being used, the 'A' MDAFWP suction and discharge have been vented	Applicant contacts building watch to vent 'A' MDAFWP suction and discharge **S / U**
11. **Step 7:** 7. Check AFW Pump(s) suction pressure – GREATER THAN 12.1 PSIA AL PI-24A for pump B AL PI-25A for pump A AL PI-26A for TD AFW pump		On Panel RL005, Applicant checked AL PI-25A pressure GREATER THAN 12.1 PSIA **S / U**
12. Ⓒ**Step 8:** 8. Restart affected Auxiliary Feedwater Pump(s) *Start affected Motor Driven AFW pump(s) *AL HIS-23A for pump A		On Panel RL005, Applicant place AL HIS-23A in RUN and verified pump started (RED light LIT, GREEN light OUT) Discharge pressure AL PI-18A rising **S / U**

JPM STEP / PROCEDURE STEP **©** - CRITICAL STEP	CUE	STANDARD
13. **Step 9:** 9. Return to procedure and step in effect	**CUE: The JPM is complete.** RECORD STOP TIME BELOW.	

Terminating cue: The JPM Is complete when the Applicant has completed ALR 00-127A and aligned ESW to supply 'A' train of Auxiliary Feedwater

STOP TIME: _______

Initial Conditions: A tornado has gone through the protected area east of the Turbine Building causing a Unit Trip. The crew has completed actions of EMG E-0, REACTOR TRIP OR SAFETY INJECTION, and have transitioned to EMG ES-02. REACTOR TRIP RESPONSE.

Reports from Site Security indicate large amounts of water outside the Turbine Building on the east side.

Initiating Cue: The Control Room Supervisor directs you to respond to ALR 00-127A, AFP SUCT PRESS LO.

Facility: WCNOC

Task No: ___________

Task Title: Restore RCP cooling per OFN BB-005

Job Performance Measure No: S7

K/A Reference: 003/A4.08 (3.2/2.9): Ability to manually operate and/or monitor in the control room: RCP cooling water supplies

Examinee: ____________________

NRC Examiner: ____________________

Start: ___________ Stop: ___________

Date: ____________________

Result: Satisfactory / Unsatisfactory

Examiner Signature: ____________________

Method of testing:

Simulated Performance _____ Actual Performance X

Classroom __________ Simulator X Plant ________

Initial Conditions:	The unit is operating at 100% power. The crew has entered OFN BB-005, RCP MALFUNCTIONS.				
Initiating Cue:	The Control Room Supervisor directed you to perform steps 7 & 8 of OFN BB-005.				
Task Standard:	The Applicant opened EG HIS-126A and EG HIS-126 to establish CCW flow to the RCPs per OFN BB-005, Step 7.				
Required Materials:	1. OFN BB-005, RCP MAL.FUNCTIONS, Steps 7 and 8 **Simulator Setup: IC 311, IC 31, ICM movEGHV0071.cmf t:2 inserted**				
References:	OFN BB-005, RCP MALFUNCTIONS				
Time Critical:	No	Alternate Path:	Yes	Validation Time:	10 min

START TIME: _______

JPM STEP / PROCEDURE STEP C - CRITICAL STEP	CUE	STANDARD
1. **CAUTION:** A Dedicated Applicant cannot be used to maintain Operability for valves that receive a CISB signal. Refer to AP 26C-004, OPREABILITY DETERMINATION AND FUNCTIONALITY ASSESSMENT	**IF** Applicant discusses CAUTION with CRS, **THEN:** **Cue:** Acknowledge report	Applicant reads and understands CAUTION, place keeps and proceeds to next step **S / U**
2. **Step 7.a:** 7. Check CCW to Service Loop and Containment – NOT IN SERVICE a. Ensure CCW pumps – AT LEAST ONE RUNNING		On Panel RL019, Applicant ensured at least one CCW pump is running (RED light LIT, GREN light OUT) **S / U**
3. **Step 7.b:** b. Ensure One Pair of CCW Service Loop Supply and Return Valves for an Operating CCW Pump – OPEN *EG ZL-15 And EG ZL-53 OR *EG ZL-16 And EG ZL-54		On Panel RL019, Applicant ensured at least one set of RED lights were lit (RED light(s) LIT, GREEN light(s) OUT) **S / U**

4. **<u>Step 7.c:</u>** c. Ensure CCW to and from RCS Isolation valves – OPEN ○ EG HIS-58 ○ EG HIS-59 ○ EG HIS-60 ○ EG HIS-71		On Panel RL019, Applicant verified the following: Verified RED light lit on EG HIS-58 Verified RED light lit on EG HIS-59 Verified RED light lit on EG HIS-60 Verified RED light NOT lit on EG HIS-71 Depressed OPEN pushbutton for EG HIS-71 and recognized the GREEN light is still lit Continued with RNO step **S / U**
5. ***<u>*COMMENCE ALTERNATE PATH*</u>*** ©**<u>RNO Step 7.c.1:</u>** c. Perform the following: 1) IF any valve can NOT be opened, THEN reenergize and open associated bypass valve *EG HIS-126A And EG HIS-126 For EG HIS-71		On Panel RL020, Applicant depressed NON-ISO pushbutton on EG HIS-126A and verified WHITE light lit Depressed the OPEN pushbutton on EG HIS-126 and verified open (RED light LIT, GREEN light OUT) **S / U**

6. **<u>RNO Step 7.c.2:</u>** 2) IF any bypass valve is open THEN perform the following: o Refer to Tech Spec 3.6.3 and 3.7.7 o Assign an Applicant to close all bypass valves if containment isolation phase B occurs	**<u>WHEN</u>** Applicant reports to CRS, **<u>THEN:</u>** **<u>Cue:</u>** An Applicant will be stationed at the panel	Applicant notified CRS to assign a dedicated Applicant **S / U**
7. **<u>RNO Step 7.c.3:</u>** 3) **<u>IF</u>** CCW to and from RCS can **<u>NOT</u>** be established, **<u>THEN</u>** shutdown affected RCP(s) within 5 minutes, using ATTACHMENT B, Step B1		Applicant recognized that CCW was flowing to RCPs and N/A'd this step **S / U**
8. **<u>Step 8.a:</u>** 8. Verify adequate CCW flow to Thermal Barriers: a. Check CCW Thermal Barrier Flow Annunciators – CLEAR 00-070C, RCP A THRM BAR CCW FLOW 00-071C, RCP B THRM BAR CCW FLOW 00-072C, RCP C THRM BAR CCW FLOW 00-073C, RCP D THRM BAR CCW FLOW 00-074C, RCP THRM BAR CCW FLOW		Applicant checked all annunciators clear **S / U**
9. Applicant reported step(s) 7 & 8 complete	**THE JPM IS COMPLETE**	

Terminating cue: The JPM Is complete when the applicant has completed steps 7 and 8.

STOP TIME: _______

Initial Conditions: The unit is operating at 100% power. The crew has entered OFN BB-005, RCP MALFUNCTIONS.

Initiating Cue: The Control Room Supervisor directed you to perform steps 7 & 8 of OFN BB-005.

Facility: WCNOC Task No: ___________

Task Title: Set RM-11R Setpoints for a Radioactive Release Job Performance Measure No: S8

K/A Reference: 071/A4.25 (3.2/3.2): Ability to manually operate and/or monitor in the control room: Settings of process radiation monitor alarms, automatic functions, and adjustment of setpoints

Examinee: ___________________________ NRC Examiner: ___________________________

Start: ___________ Stop: ____________ Date: __________________________

Result: Satisfactory / Unsatisfactory Examiner Signature: _______________________

Method of testing: Simulated Performance ____ Actual Performance X

Classroom ____________ Simulator X Plant ________

Initial Conditions:	The Unit is operating at 100% power. Chemistry has presented APF 07B-001-11-07, RADWASTE VENT GAS RELEASE PERMIT, to the control room for a planned release.				
Initiating Cue:	The Control Room Supervisor directed you to enter the Supervisor RM-80 Setpoints listed using SYS SP-121, OPERATION OF THE G.A. MONITOR SYSTEM, step 6.3				
Task Standard:	On RM-11R, the Applicant successfully changed the Radwaste Vent (SP056A, GHE 103) High Setpoint (Channel Item 009) to 6.33E+04 μCi/sec **OR** Low Setpoint (Channel Item 010) to 8.93E+02 μCi/sec				
Required Materials:	1. APF 07B-001-11-07, RADWASTE VENT GAS RELEASE PERMIT 2. SYS SP-121, OPERATION OF THE G.A. MONITOR SYSTEM, Section 6.3 **Simulator Setup: IC 309, IC 31** **JPM Initial Conditions set to run concurrently with S4 JPM**				
References:	APF 07B-001-11-07, RADWASTE VENT GAS RELEASE PERMIT SYS SP-121, OPERATION OF THE G.A. MONTIOR SYSTEM				
Time Critical:	No	Alternate Path:	No	Validation Time:	15 min

START TIME: _______

JPM STEP / PROCEDURE STEP **C** - CRITICAL STEP	CUE	STANDARD
1. **Step 6.3:** Channel Item & Release Setpoint Operations using RM-11 (SP056A)		Applicant located correct step in procedure and continued with this section **S / U**
2. **Step 6.3.1:** 1. **IF** grid 1 is NOT selected **THEN** SELECT grid 1 from the MASTER MENU		On Panel SP056A, Applicant verified that grid 1 was selected **S / U**
3. **Step 6.3.2.1:** 2. To change the value of a Current RM-80 Database Channel Item, PERFORM the following: 1. SELECT LOGIN, located in the MASTER MENU section	**Examiner Note:** Applicant may click on the channel (GHE 103) from Grid 1 to check current setpoint prior to logging on to make the change	On Panel SP056A, Applicant selects LOGIN from the MASTER MENU **S / U**
4. **Step 6.3.2.2:** 2. User login pop up window will appear, requesting user name (super) and the password		On Panel SP056A, Applicant verified that the User Login pop-up appears **S / U**
5. **NOTE:** The password is located in the Shift Managers note book	**CUE:** (as Shift Manager) The password is password	Applicant read and understood NOTE, place kept and proceeded to the next step **S / U**
6. **Step 6.3.2.3:** 3. ENTER the user name (super) and the password in the User Login pop up box		On Panel SP056A, Applicant enters user name (super) and password (password) in the User Login pop up box **S / U**

7. ȼ**Step 6.3.2.3:** 3. ENTER the user name (super) and the password in the User Login pop up box		On Panel SP056A, Applicant enters user name (super) and password (password) in the User Login pop up box **S / U**
8. **NOTE:** When RM-11 is in SUPERVISOR mode the word SUPERVISOR is displayed above the MASTER MENU and a green border appears around the page		Applicant read and understood NOTE, place kept and proceeded to the next step **S / U**
9. ȼ**Step 6.3.2.4:** 4. SELECT ok		On Panel SP056A, Applicant selects ok **S / U**
10. **Step 6.3.2.5:** 5. ENSURE SUPERVISOR is selected by verifying that: o The word SUPERVISOR is displayed in upper right hand corner of the MASTER MENU screen o The green border appears around the page		On Panel SP056A, Applicant verified SUPERVISOR is selected by noting SUPERVISOR in the upper right corner of the MASTER MENU screen and the green border appeared **S / U**
11. ȼ**Step 6.3.2.6:** 6. On grid 1, RIGHT CLICK the selected channel, pop up box will appear		On Panel SP056A, Applicant right clicks instrument GHE103, verified pop up box appeared **S / U**

12. **C<u>Step 6.3.2.7:</u>** 7. SELECT CHANNEL ITEM EDIT		On Panel SP056A, Applicant selects the channel item edit **S / U**
13. **<u>Step 6.3.2.8:</u>** 8. CHECK desired channel is selected ○ **<u>IF</u>** desired channel is NOT selected, **<u>THEN</u>** SELECT channel and PRESS DATABASE in the popup box		On Panel SP056A, Applicant checks desired channel is selected If channel is not selected, Applicant selected desired channel and PRESS DATABASE in the popup box **S / U**
14. **<u>NOTE:</u>** The VALUE will be bordered in red when selected		Applicant read and understood NOTE, place kept and proceeded to the next step **S / U**
15. **C<u>Step 6.3.2.9:</u>** 9. SELECT the VALUE of the Channel Item (CI) to be changed		On Panel SP056A, Applicant selects either channel item 009 **<u>OR</u>** 010, verified that it is bordered in red **S / U**

16. ¢**Step 6.3.2.10:** 10. To open the Channel Item Editor pop up box, PERFORM either of the following: *EDIT SELECTED ITEM – SELECTED *SELECTED CHANNEL ITEM VALUE – DOUBLE CLICK		On Panel SP056A, Applicant opens the channel item editor by either of the following: 1: Selected EDIT SELECTED ITEM **OR** 2: Double Clicks SELECTED CHANNEL ITEM VALUE **S / U**
17. ¢**Step 6.3.2.11:** 11. KEY in the desired Channel Item value in the correct format. Example: 5.79x10-5 is keyed in as 5, ., 7, 9, e, -, 0, 5		On Panel SP056A, Applicant keyed in desired value: GHE103 For Channel item 009 = 6.33E+04 **OR** For Channel item 010 = 8.93E+02 **S / U**
18. ¢**Step 6.3.2.12:** 12. SELECT the SEND TO RM-80 immediately to the right of the NEW VALUE change field		On Panel SP056A, Applicant selected SEND to RM-80 to the right of the NEW VALUE **S / U**

19. ¢**<u>Step 6.3.2.13:</u>** 13. A Change Monitor Item Confirmation pop up box will appear in screen: ○ **<u>IF</u>** the data in the message area is correct, **<u>THEN</u>** PRESS the YES button ○ **<u>IF</u>** the data in the message area is incorrect, **<u>THEN</u>** PRESS the NO button **<u>AND</u>** RETURN to Step 6.3.2.11		On Panel SP056A, Applicant verified change monitor configuration pop up box appears Applicant verified data entered in Step 6.3.2.11 is correct, then pressed the YES button **<u>IF</u>** the data displayed is incorrect, Applicant pressed the NO button and returned to step 6.3.2.11 **S / U**
20. **<u>Step 6.3.2.14:</u>** 14. **<u>IF</u>** the entry is accepted, **<u>THEN</u>** ENSURE the message on the Alarm screen indicates the correct value		On Panel SP056A, Applicant verified on the alarm screen that a message is displayed showing the correct value **S / U**
21. **<u>Step 6.3.2.15:</u>** 15. IF the entry is NOT accepted, THEN VERIFY an error message is displayed		On Panel SP056A, Applicant verified that entry was accepted and this step is N/A, proceeded to next step **S / U**
22. ¢**<u>Step 6.3.3.1:</u>** 3. To change the value of a Master RM-80 Database Channel Item, PERFORM the following: 1. KEY in the desired Channel Item value in the correct format. Example: 5.79x10-5 is keyed in as 5, ., 7, 9, e, -, 0, 5		On Panel SP056A, Applicant keyed in desired value: Keyed same values as on Step 6.3.2.11 **S / U**

23. **<u>Step 6.3.3.2:</u>** 2. SELECT the SEND TO MASTER box immediately to the right of the SEND TO RM-80 box		On Panel SP056A, Applicant selects SEND TO MASTER to the right of the SEND to RM-80 box **S / U**
24. **<u>Step 6.3.3.3:</u>** 3. A Channel Change Item Confirmation pop up box will appear on screen: o **<u>IF</u>** the data in the message area is correct, **<u>THEN</u>** PRESS the YES button o **<u>IF</u>** the data in the message area is incorrect, **<u>THEN</u>** PRESS the NO button **<u>AND</u>** RETURN to step 6.3.3.1		On Panel SP056A, Applicant verified change monitor configuration pop up box appears Applicant verified data entered in step 6.3.3.1 is correct, then pressed the YES button **<u>IF</u>** the data displayed is incorrect, presses the NO button and returns to step 6.3.3.1 **S / U**
25. **<u>NOTE:</u>** If RM-80 and master setpoints do NOT match, the setpoint value will remain orange		Applicant read and understood NOTE, place kept and proceeded to the next step **S / U**
26. **<u>Step 6.3.3.4:</u>** 4. **<u>IF</u>** the entry is accepted, **<u>THEN</u>** ENSURE the message on the Alarm screen indicates the correct value		On Panel SP056A, Applicant verified on the alarm screen that a message is displayed showing the correct value **S / U**

27. **<u>Step 6.3.3.5:</u>** 5. IF the entry is NOT accepted, THEN verify an error message is displayed		On Panel SP056A, Applicant verified that entry was accepted and this step is N/A, proceeded to next step **S / U**
28. **<u>NOTE:</u>** When successfully logged out, the LOG OUT will disappear from the screen		Applicant read and understood NOTE, place kept and proceeded to the next step **S / U**
29. **<u>Step 6.3.3.6:</u>** 6. WHEN no further changes are desired, THEN PERFORM the following: a. CLOSE the CHANNEL ITEM EDITOR pop up box b. SELECT the LOG OUT	**<u>Examiner Note:</u>** The Applicant will continue in the procedure to repeat entering the other channel setpoint change. The JPM mat be ended at this point **<u>CUE:</u> The JPM is complete.** <u>RECORD STOP TIME BELOW.</u>	On Panel SP056A, Applicant selects ok **S / U**

Terminating cue: The JPM Is complete when the Applicant has completed entering the first setpoint change in the RM-11R

STOP TIME: _______

Initial Conditions: The Unit is operating at 100% power. Chemistry has presented APF 07B-001-11-07, RADWASTE VENT GAS RELEASE PERMIT, to the control room for a planned release.

Initiating Cue: The Control Room Supervisor directed you to enter the Supervisor RM-80 Setpoints listed using SYS SP-121, OPERATION OF THE G.A. MONITOR SYSTEM, step 6.3

Facility: WCNOC Task No: ____________

Task Title: Line up EDG for Auto start per SYS KJ-121 Job Performance Measure No: P1

K/A Reference: 064/A4.05 (3.1/3.2): Ability to manually operate and/or monitor in the control room: Transfer of ED/G control between manual and automatic

Examinee: ____________________ NRC Examiner: ____________________

Start: ____________ Stop: ____________ Date: ____________________

Result: Satisfactory / Unsatisfactory Examiner Signature: ____________________

Method of testing: Simulated Performance X Actual Performance ____

Classroom ____________ Simulator ____________ Plant X

Initial Conditions:	The unit is stable in MODE 4. The crew has just completed a surveillance run on 'A' Emergency Diesel Generator.				
Initiating Cue:	The Control Room Supervisor directs you to place 'A' Emergency Diesel Generator in standby for automatic operation in accordance with SYS KJ-121, DIESEL GENERATOR NE01 AND NE02 LINEUP FOR AUTOMATIC OPERATION, Section 6.1 The Jacket Water Cooling System and Intercooler Cooling Water System were NOT drained The governor oil was NOT drained. The EDG will not be run again. Prerequisites are completed.				
Task Standard:	The applicant placed the 'A' EDG in standby per SYS KJ-121, Section 6.1.				
Required Materials:	1. SYS KJ-121, DIESEL GENERATOR NE01 AND NE02 LINEUP FOR AUTOMATIC OPERATION				
References:	SYS KJ-121, DIESEL GENERATOR NE01 AND NE02 LINEUP FOR AUTOMATIC OPERATION				
Time Critical:	No	Alternate Path:	Yes	Validation Time:	20 min

START TIME: _______

JPM STEP / PROCEDURE STEP C - CRITICAL STEP	CUE	STANDARD
Examiner Note: If Applicant asks for or questions IV(s), state that another Operator is waiting in the relief area to perform once you have completed		
1. **Step 6.1.1:** IF EDG NE01 Jacket Water Cooling System OR Intercooler Cooling Water System have been drained, THEN VENT EDG NE01 Intercooler and Jacket Water Heat Exchangers:		Applicant recognized from initiating cue this step is N/A and proceeded to the next step **S / U**
2. **NOTE** If EDG NE01 is to be started for maintenance testing Steps 6.1.2 and 6.1.3 may be marked N/A. These minimum temperature requirements must be met prior to declaring the EDG operable of performing STS's to prove operability. The minimum temperature for operability for Jacket Water temperature is 105^{o}F. The alarm setpoint is 135^{o}F		Applicant read and understood NOTE, place kept and proceeded to next step **S / U**
3. **Step 6.1.2:** 2. VERIFY Jacket Water temperature FROM ENGINE is greater than or equal to 135°F. Jacket Water Temp____^{o}F	**When** Applicant locates gage and describes reading it, **Then:** **CUE:** Point to 140°F	On Panel KJ121, Applicant located Jacket Water temperature and verified temperature, recorded in space provided **S / U**

4. **Step 6.1.3:** 3. VERIFY Lube Oil temperature TO ENGINE is greater than or equal to 115°F. Lube Oil Temp______ºF	**When** Applicant locates gage and describes reading it, **Then:** **CUE:** Point to 120°F	On Panel KJ121, Applicant located Lube Oil temperature and verified temperature, recorded in space provided **S / U**
5. **Step 6.1.4:** 4. VERIFY Fuel Oil Storage Tank TJE01A level is greater than or equal to 82% (88,170 gallons), as indicated by JE LI-5A or computer point JEL005 TJE01A Level_________%	**When** Applicant locates indicator and describes reading it, **Then:** **CUE:** As indicated	On southeast wall of the DG room, Applicant Located Fuel Oil Storage Tank level and verified level, recorded in space provided **S / U**
6. **Step 6.1.5:** 5. VERIFY Emergency Fuel Oil Day Tank TJE02A level is greater than 61%. TJE02A Level________%	**When** Applicant locates indicator and describes reading it, **Then:** **CUE:** Point to 70%	On Panel KJ121, Applicant Located Day Tank level and verified level, recorded in space provided **S / U**
7. **Step 6.1.6:** 6. ENSURE NB0111, FDR EMER DG NE01 is racked up ○ NB0111 – RACKED UP	**Examiner Note:** This step should be discussed without opening the cubicle door. **When** discussed and checked, Then: **CUE:** Charged flag is visible, alignment is proper, positive interlock roller is free to turn	In NB01 Switchgear Room, Applicant located Breaker NB0111 and verified: • Yellow "charged" flag • Proper alignment • Positive interlock roller free to turn Applicant determined breaker is RACKED UP **S / U**

8. **<u>CAUTION</u>** If governor oil level is out of sight glass high or low, the EDG is inoperable		Applicant reads and acknowledges caution, place keeps, and proceeds to next step **S / U**
9. **<u>Step 6.1.7:</u>** 7. ENSURE EDG NE01 governor oil level is satisfactory in sight glass ○ Oil level - BETWEEN 1/2 AND 3/4 FULL	**<u>When</u>** Applicant locates indication and describes reading it, **<u>Then:</u>** **<u>CUE:</u>** 3/4	Applicant Located the sight glass on the engine side of the governor. Checked that oil is visible in the sight glass. Realized from the cues that the engine has been run since the governor was drained last **S / U**
10 **<u>Step 6.1.8:</u>** 8. RECORD NE01 Governor Speed Set________________. ○ **<u>IF</u>** Governor Speed Set is <u>NOT</u> as per CKL ZL-004, TURBINE BUILDING READING SHEETS, **<u>THEN</u>**, NOTIFY the SM **<u>AND</u>** CONSULT System Engineering	**<u>When</u>** Applicant locates speed set and describes reading it, **<u>Then:</u>** **<u>CUE:</u>** As indicated **<u>When</u>** Applicant discusses comparing readings, **<u>Then:</u>** **<u>CUE:</u>** Governor Speed Set matches logs	Applicant located speed set knob on governor and verified position, recorded in space provided **S / U**

11 **<u>NOTES</u>** ○ When closing petcocks, do NOT use excessive force. Torque applied should NOT be greater than the torque generated using either a open or closed end box wrench with a moment-arm if no greater than 5” ○ Petcocks are reverse seating and rise away from the valve block when turned in the clockwise direction to close the valve		Applicant reads and acknowledges note, place keeps, and proceeds to next step **S / U**
12 **<u>Step 6.1.9:</u>** 9. ENSURE EDG NE01 cylinder petcocks closed. ○ Petcocks - CLOSED	**<u>When</u>** Applicant has located the wrench and as each petcock is tested in turn, **<u>Then:</u>** **<u>CUE:</u>** No movement occurred.	With an open end box wrench Applicant simulated turning each petcock in the clockwise direction to verify no movement. **S / U**

13 C **<u>Step 6.1.10:</u>** 10. CHECK both EDG NE01 lockout relays RESET: 1. **<u>IF</u>** either EDG NE01 lockout relay blue light NOT lit, **<u>THEN</u>** RESET affected lockout relay 2. Lockout Relay Blue Lights - LIT ***<u>*Commence Alternate Path*</u>*** **<u>Lockout Relays Require manual Reset</u>**	**<u>When</u>** Applicant locates lockout relays, **<u>Then:</u>** **<u>CUE:</u>** Neither light is lit **<u>When</u>** Applicant describes how to reset the lockout relays, **<u>Then:</u>** **<u>CUE:</u>** As each relay is reset, BLUE light lit **<u>IF</u>** Applicant contacts the control room, **<u>Then:</u>** **<u>CUE:</u>** acknowledge report	On Panel NE107, Applicant located the lights and each Lockout Relay, determined they were not reset, and simulated resetting the relays Applicant may contact the control room to inform them of the required reset. **S / U**
14 C **<u>Step 6.1.11:</u>** 11. At NE107, DEPRESS KJ HS-12, ENGINE SHUTDOWN RESET ○ KJ HS-12 – DEPRESSED	**<u>When</u>** the Applicant locates the Shutdown reset, **<u>Then:</u>** **<u>CUE:</u>** Button depressed	On Panel NE107, Applicant located ENGINE SHUTDOWN RESET pushbutton and simulated depressing **S / U**
15 **<u>Step 6.1.12:</u>** 12. At NG03DBF3, ENSURE KJ HS-89, DPKJ02A STANDBY DIESEL ROCKER ARM PRE-LUBE PUMP MOTOR is in auto ○ KJ HS-89 – AUTO	**<u>When</u>** Applicant locates switch and describes position, **<u>Then:</u>** **<u>CUE:</u>** Control switch indicates AUTO	At MCC NG03D, Applicant located control switch on breaker BF3 and verified it is in AUTO **S / U**

16	**NOTE** Placing KJ HS-9, MASTER TRANSFER SWITCH to local will cause annunciator 00-020E, DG NE01 OOS to alarm and make the EDG inoperable		Applicant reads and acknowledges note, place keeps, and proceeds to next step **S / U**
17	**Step 6.1.13:** 13. **IF** Exciter Shutdown amber light is lit, **THEN** RESET Exciter Shutdown, by performing the following:	**When** Applicant locates and discusses amber light, **Then:** **CUE:** Amber light is NOT lit	On Panel NE107, Applicant locates Exciter Shutdown amber light and determines it is NOT lit **S / U**
18	**Step 6.1.14:** 14. ENSURE all target relays with dropped flags are reset	**When** Applicant locates and discusses relays, **Then:** **CUE:** All flags are reset	On Panel NE107, Applicant locates relays and determines all relays are reset **S / U**
19	C **Step 6.1.15:** 15. At NE107, ENSURE KJ HS-9, MASTER TRANSFER SWITCH in auto. ○ KJ HS-9 – AUTO	**When** Applicant locates and discusses switch, **Then:** **CUE:** Switch indicates AUTO	On Panel NE107, Applicant located KJ HS-9 and determined switch is in the AUTO position **S / U**
20	**Step 6.1.16:** 16. ENSURE KJ HS-73, FIELD FLASHING CONTROL SW is in rated position ○ KJ HS-73 – RATED/AUTO FLASH	**When** Applicant locates and discusses switch, **Then:** **CUE:** Switch indicates RATED/AUTO FLASH	On Panel NE107, Applicant located KJ HS-73 and verified it is in the RATED position **S / U**

21 **Step 6.1.17:** 17. ENSURE EDG NE01 barring device is removed. o Barring Device - REMOVED	**When** Applicant locates and describes barring device block, **Then:** **CUE:** Barring device is NOT present	On the Diesel engine, Applicant located the area where the barring device is inserted, on the side of the engine below the fuel racks and verifies the device is removed **S / U**
22 C **Step 6.1.18:** 18. ENSURE KJ-V775A, ENGINE DRIVEN JACKET WATER PUMP 6A PT-64 INSTRUMENT AIR ISO is open o KJ-V775A – OPEN ***Commence Alternate Path**** **KJ-V775A should be open**	**When** Applicant locates and discusses checking the valve open, **Then:** **CUE:** Valve does not move in the clockwise direction **When** Applicant discuss opening the valve, **Then:** **CUE:** Valve handwheel is moving, handwheel stops moving, valve is open **IF** Applicant calls control room to report valve out of position, **Then:** **Cue:** Acknowledge report	Applicant located Air Iso to PT-64 and determined the valve was closed, simulates opening the valve Applicant may contact the control room to report valve found out of position **S / U**

23 **<u>Step 6.1.19:</u>** 19. CHECK all EDG NE01 alarms clear: ○ Local Panel KJ121 – ALL ANNUNCIATORS CLEAR ○ Main Control Board – ALL EDG A ANUNCIATORS CLEAR	**<u>When</u>** Applicant discusses checking KJ-121 alarm panel, **<u>Then:</u>** **<u>CUE:</u>** No alarms present **<u>When</u>** Applicant discusses contacting the Main Control Room, **<u>Then:</u>** **<u>CUE:</u>** No alarms present in the Main Control Room	On Panel KJ-121, Applicant verified all alarms clear Applicant simulates contacting the Main Control Room and determined all alarms clear in the Main Control Room **S / U**
24 **<u>Step 6.1.20:</u>** 20. CHECK fuse indication lights on panel NE107 are lit: ○ IL-7 – LIGHT ON ○ IL-8 – LIGHT ON ○ IL-9 – LIGHT ON ○ IL-10 – LIGHT ON ○ IL-11 – LIGHT ON	**<u>When</u>** Applicant locates and describes the indication of the fuse lamps, **<u>Then:</u>** As each is checked, **<u>CUE:</u>** Light is Lit	On Panel NE107, Applicant verifies all fuse lights are lit **S / U**
25 **<u>Step 6.1.21:</u>** 21. ENSURE KJBS0001A, BASKET STRAINER FUEL OIL PUMP is aligned to one side of the duplex strainer	**<u>When</u>** Applicant locates and describes checking how the strainer is aligned, **<u>Then:</u>** **<u>CUE:</u>** As indicated.	Applicant locates Fuel Oil Pump Basket Strainer and verifies alignment **S / U**
26 **<u>NOTE</u>** The following step verifies that relay ASR is deenergized		Applicant reads and acknowledges note, place keeps, and proceeds to next step **S / U**

27 **Step 6.1.22:** 22. In KJ121, visually observe that the blue plunger of relay ASR is extended out approximately 3/8"	**When** Applicant describes where the plunger is and what to look for, **Then:** **CUE:** Plunger is out 3/8"	On Panel KJ-121, Applicant located relay ASR plunger and verified its position **S / U**
28 **Step 6.1.23:** **IF** EDG has been operated at loads less than 20% (1.25 MW) for greater than 10 hours, **THEN** slowly LOAD engine, approximately 400 Kw/min, to a load of 3 MW and run at this load for at least one hour. Then EDG shall be loaded to full load for at least one hour, prior to returning to standby		Applicant will recognize from Initial Conditions that Diesel was run at greater than 20% for operability and proceeds to next step **S / U**
29 **Step 6.1.24:** Section 6.1, Aligning DG NE01 For Automatic Operation, complete.	**CUE: The JPM is complete.** RECORD STOP TIME BELOW.	Applicant completes procedure **S / U**

Terminating cue: The JPM Is complete when the Applicant has successfully completed section 6.1 of SYS KJ-121

STOP TIME: _______

Plant equipment shall not be operated, if you have a question about the task or need clarification do not hesitate to ask your evaluator. JPM's are considered "open reference", therefore reference material that is normally available to you in the plant (including the Control Room) is available during this JPM. If you desire to use a reference, ask your evaluator if it is acceptable to do so for the task under consideration. You **may not** solicit technical information from other operators, engineers or technical advisors.

Initial Conditions: The unit is stable in MODE 4. The crew has just completed a surveillance run on ‘A’ Emergency Diesel Generator.

Initiating Cue: The Control Room Supervisor directs you to place ‘A’ Emergency Diesel Generator in standby for automatic operation in accordance with SYS KJ-121, DIESEL GENERATOR NE01 AND NE02 LINEUP FOR AUTOMATIC OPERATION, Section 6.1

The Jacket Water Cooling System and Intercooler Cooling Water System were NOT drained

The governor oil was NOT drained.

The EDG will not be run again.

Prerequisites are completed.

Facility: WCNOC Task No: ___________

Task Title: Open reactor Trip Breakers as directed by EMG FR-S1 Job Performance Measure No: P2

K/A Reference: 012/A4.06 (4.3/4.3): Ability to manually operate and/or monitor in the control room: Reactor Trip Breakers

Examinee: ____________________ NRC Examiner: ____________________

Start: __________ Stop: ___________ Date: ____________________

Result: Satisfactory / Unsatisfactory Examiner Signature: ____________________

Method of testing: Simulated Performance X Actual Performance ____

Classroom ____________ Simulator __________ Plant X

Initial Conditions:	A Turbine trip occurred from 100% power, and the Reactor failed to trip in both automatic and manual. The crew is performing EMG FR-S1, RESPONSE TO NUCLEAR POWER GENERATION/ATWS No testing was in progress at the time of Turbine Trip				
Initiating Cue:	The Control Room Supervisor directs you to locally open reactor trip and bypass breakers				
Task Standard:	Applicant locally opened both reactor trip and bypass breakers				
Required Materials:	None				
References:	EMG FR-S1, RESPONSE TO NUCLEAR POWER GENERATION/ATWS				
Time Critical:	No	Alternate Path:	No	Validation Time:	10 min

START TIME: _______

JPM STEP / PROCEDURE STEP Ͼ - CRITICAL STEP	CUE	STANDARD
<u>Examiner Note:</u> JPM steps 2-5 may be performed in any order, Bypass breakers in the given plant conditions should already be open		
1. Operator dispatched to locally open reactor trip and bypass breakers		Applicant proceeded to the 2026' Level of the Auxiliary Building and entered the Rod Drive M/G Room **S / U**
2. **<u>Locally open reactor trip and bypass breakers</u>** ϾOpen Reactor Trip Breaker 'A'	**<u>WHEN</u>** Applicant simulates depressing the TRIP pushbutton, **<u>THEN:</u>** **<u>CUE:</u>** Breaker trip sound is heard and OPEN appears in the window	On Panel SB102B, Applicant located Reactor Trip Breaker 'A', removed MANUAL TRIP COVER and depressed TRIP pushbutton **S / U**
3. **<u>Locally open reactor trip and bypass breakers</u>** ϾOpen Reactor Trip Breaker 'B'	**<u>WHEN</u>** Applicant simulates depressing the TRIP pushbutton, **<u>THEN:</u>** **<u>CUE:</u>** Breaker trip sound is heard and OPEN appears in the window	On Panel SB102B, Applicant located Reactor Trip Breaker 'B', removed MANUAL TRIP COVER and depressed TRIP pushbutton **S / U**

JPM STEP / PROCEDURE STEP C - CRITICAL STEP	CUE	STANDARD
4. **<u>Locally open reactor trip and bypass breakers</u>** CBypass Breaker 'A'	**<u>IF</u>** Applicant simulates removing manual trip cover to verify breaker is open, **<u>THEN:</u>** **<u>CUE:</u>** window indicates OPEN	Applicant determined from initial conditions that the Bypass Breaker was open **<u>OR</u>** On Panel SB102A, Applicant located Bypass Breaker 'A', removed MANUAL TRIP COVER, removed it and verified breaker indication as OPEN **S / U**
5. **<u>Locally open reactor trip and bypass breakers</u>** CBypass Breaker 'B'	**<u>IF</u>** Applicant simulates removing manual trip cover to verify breaker is open, **<u>THEN:</u>** **<u>CUE:</u>** window indicates OPEN	Applicant determined from initial conditions that the Bypass Breaker was open **<u>OR</u>** On Panel SB102A, Applicant located Bypass Breaker 'B', removed MANUAL TRIP COVER, removed it and verified breaker indication as OPEN **S / U**
6. Control Room notified that Reactor Trip and Bypass Breakers are Open	**<u>CUE:</u> The JPM is complete.** <u>RECORD STOP TIME BELOW.</u>	Applicant contacted the control room and reported that Reactor Trip and Bypass Breakers are open **S / U**

Terminating cue: The JPM Is complete when the applicant has opened the Reactor Trip Breakers

STOP TIME: _______

Plant equipment shall not be operated, if you have a question about the task or need clarification do not hesitate to ask your evaluator. JPM's are considered "open reference", therefore reference material that is normally available to you in the plant (including the Control Room) is available during this JPM. If you desire to use a reference, ask your evaluator if it is acceptable to do so for the task under consideration. You **may not** solicit technical information from other operators, engineers or technical advisors.

Initial Conditions: A Turbine trip occurred from 100% power, and the Reactor failed to trip in both automatic and manual. The crew is performing EMG FR-S1, RESPONSE TO NUCLEAR POWER GENERATION/ATWS

No testing was in progress at the time of Turbine Trip

Initiating Cue: The Control Room Supervisor directs you to locally open reactor trip and bypass breakers

Facility: WCNOC

Task No: ____________

Task Title: Isolate RCP seals per EMG C-0, Step 16

Job Performance Measure No: P3

K/A Reference: 003/A4.01 (3.3/3.2): Ability to manually operate and/or monitor in the control room: Seal injection

Examinee: ____________________________

NRC Examiner: ____________________________

Start: ____________ Stop: _____________

Date: ____________________________

Result: Satisfactory / Unsatisfactory

Examiner Signature: ________________________

Method of testing:

Simulated Performance X

Actual Performance ____

Classroom ______________

Simulator ___________

Plant X

Initial Conditions:	The unit tripped due to a complete loss of all AC power. The crew has entered EMG C-0, LOSS OF ALL AC POWER.
Initiating Cue:	The Control Room Supervisor has directed you to perform EMG C-0, LOSS OF ALL AC POWER, Step 16, to locally close valves to isolate RCP seals.
Task Standard:	Applicant closed BG HV-8100, BG -V101, BG V105, EG HV-61, and EG HV-133 to isolate RCP seals per EMG C-0, LOSS OF ALL AC POWER, Step 16.
Required Materials:	1. EMG C-0, LOSS OF ALL AC POWER, Step 16
References:	EMG C-0, LOSS OF ALL AC POWER

Time Critical:	No	Alternate Path:	No	Validation Time:	15 min

START TIME: _______

JPM STEP / PROCEDURE STEP Ͼ - CRITICAL STEP	CUE	STANDARD
1. Ͼ**Step 16.a:** 16. Dispatch Personnel To Locally Close Valves to Isolate RCP Seals: a. Seal Water Return Containment Isolation Valve ○ BG HV-8100 (2000'AUX BLDG, SOUTH PIPE PEN ROOM LOWER LEVEL)	**When** the Applicant locates the valve and discusses engaging the declutch **Then:** **CUE:** Declutch lever is engaged **When** the Applicant discusses closing the valve **Then:** **CUE:** Handwheel is turning in the clockwise direction Stem is inserting Handwheel stops turning Stem is inserted	Applicant located valve BG HV-8100 in the Aux Building, 2000' level, South Penetration Room Applicant simulated disengaging clutch lever while turning the handwheel in a clockwise direction Declutch lever may be released once it engages Applicant continued turning the handwheel clockwise until the stem was fully inserted and the handwheel stopped turning **S / U**

JPM STEP / PROCEDURE STEP Ꞔ - CRITICAL STEP	CUE	STANDARD
2. Ꞔ**Step 16.b:** b. Seal Water Injection Filters Inlet Isolations ○ BG-V101 (2000' AUX BLDG., DEMIN ALLEY BA/SEAL INJ FILTER A VALVE ROOM) ○ BG-V105 (2000' AUX BLDG, DEMIN ALLEY CTMT COOLANT FILTER/SEAL INJ FILTER B VALVE ROOM)	**Examiner Note:** reach rods are disconnected **When** the Applicant locates the valve(s) and discusses closing the valve(s) **Then:** **CUE:** T-handle is turning in the clockwise direction Stem is inserting T-handle stops turning Stem is inserted	Applicant located valve BG-V101 T-handle operator in the Aux Building, 2000' level in the Demin Alley BA/Seal Inj Filter A Valve Room Applicant turned the operator clockwise until the operator stopped turning and noted the stem position Applicant located valve BG-V105 T-handle operator in the Aux Building, 2000' level in the Demin Alley CTMT Coolant Filter/Seal Inj Filter B Valve Room Applicant turned the operator clockwise until the operator stopped turning and noted the stem position **S / U**

JPM STEP / PROCEDURE STEP Ͼ - CRITICAL STEP	CUE	STANDARD
3. Ͼ**Step 16.c:** c. CCW Return From RCS Isolation Valve ○ EG HV-61 (2000' AUX BLDG NORTH PIPE PEN ROOM)	**When** the Applicant locates the valve and discusses engaging the declutch **Then:** **CUE:** Declutch lever is engaged **When** the Applicant discusses closing the valve **Then:** **CUE:** Handwheel is turning in the clockwise direction Stem is inserting Handwheel stops turning Stem is inserted	Applicant located valve EG HV-61 in the Aux Building, 2000' level, North Penetration Room Applicant simulated disengaging clutch lever while turning the handwheel in a clockwise direction Declutch lever may be released once it engages Applicant continued turning the handwheel clockwise until the stem was fully inserted and the handwheel stopped turning **S / U**

JPM STEP / PROCEDURE STEP ₢ - CRITICAL STEP	CUE	STANDARD
4. ₢**Step 16.d:** d. CCW From RCS CTMT Isolation Valve Bypass EG HV-133 (2000' AUX BLDG NORTH PIPE PEN ROOM)	**When** the Applicant locates the valve and discusses engaging the declutch **Then:** **CUE:** Declutch lever is engaged **When** the Applicant discusses closing the valve **Then:** **CUE:** Handwheel is turning in the clockwise direction Stem is inserting Handwheel stops turning Stem is inserted	Applicant located valve EG HV-133 in the Aux Building, 2000' level, North Penetration Room Applicant simulated disengaging clutch lever while turning the handwheel in a clockwise direction Declutch lever may be released once it engages Applicant continued turning the handwheel clockwise until the stem was fully inserted and the handwheel stopped turning **S / U**
5. Inform the Control Room that step 16 of EMG C-0 has been completed	**When** the Applicant contacts the Control Room **Then:** **CUE:** Acknowledge report **CUE: The JPM is complete.** RECORD STOP TIME BELOW.	Applicant informed the Control Room that step 16 of EMG C-0 is complete **S / U**

JPM STEP / PROCEDURE STEP **C** - CRITICAL STEP	CUE	STANDARD

Terminating cue: The JPM Is complete when the Applicant has successfully completed step 16 of EMG C-0, LOSS OF ALL AC POWER

STOP TIME: _______

Plant equipment shall not be operated, if you have a question about the task or need clarification do not hesitate to ask your evaluator. JPM's are considered "open reference", therefore reference material that is normally available to you in the plant (including the Control Room) is available during this JPM. If you desire to use a reference, ask your evaluator if it is acceptable to do so for the task under consideration. You **may not** solicit technical information from other operators, engineers or technical advisors.

Initial Conditions: The unit tripped due to a complete loss of all AC power. The crew has entered EMG C-0, LOSS OF ALL AC POWER.

Initiating Cue: The Control Room Supervisor has directed you to perform EMG C-0, LOSS OF ALL AC POWER, Step 16, to locally close valves to isolate RCP seals.

Facility: Wolf Creek Scenario No.: 1 Op-Test No.: December 2019

Examiners: ______________ Operators: ______________

Initial Conditions: 4% Power, BOL, Yellow Train In Service, ‘A’ MFP Running, ‘A’ RHR Pump out of service.

Turnover: The unit is operating at 4% power, BOL with ‘A’ MFP in service. Power ascension is on hold due to emergent work on ‘A’ RHR Pump. ‘A’ RHR Pump is tagged out and is expected to be restored to service in 1 hour. LCO 3.5.2, COND A was entered. GEN 00-003, HOT STANDBY TO MINIMUM LOAD is in progress, on step 6.10, maintain power level while the oncoming crew briefs entry to MODE 1. Temperature is being controlled using Steam Dumps in Automatic. MCB Annunciators 103D and E are listed on the White Board.

Critical Tasks: **CT-1** Manually start either ‘A’ or ‘C’ CCW Pump after SIS. **CT-2** Close either BG HIS-8160 or BG HIS-8152 to isolate CTMT. **CT-3** Initiate Cooldown of the RCS prior to RWST Level dropping below 68% per EMG C-11.

Event No.	Malf. No.	Event Type*	Event Description
1		C (BOP/CRS)	AE FK-560, ‘B’ S/G Feed Reg Bypass Valve fails OPEN in Auto, Manual Available ALR 00-109B or 109C
2		C (ATC/CRS) Tech Specs	Loss of Vital 120 VAC Instrument Bus NN03 OFN NN-021 LCO 3.8.9 COND C
3		I (ATC/CRS) Tech Specs	BB PI-455, Upper Selected PZR Pressure Channel fails LOW OFN SB-008, ATT K LCO 3.3.1 Functions 6, 8, COND A, E LCO 3.3.2, Functions 1d, 3a3, 5d, 6e, 8b, COND A, D, L
4		I (All)	AB UK-33, Steam Dump Cooldown CTRL fails HIGH in Auto AP15C-003, OFN AB-041
5		M (All)	Earthquake, Large Break LOCA (6”) on Loop 4 Cold Leg EMG E-0, EMG E-1
6		C (ATC/CRS)	Valves BG HV-8160, BG HV-8152, and KA HIS-29B fail to Auto Close on CISA EMG E-0, ATT F, Step F3
7		C (BOP/CRS)	Both Red Train CCW Pumps fail to autostart on SIS EMG E-0, ATT F, Step F6
8		C (All)	‘B’ RHR Pumps trips on SIS due to suction valve failure EMG C-11

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

Target Quantitative Attributes per Scenario (See Section D.5.d)	Actual Attributes	ES-301-5	CRS	ATC	BOP
1. Malfunctions after EOP entry (1–2)	3	Rx	0	0	0
2. Abnormal events (2–4)	4	Nor	0	0	0
3. Major transients (1–2)	1	I/C	7	5	4
4. EOPs entered/requiring substantive actions (1–2)	2	Maj	1	1	1
5. Entry into a contingency EOP with substantive actions (≥ 1 per scenario set)	1	TS	2	0	0
6. Preidentified critical tasks (≥ 2)	3				

Critical Task	Safety Significance	Cueing	Measurable Performance Indicators	Performance Feedback
CT1: Close either BG HIS-8160 or BG HIS-8152 containment isolation valves before completion of EMG E-0, Attachment F.	The non-essential containment penetrations are isolated to prevent potential release of radioactive materials from containment. With both BG HIS-8160 and BG HIS-8152 open, a release path to the environment exists. KA HIS-29B is failed open to prevent these valves from failing closed.	Red lights lit on *BG HIS-8160 *BG HIS-8152 ESFAS Status PANEL CISA Section White Lights NOT LIT. *BGHV8152 (Red) *BGHV8160(Yellow)	On Panel RL001, Depress CLOSE on: *BG HIS-8160 *BG HIS-8152	Green lights lit on *BG HIS-8160 *BG HIS-8152 ESFAS Status Panel ICSA Section White Lights LIT for Yellow Train if BG HV8160 closed. Red Train White Lights require both BG HV8152 and KA HIS28B closed.
CT2: Manually start 'A' or 'C' CCW pump to cool Red Train ECCS equipment within 30 minutes to prevent the loss of CCP or SI pumps.	Failure to maintain CCW flow to ECCS components would result in a reduction of margin of safety due to loss of Red Train caused only by improper crew response. AI 21-016 specifies TSA to trip CCPs and SIPs on a loss of CCW cooling within 30 minutes.	Green lights are lit on both Yellow train hand switches * EG HIS-21 and * EG HIS-23.	On Panel RL-019, Manually start one Yellow Train CCW Pump. Either: * EG HIS-21 or * EG HIS-23.	Red Light on the manipulated hand switch, * EG HIS-21 or * EG HIS-23.
CT3 Initiate RCS Cooldown To Cold Shutdown before RWST level reaches the unacceptable region of EMG C-11, Figure 1 (68%).	Reduce the need for supporting plant systems and equipment required for heat removal	EMG C-11, Step 14 procedure direction.	Manipulation of S/G ARVs * AB PIC-1A * AB PIC-2A * AB PIC-3A * AB PIC-4A Or TDAFWP Pump at Max Load	Monitor NPIS Cooldown Rate <100F established or verified to exist by the crew.

Note: Causing an unnecessary plant trip or ESF actuation may constitute a Critical Task failure. Actions taken by the applicant(s) will be validated using the methodology for critical tasks in Appendix D to NUREG-1021.

SCENARIO # 1 NARRATIVE

Turnover: The Unit is operating at 4% power, BOL with ‘A’ MFP in service. Power ascension is on hold due to emergent work on ‘A’ RHR Pump. ‘A’ RHR Pump is tagged out and is expected to be restored to service in 1 hour. LCO 3.5.2 COND A was entered. Maintain current power level while the crew briefs for entering MODE 1. Annunciators 103D and 103E are written on the White Board.

Event 1: AE FK-560, ‘B’ MFRV Bypass valve fails OPEN in Auto. Level in ‘B’ S/G rises. Annunciator 109B will actuate if level rises to 55%. The BOP and CRS will respond using ALR 00-109B to take Manual Control and restore level. After plant conditions are stable, the next event will start as directed by the Lead Examiner.

Event 2: Loss of bus NN03. Annunciators 027A and 027C will actuate, indicating a loss of instrument bus power, as well as multiple annunciators that are symptoms of that power loss. Partial Trip Status PERMIS/BLOC Panel, SB-069, will also show columns of white lights for the loss of NN03 powered equipment. The CRS will direct “Select out Blue” which will prompt which will prompt ATC and BOP Operators to select alternate channels as memory actions. The ATC will select manual on the PZR Master Pressure Controller before selecting an alternate channel to prevent lifting a PORV. The BOP will manually isolate ‘C’ ARV. The crew will perform OFN NN-021 and dispatch the Turbine Building Watch to investigate the loss of power, which was due to a maintenance worker inadvertently bumping open breaker NN0301. Closing this breaker restores power to NN03. Once the crew has reenergized the bus and determined applicable technical specifications, the next event will start as directed by the Lead Examiner.

Event 3: BB PI-455, Upper Selected PZR Pressure Channel fails LOW. The PZR heaters will energize causing RCS Pressure to rise. The ATC will take Manual Control of the Master Pressurizer controller and restore pressure to normal operating band as a Memory Action. Failure to accomplish this task properly will result in a PORV lifting. The crew will address the instrument failure using OFN SB-008, ATT K to select out the failed channel and restore automatic pressure control. Once the CRS has evaluated technical specifications, the next event will start at the direction of the Lead Examiner.

Event 4: AB UK-33, Steam Dump Cooldown Controller fails HIGH in Auto. Controller Failure will be diagnosed by AB UK-33 output rising to 100% and the three Steam Dump Valves, AB UV34, AB UV-45 and AB UV41 fully opening. As a result of the steam dump valves opening, Tavg will drop, adding positive reactivity which will cause inadvertent MODE change to MODE 1 without prompt Operator Action. S/G Levels rise due to swell causing MCB Annunciators 109B-111B to actuate. The BOP should take manual control of the failed AB UK-33 controller per AP15C-003, Manual Back-up to stabilize plant conditions. Once plant conditions are stable, the Major event will start as directed by the Lead Examiner.

Event 5: Earthquake, Large Break LOCA (6”) on Loop 4 Cold Leg. The earthquake will be felt and associated annunciators will all actuate (98B, 98D, 98E). The crew will diagnose RCS pressure and PZR Level lowering, as well as degrading conditions in CTMT, and manually trip the Reactor, actuate SI and perform EMG E-0 Immediate Actions. The next three post-trip events will also be addressed by the crew.

Event 6: Three CTMT Isolation Valves fail to close on CISA. (BG HV-8160, BG HV-8152, and KA HIS-29). This failure will be indicated on the ESF SYS Status Indication boards. The ATC, while performing EMG E-0, ATTACHMENT F should manually close one of the two valves Letdown valves to isolate the open path from CTMT while performing Step F3. The failure of KA HIS-29 supports the critical task as BG HIS-8160 fails closed on a loss of air to containment.

CT1: Close either BG HV-8152 or BG HV-8160 containment Phase-A isolation valves to isolate a relief path from containment prior to completion of EMG E-0, Attachment F.

Event 7: Both Red Train CCW Pumps fail to Auto Start on SIS. The BOP, after completing Immediate Actions, should note no operating CCW Pump running to cool Red Train Safety Loads and manually start either 'A' or 'C' CCW Pumps. The ATC also has guidance per EMG E-0, ATTACHMENT F, Step F6, to manually start one of the two pumps if one is NOT running at that time.

CT2: Manually start 'A' or 'C' CCW pump to cool Red Train ECCS equipment within 30 minutes to prevent the loss of ECCS pumps.

Event 8: 'B' RHR pump trips on SIS due to suction valve, BN HV-8812B failing closed. This failure combined with the unavailability of the 'A RHR pump will cause the crew to transition from EMG E-1 to EMG C-11. LOSS OF EMERGENCY COOLANT RECIRCULATION to conserve the remaining RWST inventory and mitigate the loss of Cold Leg Recirc Capability. An ORANGE path on Integrity CSF may occur due to excessive cooldown. EMG FR-P1, RESPONSE TO IMMINENT PRESSURIZED THERMAL SHOCK CONDITIONS may be referenced.

CT3: Initiate RCS Cooldown to Cold Shutdown before RWST level reaches the Unacceptable Region of EMG C-11, Figure 1 (68%).

The scenario is complete when the crew has initiated RCS Cooldown to Cold Shutdown per EMG C-11 and/or at the discretion of the Lead Examiner.

SIMULATOR SCENARIO FILES

;2019 ILO NRC Exam, Scenario 1 (IC 301)

;Initial Conditions – IC301, 4% Power, BOL, RHR Pump 'A' OOS for emergent work (For Scenario)
ICR bkrNB00101 t:2

;Event 1 – Key 1 - AE FK-560, 'B' Feed Reg Bypass Valve, fails OPEN in Auto, Manual Available (BOP, CRS)
ICM cdAELC-560.cmf t:4 r:60 f:50 k:1

;Event 2 – Key 2 - Loss of Bus NN03 (ATC/CRS, Tech Specs)
IMF mNN03 i:-1 f:-1 k:2

;Event 3 – Key 3 – BB PI-455, Upper Selected PZR Press Instrument fails LOW (ATC/CRS – TS)
ICM trBBPT0455.cmf t:3 k:3 r:10 f:1700

;Event 4 – Key 4 – AB UK-33, Steam Dump Cooldown CTRL fails HIGH in Auto (Reactivity)
ICM cntABUK0033 f:75 r:120 k:4

;Event 5 - Key 5 - Earthquake, Large Break LOCA (6") on Loop 4 Cold Leg (Major)
IMF mSG01 f:60 k:5
IMF mBB06D f:6 r:60 k:5

;**Event 6** – Three CISA Valves fail to Auto Close (ATC - CT)
IMF mSA27KA01
IMF mSA27BG07
IMF mSA27BG08

;Event 7 –Both Red Train CCW Pumps fail to autostart on SI (BOP - CT)
{jpplsi} IMF mEG14A
{jpplsi} IMF mEG14C

;Event 8 – 'B' RHR Pump Trips on SI (For EMG C-11 Scenario)
{jpplsi} ICM movBNHV8812B.cmf t:2 d:5
{jpplsi} ICM bkrNB00204 t:1 d:30
{jpplsi} ICR movBNHV8812B.crf t:0 d:45

;Local Action – **Key 9** - Reenergize Bus NN03
{Key[9]} DMF mNN03

;Local Action – **Key 10 -** Turbine Building Watch Locally closes breakers for BAT pumps.
IRF rBG40A f:1 k:10
IRF rBG40B f:1 d:30 k:10

;Local Action - **Key 11 -** Aux Building Watch locally closes breaker for BG HV-8104
IRF rBG41 f:1 k:11

;Local Action – **Key 12** – Align 'A' Emergency Diesel Generator for AUTO
{Key[12]} scn SimGroup\EDGA_STBY

;Local Action – **Key 13** – Align 'B' Emergency Diesel Generator for AUTO
{Key[13]} scn SimGroup\EDGB_STBY

;End

Booth Instructions

Ensure NRC Exam Security Established per AIF 30B-015-09, and AIF 30B-015-18

Ensure the following procedures are available, free of markings and are the most recent revision in Curator (9/24/19):

- **GEN 00-003, HOT STANDBY TO MINIMUM LOAD (Rev 102)**
- **ALR 00-109B, SG B LEV DEV (Rev 10A)**
- **ALR 00-109C, SG B FLOW MISMATCH (Rev 11A)**
- **OFN SB-008, INSTRUMENT MALFUNCTIONS (Rev 48)**
- **OFN SB-008, ATTACHMENT K, PZR PRESSURE MALFUNCTION (Rev 48)**
- **OFN NN-021, LOSS OF VITAL 120 VAC INSTRUMENT BUS (Rev 29)**
- **OFN AB-041, STEAMLINE OR FEEDLINE LEAK (Rev 5A)**
- **EMG E-0, REACTOR TRIP OR SAFETY INJECTION (Rev 40)**
- **EMG E-1, LOSS OF REACTOR OR SECONDARY COOLANT (Rev 29)**
- **EMG C-11, LOSS OF EMERGENCY COOLANT RECIRCULATION (Rev 30)**
- **EMG FR-P1, RESPONSE TO IMMINENT THERMAL SHOCK CONDITIONS (Rev 23)**

NOTE: All events are loaded into snap **IC301**

Ensure malfunctions, including severity levels match scenario.

Ensure scenario runs for at least 10-15 minutes to allow data trends to populate

Ensure marked up copy of GEN 00-003 is available to the CRS, up to step 6.10

Ensure critical parameter white board is displayed with RCS T_{avg} control band 555ºF – 560ºF

Ensure all meters, lamps, bistables and annunciators are correct for the initial setup. **Blue Placard is on the 'A' CCP and 'A' RHR Pump handswitch EJ HIS-1 is in PTL with Caution tag affixed. 103D and 103E written on the white board**

Ensure soft panel display in back is set to RP312 RCP Vibration on left screen and AMSAC on right screen.

Ensure no discernable history from RM11, Ovation screens, paper trend recorders, etc.

Ensure all laminated brief sheets, foldout pages, E plan boards are wiped clean.

Ensure all follow-up buttons are removed from the boards and trash cans and recycle bins are free of any potential exam material.

Ensure communications are established with the lead examiner, fresh batteries, radio check sat.

Critical Parameter Data to be collected:

- **Time from SIS Actuation until either A or C CCW Pump is Manually Started.** The crew must manually start either Red Train CCW Pump within 30 minutes to restore Red Train ECCS cooling.
- **RWST Level, BN LR-930.** The crew must commence a cooldown to cold shutdown per EMG C-11 prior to reaching Unacceptable level of 68% in RWST Level.

Ensure Horns are ON and machine is in RUN

Insert Key 1 for Event 1 (AE FK-560, 'B' S/G FRV Bypass fails OPEN
.
Insert Key 2 for Event 2 (Loss of Bus NN03).
When directed to shut breaker NN0301, **Insert Key 9**
When directed to Locally Acknowledge alarms on NK03, **Soft Panel**

Insert Key 3 for Event 3 (BB PI-455, Upper Selected PZR Press Instrument fails LOW)

Insert Key 4 for Event 4 (AB UK-33 fails HIGH in Auto)

Insert Key 5 for Major Event (Earthquake, Large Break LOCA on D Cold Leg, CISA valves fail to close, Red Train CCW Pumps fail to auto start on SI, 'B'RHR Pump trips on SI)

When directed to reset and close breakers for BAT pumps, **Insert Key 10**

When directed to reset and close breaker for BG HV-8104, **Insert Key 11**

When directed to align 'A' EDGs for AUTO start, **Insert Key 12**

When directed to align 'B' EDGs for AUTO start, **Insert Key 13**

Op Test No.: Dec 2019	Scenario No.: 1	Event No.: 1	Total No Pages 41

Event Description: **AE FK-560, 'B' S/G Feed Reg Bypass Valve fails OPEN in Auto, Manual Available**

Time	Position	Applicant's Actions or Behavior
Simulator Operator: Insert **Key 1** at the lead examiners direction **Diagnostics**: Indicated flow and level on AE FR-520 trending up. Actual flow on AE FI-520A and AE FI-521A, and actual level on AE LI-527 through 529 trending up. MFRBV controller AE LK-560 opening **Annunciators**: 109B, 109C		
	BOP	Recognizes AE FK-560 is opening
Examiner Note: Depending on timeliness of crew response, 109B, SG B LEV DEV may also actuate. That ALR mitigation action to take manual control of the MFRBV is the same		
	CRS	Enters and directs ALR 00-109C, SG B FLOW MISMATCH
ALR 00-109C, SG B FLOW MISMATCH		
NOTE o Steps 1 through 3 are Memory Action steps o A slight step change on the Feedwater Reg Valve controller's output could occur during the transfer between auto and manual		
	BOP	1. Check Difference Between Steam Generator 'B' Steam Flow And Feed Flow – GREATER THAN 0.7 MPPH ***– Yes*** o AB FI-522A For Steam Flow o AB FI-523A For Steam Flow o AE FI-520A For Feed Flow o AE FI-521A For Feed Flow
	BOP	2. Check For Instruments Operating Properly: ***- Yes*** o Steam Generator 'B' Controlling Steam Pressure Channel - WITHIN 100 PSIG OF REMAINING CHANNELS * AB PI-524A * AB PI-525A o Steam Generator 'B' Controlling Feedwater Flow Channel – WITHIN 0.2 MPPH OF OTHER CHANNEL o Steam Generator 'B' Controlling Steam Flow Channel – WITHIN 0.2 MPPH OF OTHER CHANNEL

Op Test No.: Dec 2019 Scenario No.: 1 Event No.: 1 Total No Pages 42

Event Description: AE FK-560, 'B' S/G Feed Reg Bypass Valve fails OPEN in Auto, Manual Available

Time	Position	Applicant's Actions or Behavior
	BOP	3. Restore Steam Generator 'B' Level To Program Value: a. Check Feedwater Control Valve – INSERVICE TO FEED S/G B ○ AE FK-520 **– *No*** RNO Step 3.a. Perform the following: 1) Place Feedwater Reg Bypass Control Valve in manual AE LK-560 2) Adjust Feedwater Reg Bypass Control Valve, as necessary, to maintain program value 3) Go to step 4
Simulator Operator: IF contacted as WWM, acknowledge requests. **IF** contacted as Call Supt., acknowledge status		
	BOP	4. Check Secondary Plant Conditions – Stable **– *Yes***
	BOP	5. Check For S/G B Tube Leakage: *S/G B Level – INCREASING IN AN UNCONTROLLED MANNER **– *No*** OR *Unexpected Rise In S/G B Level **– *No*** RNO Return to procedure and step in effect
Event Termination: After the crew has the 'B' S/G MFRBV in manual and controlling S/G level or at the direction of the Lead Examiner. **Simulator Operator: Insert Key 2** at direction of the Lead Examiner.		

Op-Test No.: Dec 2019	Scenario No.: 1	Event No.: 2	Total No Pages 41

Event Description: Loss of Vital 120 VAC Instrument Bus NN03

Time	Position	Applicant's Actions or Behavior
Simulator Operator: **Insert Key 2** at direction of Lead Examiner. Diagnostics: Multiple alarms, alarm panel SB069 will show columns of white lights for the NN03 powered equipment Annunciators: Multiple, including 027A and 027B		
	CREW	Diagnoses failure of bus NN03
Examiner Note: The NN alarms and associated instruments have color placards to assist the Operators in identifying the affected instruments. The Crew will communicate which instrument bus color to select away from, e.g. "Select Out Blue." The ATC and RO will select away from blue channels prior to entering the ALR or OFN. Delay in selecting away from the affected instruments could result in reactor trip.		
	CRS	Enters and directs either ALR 00-027A or OFN NN-021
ALR 00-027A, NN03 INST BUS UV		
NOTE Step 1 is a Memory Action step		
	ATC	1. Ensure PZR Control Signals – USING UNAFFECTED CHANNELS a. Check alternate channel selection required **– *Yes*** b. Check pressurizer pressure channel affected **– *Yes*** c. Place Pressurizer Master Controller in manual ○ BB PK-455A – IN MANUAL d. Select alternate channel, using table below (see table below) e. Return Pressurizer Master Controller to auto, as directed by CRS BB PK-455A – AUTO
	ATC/BOP	2. Dispatch Operator to NN03 Instrument Bus with Interlock Key to perform actions as directed by SM or CRS
	CRS	3. Refer to Technical Specifications 3.8.9, 3.8.10 and 3.3.1 Enters LCO 3.8.9 Distribution Systems – Operating, Condition C – 2 hrs

AFFECTED BUS	PZR PRESSURE		PZR LEVEL	
	SWITCH	SELECT CHANNEL	SWITCH	SELECT CHANNEL
NN03 BLUE TRAIN	PS-455F	P455/P456	LS-459D	L459/L460

Op-Test No.: Dec 2019 Scenario No.: 1 Event No.: 2 Total No Pages 41

Event Description: Loss of Vital 120 VAC Instrument Bus NN03

Time	Position	Applicant's Actions or Behavior
	CRS	4. Go To OFN NN-021, LOSS OF VITAL 120 VAC INSTRUMENT BUS, Step 1

OFN NN-021, LOSS OF VITAL 120 VAC INSTRUMENT BUS

NOTES

Steps 1 through 4 can be done in any order
Steps 1 through 4 are Memory Action steps

Time	Position	Applicant's Actions or Behavior
	ATC	1. Loss of NN01 or NN02 with Control Rods inserting **– *No*** RNO Go to step 2
	BOP	2. Ensure S/G Control Systems are using Unaffected Channels: ***- Yes*** **No blue channels on the S/G Control Systems**
	ATC	3. Ensure PRESSURIZER PRESSURE CONTROL is selected to Unaffected Channels: a. Check pressurizer pressure channel affected **– *Yes*** b. Place Pressurizer Master Controller in manual o BB PK-455A c. Select alternate channel, using table below:

AFFECTED BUS	PZR PRESSURE	
	SWITCH	SELECT CHANNEL
NN01 RED TRAIN	PS-455F	P457/P456
NN02 WHITE TRAIN	PS-455F	P455/P458
NN03 BLUE TRAIN	PS-455F	P455/P456
NN04 YELLOW TRAIN	PS-455F	P455/P456

Time	Position	Applicant's Actions or Behavior
		d. Adjust Pressurizer Master Controller to restore pressure to normal o BB PK-455A – ADJUSTED e. Return Pressurizer Master Controller to auto, as directed by CRS o BB PK-455A - AUTO
	ATC	4. Ensure PZR Level Control is selected to Unaffected Channels: a. Check pressurizer level channel affected **– *No*** RNO Go to step 5

Op-Test No.: Dec 2019	Scenario No.: 1	Event No.: 2	Total No Pages 41

Event Description: Loss of Vital 120 VAC Instrument Bus NN03

Time	Position	Applicant's Actions or Behavior
Simulator Operator: Contact the Control Room and report that maintenance worker bumped open NN0301. There is no apparent damage to the bus		
	ATC	5. (ρ) Check RWST Switchover has occurred: ***- No*** * "A" Train Swapped over ○ BG HIS-112B – CLOSED ○ BG HIS-112D – OPEN OR * "B" Train Swapped over ○ BG HIS-112C – CLOSED ○ BG HIS-112E – OPEN RNO Perform one of the following: * IF letdown has isolated, THEN go to step 6 * IF letdown is NOT isolated, THEN go to step 7
	ATC/BOP	7. Stabilize Plant: a. Stop any plant operations requiring rod motion b. (ρ) Adjust turbine load, as necessary, to maintain T_{avg} within 3^{o}F of T_{ref}
	CRS	8. Go to appropriate Attachment: ○ Loss of NN01 – ATTACHMENT A ○ Loss of NN02 – ATTACHMENT B ○ Loss of NN03 – ATTACHMENT C ***– Yes*** ○ Loss of NN04 – ATTACHMENT D
ATTACHMENT C, LOSS OF VITAL INSTRUMENT BUS NN03 (BLUE TRAIN)		
	ATC	C1. Defeat RCS Temperature Control for Loop 3: a. Position Loop Tavg Control Signal to – T432 ○ BB TS-412T b. Position Loop ΔT Control signal to – T431 ○ BB TS-411F
	BOP	C2. Lock S/G C Atmospheric Relief Valve Manual Drive Lever in Closed Position ○ AB PIC-3A
	CREW	C3. Determine NN03 Status: a. Check NN03 Bus – NO APPARENT DAMAGE ***– Yes*** b. Ensure NN03 normal feeder breaker closed ○ NN0301 – CLOSED

Op-Test No.: Dec 2019 Scenario No.: 1 Event No.: 2 Total No Pages 41

Event Description: Loss of Vital 120 VAC Instrument Bus NN03

Time	Position	Applicant's Actions or Behavior
Simulator Operator: WHEN contacted to close NN0301, **Insert Key 9**, report NN0301 closed.		
	ATC	C4. Check NN03 – POWERED FROM INVERTER NN13 PRIOR TO BUS LOSS a. Check Inverter NN13 System Output Volts normal b. Go to step C8
Simulator Operator: WHEN contacted as Turbine Building Watch to report NN13 System Output volts, acknowledge request and report NN13 output voltage is 120 volts AC		
NOTE Inverter Output indication (amps) is bypassed with the Maintenance Bypass switch in Bypass Position		
	CRS	C8. Refer to Applicable Technical Specifications: *3.8.7, Inverters – Operating *3.8.8, Inverters – Shutdown *3.8.9, Distribution Systems – Operating *3.8.10, Distribution Systems – Shutdown **Enters LCO 3.8.7 Inverters – Operating, Condition A – 24 hours** **Enters LCO 3.8.9 Distribution Systems – Operating, Condition C – 2 hours** **Examiner Note: LCO 3.8.7 & 3.8.9 applies while breaker NN0301 was open. The LCO would be logged into, and exited, once NN0301 was reclosed**
	CRS	C9. Verify Protection and Control Interlocks are in their correct states per Tech Spec LCOs o LCO 3.3.1 Condition S and T o LCO 3.3.3 Condition L
	ATC	C10. Check Charging and Letdown Flow – AFFECTED BY NN BUS LOSS – No RNO Go to step C15
	ATC	C15. Check if PZR Variable Heaters can be energized: a. PZR Level – GREATER THAN 20% - ***Yes*** b. Reset and energize variable heaters o BB HIS-50 c. Ensure PZR Level – STABLE AT OR TRENDING TO PRGRAMMED VALUE – ***Yes***

Op-Test No.: Dec 2019	Scenario No.: 1	Event No.: 2	Total No Pages 41

<u>Event Description:</u> Loss of Vital 120 VAC Instrument Bus NN03

Time	Position	Applicant's Actions or Behavior
	ATC	C16. Verify PZR Pressure Control Established: a. Spray Valves – MODULATE, AS NECESSARY, TO CONTROL PRESSURE **– *Yes*** b. PZR Pressure – STABLE **– *Yes*** c. PZR Heaters – ENERGIZE, AS NECESSARY, TO CONTROL PRESSURE d. PZR PORVs – AT LEAST ONE AVAILABLE **– *Yes*** ○ BB HIS-455A ○ BB HIS-456A
	ATC	C17. Check NN03 – DEENERGIZED **– *No*** **RNO** Go to Step C27
	ATC	C27. Check NN03 – ENERGIZED **– *Yes***
	BOP	C28. Position S/G C Atmospheric Relief valve to Automatic: a. Depress auto pushbutton ○ AB PIC-3A b. Return manual drive lever to mid position
	ATC	C29. Return RCS Temperature Control to Normal: a. Position Loop Tavg Control Signal to – NORMAL ○ BB TS-412T b. Position Loop ΔT Control Signal to – NORMAL ○ BB TS-411F
	BOP	C30. Check C-16 Hold Active: ○ On Graphic 5570, LOAD CONTROL LOOP REJECTED – NOT RED **– *Yes***
	BOP	C31. On Drawer N43A, Reset Neutron Flux Rate Trips: ○ Reset on rate mode switch
	BOP	C32. At Detector Current Comparator Drawer, ensure Rod Stop Bypass Switch for N43 in Operate Position
	ATC	C33. Check T_{avg} – Within 1oF of T_{ref} a. (ρ) Place Control Rods In Automatic with CRS concurrence ○ SE HS-9 – AUTO
	CREW	C34. Return equipment to normal alignment, as directed by Shift Manager/Control Room Supervisor
	CREW	C35. Return to Procedure and Step in Effect

<u>Event termination:</u> After the crew has restored NN03, N43A rate trip is reset and/or at the direction of the Lead Examiner

<u>Simulator Operator:</u> **Insert Key 3** at direction of the Lead Examiner.

Op-Test No.: Dec 2019 Scenario No.: 1	Event No.: 3	Total No Pages 41

Event Description: **BB PI-455A, Upper Selected PZR Pressure Channel fails LOW**

Time	Position	Applicant's Actions or Behavior
Simulator Operator: **Insert Key 3** at direction of Lead Examiner. Diagnostics: BB PI-455A pressure indication is 0, pressurizer heaters energized Annunciators: Multiple, including 033C and 83C		
	ATC	Diagnoses channel failure and inform crew.
	ATC	Takes manual control of the PZR PRESS MASTER CTRL by placing controller BB PK-455A to manual and restores pressure to pre-event values (approximately 2235 psig).
	CRS	Enters and directs OFN SB-008, INSTRUMENT MALFUNCTIONS,
OFN SB-008, INSTRUMENT MALFUNCTIONS		
	ATC, CRS	1. Check for Malfunction. * Check if Reactor Coolant System Instrument Channel or Controller is Malfunctioning a. Perform appropriate attachment for malfunctioning channel or controller from table below:

VARIABLE	CHANNELS	ATTACHMENT
RCS Flow (BB)	F-414, F-415, F-416 F-424, F-425, F-426 F-434, F-435, F-436 F-444, F-445, F-446	ATTACHMENT I
PZR Level (BB)	L-459, L-460, L-461	ATTACHMENT J
PZR Pressure (BB)	P-455, P-456, P-457 P-458	ATTACHMENT K
PZR Pressure Master OR (BB) PZR Spray Controller	BB PK-455A OR BB PK-455B/BB PK-455C	ATTACHMENT V
RCS Temperature (BB)	T-411, T-421, T-431 T-441	ATTACHMENT L

ATTACHMENT K, PZR PRESSURE MALFUNCTION

NOTES

Steps K1 through K4 are Memory Action steps

Op-Test No.: Dec 2019 Scenario No.: 1 Event No.: 3 Total No Pages 41

Event Description: **BB PI-455A, Upper Selected PZR Pressure Channel fails LOW**

Time	Position	Applicant's Actions or Behavior
	BOP	K1. Identify failed instrument channel: a. Compare pressurizer pressure indications to confirm a pressurizer pressure channel failure ○ BB PI-455A – ***Yes*** ○ BB PI-456 ○ BB PI-457 ○ BB PI-458
	ATC	K2. Check failed Pressurizer Pressure Channel selected on PZR PRESS CTRL SEL switch ○ BB PS-455F – ***Yes***
	ATC	K3. Place PZR PRESS MASTER CTRL in Manual and Control Pressure ○ BB PK-455A
	ATC	K4. Select Alternate Pressurizer Pressure Channel on PZR PRESS CTRL SEL switch ○ BB PS-455F
Simulator Operator: IF contacted as WWM, acknowledge requests. IF contacted as Call Supt., acknowledge status.		
	ATC	K5. Take following actions, as appropriate to stop pressure control transient: a. Check Pressurizer Spray Valves – RESPONDING CORRECTLY – ***Yes*** b. Check PZR Control Heaters – OPERABLE – ***Yes*** c. Ensure PZR PORV – CLOSED – ***Yes*** ○ BB HIS-455A ○ BB HIS-456A
NOTE Pressurizer Backup Heaters are normally placed in auto		
	ATC	K6. Return Pressurizer Pressure Control to Automatic ○ Spray Valves ○ Control Heaters ○ Backup Heaters (using SYS BB-203) as desired ○ Open PORV Block Valves ○ PORVs ○ Pressurizer Pressure Control
	ATC	K7. Monitor Pressurizer Pressure Response to ensure proper control

Op-Test No.: Dec 2019 Scenario No.: 1 Event No.: 3 Total No Pages 41

Event Description: **BB PI-455A, Upper Selected PZR Pressure Channel fails LOW**

Time	Position	Applicant's Actions or Behavior
	ATC	K8. Check Failed Pressure Channel not selected on PZR PRESS RECORD SEL o BB PS-455G
		NOTE Pressurizer pressure channels PT-455 and PT-457 are inputs to subcooling margin monitor Train A. Pressurizer pressure channels PT-456 and PT-458 are inputs to subcooling margin monitor Train B. Selecting alternate pressure control channels does not alter inputs to the subcooling monitors. However, once the affected pressure transmitter fails above or below the calibrated limit it will automatically be removed from the subcooling margin calculation
	BOP	K9. Check failed Pressure Channel not selected on OP DT/OT DT LOOP RECORD SEL switch o SC TS-411E **– *No***
		NOTE When a TS 3.3 functions refers to another TS 3.3 function for all initiation functions and requirements, only the actions associated with TS 3.3.2, Function 1 (Safety Injection) is required to be taken. Declaring LCOs 3.3.6 and 3.3.7 not met due to an inoperable Safety Injection instrument is not required. However, for completeness a control room log entry stating that TS 3.3.6 and TS 3.3.7 have been reviewed is desired
	CRS	K10. Monitor the following Technical Specifications LCOs and comply with action statements, as appropriate: o 3.3.1, REACTOR TRIP SYSTEM INTRUMENTATION, Table 3.3.1-1, Functions 6 and 8 o 3.3.2, ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION, Table 3.3.2-1, Function 1.d, 3.a.3, 5.d, 6.e and 8.b o 3.3.4, REMOTE SHUTDOWN INSTRUMENTATION, Table 3.3.4-1, Function 3 o 3.3.6, CONTAINMENT PURGE ISOALTION INSTRUMENTATION o 3.3.7, CONTROL ROOM EMERGENCY VENTILATION INSTRUMENTATION **Enters LCO 3.3.1 Reactor Trip System Instrumentation, Condition A (immediate), E (72 hours)** **Enters LCO 3.3.2 Engineered Safety Features Actuation System Instrumentation, Condition A (immediate), D (72 hours), L (1 hour)**

Op-Test No.: Dec 2019	Scenario No.: 1	Event No.: 3	Total No Pages 41

Event Description: **BB PI-455A, Upper Selected PZR Pressure Channel fails LOW**

Time	Position	Applicant's Actions or Behavior
		CAUTIONS o Avoid introduction of 2/4 low pressurizer pressure signals, which can initiate a reactor trip and SI o Avoid introduction of 2/4 OT/ΔT reactor trip by insuring other channels are not tripped TB-411C, TB-421C, TB-431C or TB-441C
		NOTES o When the last bistable for the effected instrument is tripped, the output to that control board indication will drop to zero o If time permits prior to tripping bistables, I&C should trouble shoot and obtain as found information including a determination of which SSPS train is affected. M-767-00310, Tables 6-3 and 6-4 may be used to aid I&C in SSPS train determination
	BOP	K11. Place appropriate Reactor Trip/Safeguards bistables for failed pressure in TRIPPED mode: **Examiner Note:** bistables are not modeled in the in the back of the simulator, operating crew will have I&C perform this task
	CREW	K12. Request I&C to repair failed channel
	CRS	K13. Review ATTACHMENT S for Post Accident and Remote Shutdown Instrumentation requirements
	CREW	K14. Return to Procedure and Step in Effect

Event Termination: After the crew has selected out the failed channel, stabilized the plant and/or at the direction of the lead examiner.

Simulator Operator: **Insert Key 4** at direction of Lead Examiner.

Op-Test No.: Dec 2019 Scenario No.: 1	Event No.: 4	Total No Pages 41
Event Description: **AB UK-33, Steam Dump Cooldown CTRL fails HIGH in Auto**		

Time	Position	Applicant's Actions or Behavior
Simulator Operator: **Insert Key 4** at direction of Lead Examiner. Diagnostics: RCS Pressure and Temperature lowering slowly, S/G Pressure lowering and Level rising in all S/Gs Annunciators: Multiple to include 065E, 033C, and 108-111A		
	CREW	Recognize changing plant conditions and diagnoses that steam dump control is failing and steam dump is opening
	BOP	Stops excessive steam flow by taking Manual Control of Steam dumps by any of the following: 1. STEAM HDR PRESS CTRL AB PK-507 – MANUAL 2. STEAM DUMP COOLDOWN CONTROL 3. STEAM DUMP BYPASS INTERLOCK, AB HS-63 OR 64, placed in OFF (This will close the Steam Dump terminating flow)
Examiner Note: In accordance with AP 15C-003, Step 6.1.4 Manual Backup: If an automatic trip, actuation, or control signal has reached or exceeded its setpoint for actuation and not actuated, the operator shall manually initiate the signal. Taking manual control of the Steam Dump controller in the event of failure is an example of this procedural Operator expectation		
	ATC/BOP	Stabilize plant conditions to include RCS pressure, Temperature, PZR level, and S/G Level.
Simulator Operator: IF contacted as WWM, acknowledge requests. IF contacted as Call Supt., acknowledge status.		
Event termination: After the crew has taken manual control of the Steam Dumps and/or at the discretion of the Lead Examiner. Simulator operator: **Insert Key 5** at the lead examiners direction.		

Op-Test No.: Dec 2019 Scenario No.: 1 Event Nos.: 5/6/7/8 Total No Pages 41		
Event Description: Earthquake causes Large Break LOCA (6”) on Loop 4 Cold Leg. 3 valves fail to Auto CLOSE on CIAS. Both RED train CCW pumps fail to AUTO start on SIS. ‘B’ RHR pumps trips on SIS due to suction valve BN HV-8812B failing closed		
Time	**Position**	**Applicant’s Actions or Behavior**
Simulator Operator: **Insert Key 5** at direction of Lead Examiner. Diagnostics: Loud rumbling sound heard and felt, RCS pressure and PZR level lowering rapidly Annunciators: Multiple to include 0908B/D/E & 030A, 031A		
	CREW	Recognizes earthquake and lowering RCS pressure and PZR level, diagnosis LOCA
	CRS	Directs manual Reactor Trip and Safety Injection
EMG E-0, REACTOR TRIP OR SAFETY INJECTION		
NOTE o Steps 1 through 4 are immediate action steps o Foldout page shall be monitored throughout this procedure		
	ATC	1. Verify Reactor Trip: ***Yes*** a. Check all rod bottom lights – LIT b. Check reactor trip breakers and bypass breakers – OPEN o SB ZL-1 o SB ZL-2 o SB ZL-3 o SB ZL-4 c. Check intermediate range neutron flux – DECREASING o SE NI-35B [GAMMA METRICS] o SE NI-36B [GAMMA METRICS]
	BOP	2. Verify Turbine Trip: ***Yes*** a. Check Main Stop Valves – ALL CLOSED
	ATC	3. Check AC Emergency Busses – AT LEAST ONE ENERGIZED **–** ***Yes*** *NB01 – ENERGIZED *NB02 – ENERGIZED

Op-Test No.: Dec 2019 Scenario No.: 1 Event Nos.: 5/6/7/8 Total No Pages 41

Event Description: **Earthquake causes Large Break LOCA (6") on Loop 4 Cold Leg. 3 valves fail to Auto CLOSE on CIAS. Both RED train CCW pumps fail to AUTO start on SIS. 'B' RHR pumps trips on SIS due to suction valve BN HV-8812B failing closed**

Time	Position	Applicant's Actions or Behavior
	ATC	4. Check if Safety Injection is Actuated: a. Check any indication SI is actuated – LIT ***– Yes*** *Annunciator 00-030A, NF039A LOCA SEQ ACTUATED – LIT *Annunciator 00-031A, NF039B LOCA SEQ ACTUATED – LIT *ESFAS status panel SIS section – ANY WHITE LIGHTS LIT *Partial Trip Status Permissive/Block status panel – SI RED LIGHT LIT b. Check both trains of SI actuated ***– Yes*** o Ann 00-030A, NF039A LOCA SEQ ACTUATED – LIT o Ann 00-031A, NF039B LOCA SEQ ACTUATED – LIT
CAUTION If offsite power is lost after SI reset, manual action may be required to restore safeguards equipment to the required configuration		
	ATC	5. (t) Check if SI required: * SI was manually actuated AND was required ***– Yes*** * Containment pressure is currently or has been – GREATER THAN OR EQUAL TO 3.5 PSIG ***– Yes*** * RCS pressure is currently or has been – LESS THAN OR EQUAL TO 1830 PSIG ***– Yes*** * Any S/G pressure is currently or has been – LESS THAN OR EQUAL TO 615 PSIG ***– No***
	BOP	FOLDOUT PAGE Step 1. RCP TRIP CRITERIA IF all conditions listed below occur, THEN trip all RCPs: o RCS pressure – LESS THAN 1400 PSIG ***– Yes*** o CCPs or SI pumps – AT LEAST ONE RUNNING ***– Yes*** o Operator controlled cooldown – NOT IN PROGRESS ***– Yes***
	BOP	FOLDOUT PAGE Step 7. RCS TEMPERATURE CONTROL o IF a Loss-Of-Offsite Power has occurred, THEN close MSIVs *AB HS-79 *AB HS-80 o IF no RCPS are running AND off-site power is available, THEN select STM PRESS mode on the steam dumps o AB US-500Z o IF RCS C/L temperature is less than 557°F AND decreasing, THEN control total feed flow to limit RCS cooldown o Maintain total feed flow greater than 270,000 lbm/hr until narrow range is greater than 6% [29%] in at least one S/G

Op-Test No.: Dec 2019	Scenario No.: 1	Event Nos.: 5/6/7/8	Total No Pages 41

Event Description: **Earthquake causes Large Break LOCA (6") on Loop 4 Cold Leg. 3 valves fail to Auto CLOSE on CIAS. Both RED train CCW pumps fail to AUTO start on SIS. 'B' RHR pumps trips on SIS due to suction valve BN HV-8812B failing closed**

Time	Position	Applicant's Actions or Behavior
	ATC	6. Verify Automatic Actions using Attachment F, AUTOMATIC SIGNAL VERIFICATION Examiner Note: See Attachment 1 for complete list of actions F3. Verify Containment Isolation Phase A: a. Check ESFAS status panel CISA section – ALL WHITE LIGHTS LIT ○ Red train – ***No*** ○ Yellow train – ***No*** RNO a. Perform the following: 1) IF containment isolation phase A has NOT actuated, THEN manually actuate containment isolation phase A – ***NO*** ○ SB HS-47 ○ SB HS-48 2) IF any CISA valve NOT closed, THEN manually close valve. IF valve(s) can NOT be closed, THEN manually or locally isolate affected containment penetration. Refer to ATTACHMENT B VALVES CLOSED BY CONTAINMENT ISOLATION SIGNAL PHASE A
		CT1: Close either BG HIS-8160 or BG HIS-8152 containment isolation valves before completion of EMG E-0, Attachment F.
		F5. Verify ECCS Pumps Running: a. Check CCPs – BOTH RUNNING – ***Yes*** b. Check SI pumps – BOTH RUNNING – ***Yes*** c. Check RHR pumps – BOTH RUNNING – ***No*** RNO c. Manually start pumps ○ EJ HIS-1 – ***Tagged out*** ○ EJ HIS-2 – ***Pump tripped, will not restart*** F6. Verify CCW Alignment: a. Check CCW pumps – ONE RUNNING IN EACH TRAIN – NO RNO a. Manually start CCW pumps as necessary to establish one running in each train ○ EG HIS-21 or EG HIS-23 for red train – ***Yes*** ○ EG HIS-22 or EG HIS-24 for yellow train – ***No***
		CT2: Manually start 'A' or 'C' CCW pump to cool Red Train ECCS equipment within 30 minutes to prevent the loss of CCP or SI pumps.

Op-Test No.: Dec 2019 Scenario No.: 1 Event Nos.: 5/6/7/8 Total No Pages 41

Event Description: Earthquake causes Large Break LOCA (6") on Loop 4 Cold Leg. 3 valves fail to Auto CLOSE on CIAS. Both RED train CCW pumps fail to AUTO start on SIS. 'B' RHR pumps trips on SIS due to suction valve BN HV-8812B failing closed

Time	Position	Applicant's Actions or Behavior
	BOP	7. Check Main Generator Breakers and Exciter Breaker – OPEN **– *Yes*** o MA ZL-3A o MA ZL-4A o MA ZL-2
	BOP	8. Check Total AFW Flow – GREATER THAN 270,000 LBM/HR **– *Yes***
	BOP	9. Check RCS Cold Leg Temperatures: *Stable at or trending to 557°F for condenser steam dumps or S/G ARVs *Stable at or trending to a range of 553°F to 557°F for S/G ARVs if recovering from an inadvertent SI
	BOP	10. Establish S/G Pressure Control: a. Check condenser – AVAILABLE **– *Yes*** o C-9 LIT o MSIV – OPEN o Circulating water pumps - RUNNING b. Place Steam Header Pressure Control in Manual o AB PK-507 c. Manually set Steam Header Pressure Control output to zero o AB PK-507 d. Place Steam Dump Select Switch in STEAM PRESS position o AB US-500Z e. Place Steam Header Pressure Control in Automatic o AB PK-507
	ATC	11. Check PZR PORVs a. Check PZR PORVs – CLOSED **– *Yes*** o BB HIS-455A o BB HIS-456A b. Power to block valves – AVAILABLE **– *Yes*** o BB HIS-8000A o BB HIS-8000B c. RCS pressure – LESS THAN 2185 PSIG
	ATC	12. Check Normal PZR Spray Valves – CLOSED **– *Yes*** o BB ZL-455B o BB ZL-455C

Op-Test No.: Dec 2019 Scenario No.: 1 Event Nos.: 5/6/7/8 Total No Pages 41

<u>Event Description:</u> Earthquake causes Large Break LOCA (6") on Loop 4 Cold Leg. 3 valves fail to Auto CLOSE on CIAS. Both RED train CCW pumps fail to AUTO start on SIS. 'B' RHR pumps trips on SIS due to suction valve BN HV-8812B failing closed

Time	Position	Applicant's Actions or Behavior
	ATC	13. Check PZR Safety Valves – CLOSED **– *Yes*** ○ BB ZL-8010A ○ BB ZL-8010B ○ BB ZL-8010C
NOTE Seal injection flow shall be maintained to all RCPs		
	ATC/BOP	14. Check if RCPs should be stopped: a. Check RCPs – ANY RUNNING **– *No*** RNO a. Go to Step 15
	CRS	15. Direct operator to Monitor Critical Safety Functions Using EMG F-0, CRITICAL SAFETY FUNCTION STATUS TREES (CSFST)
	BOP	16. Check if S/Gs are not Faulted: ***- Yes*** a. Check pressures in all S/Gs – ○ NO S/G PRESSURE DECREASING IN AN UNCONTROLLED MANNER ○ NO S/G COMPLETELY DEPRESSURIZED

	BOP	17. (t) Check if S/G tubes are intact:
		○ Check S/G Levels – NOT INCREASING IN AN UNCONTROLLED MANNER **– *Yes***
		  ○ Narrow range
		  ○ Wide range
		○ Condenser air discharge radiation – NORMAL BEFORE ISOLATION **– *Yes***
		  ○ GEG 925
		○ S/G blowdown and sample radiation – NORMAL BEFORE ISOLATION **– *Yes***
		  ○ BML 256
		  ○ SJL 026
		○ Turbine driven auxiliary feedwater pump exhaust radiation – NORMAL **– *Yes***
		  ○ FCT 381
		○ S/G steamline radiation – NORMAL **– *Yes***
		  ○ ABS 114 for S/G A
		  ○ ABS 113 for S/G B
		  ○ ABS 112 for S/G C
		  ○ ABS 111 for S/G D

Op-Test No.: Dec 2019 Scenario No.: 1 Event Nos.: 5/6/7/8 Total No Pages 41
<u>Event Description:</u> Earthquake causes Large Break LOCA (6") on Loop 4 Cold Leg. 3 valves fail to Auto CLOSE on CIAS. Both RED train CCW pumps fail to AUTO start on SIS. 'B' RHR pumps trips on SIS due to suction valve BN HV-8812B failing closed

Time	**Position**	**Applicant's Actions or Behavior**
	ATC	18. Check if RCS is intact in Containment: ***- NO*** o Containment radiation – NORMAL BEFORE ISOLATION o GTP 311 o GTI 312 o GTG 313 o GTP 321 o GTI 322 o GTG 323 o GTA 591 o GTA 601 o Containment pressure – NORMAL o GN PI-934 o GN PI-935 o GN PI-936 o GN PI-937 o GT PDI-40 o GN PR-934 o Containment sump level – NORMAL o EJ LI-7 o EJ LI-8 o EJ LR-6 o LF LI-9 o LF LI-10 RNO Perform the following: a. Ensure BIT Inlet AND Outlet Valves are open ***– Yes*** o EM HIS-8803A o EM HIS-8803B o EM HIS-8801A o EM HIS-8801B b. Go to EMG E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1
	CRS	Conducts brief and transitions to EMG E-1, LOSS OF REACTOR OR SECONDARY COOLANT
EMG E-1, LOSS OF REACTOR OR SECONDARY COOLANT		

<u>NOTES</u>

- Foldout page shall be monitored throughout this procedure
- Seal injection flow shall be maintained to all RCPs

Op-Test No.: Dec 2019 Scenario No.: 1 Event Nos.: 5/6/7/8 Total No Pages 41

Event Description: **Earthquake causes Large Break LOCA (6") on Loop 4 Cold Leg. 3 valves fail to Auto CLOSE on CIAS. Both RED train CCW pumps fail to AUTO start on SIS. 'B' RHR pumps trips on SIS due to suction valve BN HV-8812B failing closed**

Time	Position	Applicant's Actions or Behavior
	ATC/BOP	1. 14. Check if RCPs should be stopped: a. Check RCPs – ANY RUNNING ***– No*** RNO a. Go to Step 2
	BOP	2. Check if S/Gs are not Faulted: ***- Yes*** a. Check pressures in all S/Gs – ○ NO S/G PRESSURE DECREASING IN AN UNCONTROLLED MANNER ○ NO S/G COMPLETELY DEPRESSURIZED
	BOP	3. Check intact S/G Levels: a. Check Narrow Range Level in at Least One S/G – GREATER THAN 6% [29%] b. Control feed flow to maintain narrow range level in all S/Gs between 6% [29%] and 50%
CAUTION If offsite power is lost after SI reset, manual action may be required to restore safeguards equipment to the required configuration		
	ATC	4. Reset SI ○ SB HS-42A ○ SB HS-43A
	ATC	5. Reset Containment Isolation Phase A and Phase B ○ SB HS-56 For Phase A ○ SB HS-53 For Phase A ○ SB HS-55 For Phase B ○ SB HS-52 For Phase B
CAUTION If steamlines in Area 5 of Auxiliary Building are not intact extreme caution will be necessary when performing local surveys		

Op-Test No.: Dec 2019 Scenario No.: 1 Event Nos.: 5/6/7/8 Total No Pages 41

Event Description: **Earthquake causes Large Break LOCA (6") on Loop 4 Cold Leg. 3 valves fail to Auto CLOSE on CIAS. Both RED train CCW pumps fail to AUTO start on SIS. 'B' RHR pumps trips on SIS due to suction valve BN HV-8812B failing closed**

Time	Position	Applicant's Actions or Behavior
	BOP	6. Determine Secondary Radiation Levels: a. Direct Health Physics to survey steamlines in Area 5 of the Aux Bldg b. Check S/G Sampling ISOLATED **– *Yes*** c. Check Instrument Air Pressure – GREATER THAN 105 PSIG **– *Yes*** ○ KA PI-40 d. Open CCW to Radwaste System Isolation Valves ○ EG HS-69 ○ EG HS-70 e. Open all S/G sample isolation valves ○ BM HIS-65 for S/G A ○ BM HIS-35 for S/G A ○ BM HIS-66 for S/G B ○ BM HIS-36 for S/G B ○ BM HIS-67 for S/G C ○ BM HIS-37 for S/G C ○ BM HIS-68 for S/G D ○ BM HIS-38 for S/G D f. Direct Chemistry to sample all S/Gs for activity
	BOP	7. Check Secondary Radiation – NORMAL a. Condenser Air Discharge Radiation – NORMAL BEFORE ISOLATION **– *Yes*** ○ GEG 925 b. S/G Blowdown Radiation – NORMAL BEFORE ISOLATION **– *Yes*** ○ BML 256 c. S/G Sample Radiation – NORMAL **– *Yes*** ○ SJL 026 ○ Sample results d. Turbine Driven Auxiliary Feedwater Pump Exhaust Radiation – NORMAL **– *Yes*** ○ FCT 381 e. S/G Steamline Radiation – NORMAL **– *Yes*** ○ ABS 114 For S/G A ○ ABS 113 For S/G B ○ ABS 112 For S/G C ○ ABS 111 For S/G D ○ Local Surveys

Simulator Operator: WHEN contacted as HP and Chemistry, acknowledge requests

CAUTION

If any PZR PORV opens because of high PZR pressure, the PORV shall be monitored to ensure it recloses after pressure decreases to less than 2335 psig

Op-Test No.: Dec 2019 Scenario No.: 1 Event Nos.: 5/6/7/8 Total No Pages 41

<u>Event Description:</u> Earthquake causes Large Break LOCA (6”) on Loop 4 Cold Leg. 3 valves fail to Auto CLOSE on CIAS. Both RED train CCW pumps fail to AUTO start on SIS. ‘B’ RHR pumps trips on SIS due to suction valve BN HV-8812B failing closed

Time	Position	Applicant’s Actions or Behavior
	BOP	<u>8.</u> Check PORVs and Block Valves a. Power to block valves – AVAILABLE **– *Yes*** o BB HIS-8000A o BB HIS-8000B b. Check PZR PORVs – CLOSED **– *Yes*** o BB HIS-455A o BB HIS-456A c. RCS pressure – LESS THAN 2185 PSIG
NOTE Locally opening EF-HV-43, ESW A TO AIR COMPRESSOR or EG HV-44, ESW B TO AIR COMPRESSOR requires the associated ESW train to be declared inoperable. Local opening of the valve, on 2000’ NORTH END AUX BLDG, will preclude it from automatically isolating on a high flow condition		
	BOP	9. Verify Instrument Air Compressor is Running: a. Ensure at least one ESW TRN TO AIR COMPRESSOR Valve – OPEN **– *Yes*** *EF HIS-43 *EF HIS-44 b. Check AIR COMPRESSOR BRKR RESET switch associated with open ESW Valve(s) – CLOSED **– *No*** *KA HIS-3C *KA HIS-2C RNO b. Reset and close AIR COMPRESSIR BRKR RESET Switch *KA HIS-3C *KA HIS-2C c. Check INST AIR PRESS – GREATER THAN 105 PSIG **– *Yes*** o KA PI-40 d. Check neither ESW TO AIR COMPRESSOR Valve – Locally Opened **– *No*** o EF HV-43 o EF HV-44 e. Check both ESW TRN TO AIR COMPRESSOR Valves – OPEN **– *Yes*** o EF HIS-43 o EF HIS-44 f. Check both AIR COMPRESSOR BRKR RESET switches – CLOSED **– *Yes*** o KA HIS-3C o KA HIS-2C

Op-Test No.: Dec 2019 Scenario No.: 1 Event Nos.: 5/6/7/8 Total No Pages 41

Event Description: Earthquake causes Large Break LOCA (6") on Loop 4 Cold Leg. 3 valves fail to Auto CLOSE on CIAS. Both RED train CCW pumps fail to AUTO start on SIS. 'B' RHR pumps trips on SIS due to suction valve BN HV-8812B failing closed

Time	Position	Applicant's Actions or Behavior
	BOP	10. Verify Instrument Air to Containment: a. Check PZR PRESS MASTER CTRL Output – LESS THAN 55% ***- Yes*** o BB PK-455A b. Open INST AIR SPLY CTMT ISO VLV o KA HIS-29
	ATC	11. Check if ECCS Flow should be reduced: ***- No*** a. RCS Subcooling – GREATER THAN 30°F [45°F] b. Secondary heat sink: *Total Feed Flow to Intact S/Gs – GREATER THAN 270,000 LBM/HR OR *Narrow Range Level in at least one intact S/G – GREATER THAN 6% [29%] c. RCS Pressure – STABLE OR INCREASING d. PZR Level – GREATER THAN 6% [32%] RNO Go to Step 12
	ATC	12. Check if Containment Spray should be stopped: a. Check Spray Pumps – ANY RUNNING ***– No*** RNO a. Perform the following: 1) IF at least one spray pump has been stopped by operator action THEN got to step 12.b ***– No*** 2) IF no spray pumps are running, THEN OBSERVE CAUTION PRIOR TO STEP 13 and go to step 13 ***– Yes***
CAUTION After RHR pumps have been stopped, RCS pressure shall be monitored for RHR pump restart criteria		
	ATC	13. Check if RHR Pumps Should be stopped: a. Check RHR Pumps – ANY RUNNING ***– No*** RNO Go to step 14
	ATC	14. Check RCS and S/G Pressures: a. Check RCS Pressure STABLE OR DECREASING ***– Yes*** b. Check Pressure in All S/Gs – STABLE OR INCREASING ***– Yes***

Op-Test No.: Dec 2019 Scenario No.: 1 Event Nos.: 5/6/7/8 Total No Pages 41		
<u>Event Description:</u> Earthquake causes Large Break LOCA (6”) on Loop 4 Cold Leg. 3 valves fail to Auto CLOSE on CIAS. Both RED train CCW pumps fail to AUTO start on SIS. ‘B’ RHR pumps trips on SIS due to suction valve BN HV-8812B failing closed		
Time	**Position**	**Applicant’s Actions or Behavior**
	ATC	<u>15.</u> Check if Diesel Generators should be stopped: a. Check NB01 – ENERGIZED BY OFFSITE POWER **– *Yes*** b. Depress START/RESET pushbutton for Diesel Generator NE01 ○ KJ HS-8A c. Depress STOP pushbutton for Diesel Generator NE01 ○ KJ HS-8A d. Place EDG NE01 in standby using KJ-121, DIESEL GENERATOR NE01 AND NE02 LINEUP FOR AUTOMATIC OPERATION, while continuing with this procedure e. Check NB02 – ENERGIZED BY OFFSITE POWER **– *Yes*** f. Depress START/RESET pushbutton for Diesel Generator NE02 ○ KJ HS-108A g. Depress STOP pushbutton for Diesel Generator NE01 ○ KJ HS-108A h. Place EDG NE02 in standby using KJ-121, DIESEL GENERATOR NE01 AND NE02 LINEUP FOR AUTOMATIC OPERATION, while continuing with this procedure
<u>Simulator Operator:</u> WHEN contacted as the Building Watch, acknowledge request: ○ Wait 5 min and Insert Key 12, contact control room and report EDG A is lined up for automatic operation ○ Wait 10 min and Insert Key 13, contact control room and report EDG B is lined up for automatic operation		
	ATC	16. Load Equipment on Energized AC Emergency Busses: a. Locally reset and close Boric Acid Transfer Pump beakers ○ NG01AHF4 For Pump A ○ NG02AAF4 For Pump B b. Locally reset and close emergency borate valve breaker ○ NG04CPF2 For BG HV-8104
<u>Simulator Operator:</u> WHEN contacted as the Turbine/Auxiliary Building Watch, acknowledge request: ○ Wait 5 min and Insert Key 10, contact control room and report breakers are reset and closed for Boric Acid Transfer pumps ○ Wait 10 min and Insert Key 11, contact control room and report breaker is reset and closed for Emergency Borate valve		
	ATC	17. Close Non-Class 1E Battery Charger Breakers ○ PK HIS-2 For PK-21 ○ PK HIS-3 For PK-22 ○ PK HIS-4 For PK-23 ○ PK HIS-5 For PK-24

Op-Test No.: Dec 2019 Scenario No.: 1 Event Nos.: 5/6/7/8 Total No Pages 41		
Event Description: **Earthquake causes Large Break LOCA (6") on Loop 4 Cold Leg. 3 valves fail to Auto CLOSE on CIAS. Both RED train CCW pumps fail to AUTO start on SIS. 'B' RHR pumps trips on SIS due to suction valve BN HV-8812B failing closed**		
Time	**Position**	**Applicant's Actions or Behavior**
	ATC	18. Check ALL non-class 1E AC Busses and Load Centers – ENERGIZED BY OFFSITE POWER ○ PA ○ PB ○ PG ○ SL
	BOP	19. Place Hydrogen Analyzers Inservice a. On RL011, place power lockout switches for containment sample valves in NON-ISO position ○ GS HIS-40 ○ GS HIS-41 ○ GS HIS-42 ○ GS HIS-43 b. On RL011, open one Hydrogen Analyzer Supply Inner Containment Isolation Valve per train ○ GS HIS-13 OR GS HIS-14 For Red Train ○ GS HIS-4 OR GS HIS-5 For Yellow Train c. On RL011, open remaining hydrogen analyzer containment isolation valves ○ GS HIS-12 ○ GS HIS-17 ○ GS HIS-18 ○ GS HIS-3 ○ GS HIS-8 ○ GS HIS-9 d. On RL020, place containment hydrogen analyzer control switches in ANALYZE position ○ GS HIS-16A ○ GS HIS-11A e. On RL020, monitor containment hydrogen concentration ○ GS AI-19 ○ GS AI-10
	BOP	20. Verify Cold Leg Recirculation Capability: a. Check ESFAS Status Panel SIS Section – NO AMBER LIGHT LIT ○ Red Train ***– No*** ○ Yellow Train ***– No*** **RNO** Perform the following: 1. Ensure Power to Components Listed in Attachment A – Available ***– Yes*** 2. IF cold leg recirculation capability can NOT be verified for at least one RHR train, THEN go to EMG C-11, LOSS OF EMERGENCY COOLANT RECIRCULATION, Step 1

Op-Test No.: Dec 2019 Scenario No.: 1 Event Nos.: 5/6/7/8 Total No Pages 41

<u>Event Description:</u> Earthquake causes Large Break LOCA (6”) on Loop 4 Cold Leg. 3 valves fail to Auto CLOSE on CIAS. Both RED train CCW pumps fail to AUTO start on SIS. ‘B’ RHR pumps trips on SIS due to suction valve BN HV-8812B failing closed

Time	Position	Applicant’s Actions or Behavior
	CRS	Transitions to EMG C-11, LOSS OF EMERGENCY COOLANT RECIRCULATION, Step 1
EMG C-11, LOSS OF EMERGENCY COOLANT RECIRCULATION		
NOTE Foldout page shall be monitored throughout this procedure		
	BOP	<u>1.</u> Verify ECCS Pumps not affected by Sump Blockage: ***- Yes*** a. Check ECCS aligned for recirculation b. Check following to determine is sump blockage exists: 1) Check indications of cavitation – NOT PRESENT o EJ FI-168 – RHR To ACC INJ Loop 1 & 2 Flow o EJIooo4 – Pump A Current o EJ PI-614 – RHR Pump A Disch Press o EJ FI-619 – RHR To ACC INJ Loop 3 & 4 Flow o EJI0020 – Pump B Current o EJ PI-615 – RHR Pump B Disch Press 2) Check Containment Recirc Sump Levels – GREATER THAN 2001 FT o EJ LI-7 o EJ LI-8
	ATC	2. Check Emergency Coolant Recirculation Equipment available, Using ATTACHMENT A, COLD LEG RECIRCUALTION AVAILABILITY VERIFICATION – No **RNO** Try to restore at least one train of emergency coolant recirculation while continuing with this procedure
<u>CAUTION</u> If offsite power is lost after SI reset, manual action may be required to restore safeguards equipment to the required configuration		
<u>NOTE</u> RWST switchover must be reset to prevent automatic transfer to an empty containment sump		

<table>
<tr><td colspan="3">Op-Test No.: Dec 2019 Scenario No.: 1 Event Nos.: 5/6/7/8 Total No Pages 41

<u>Event Description:</u> Earthquake causes Large Break LOCA (6”) on Loop 4 Cold Leg. 3 valves fail to Auto CLOSE on CIAS. Both RED train CCW pumps fail to AUTO start on SIS. ‘B’ RHR pumps trips on SIS due to suction valve BN HV-8812B failing closed</td></tr>
<tr><th>Time</th><th>Position</th><th>Applicant’s Actions or Behavior</th></tr>
<tr><td></td><td>BOP</td><td>3. Reset Containment Spray and SI signals:
○ SB HS-42A For SIS
○ SB HS-43A For SIS
○ SB HIS-62 For RWST Switchover
○ SB HIS-63 For RWST Switchover
○ SB HS-51 For CS
○ SB HS-54 For CS</td></tr>
<tr><td></td><td>ATC</td><td>4. Check Containment Fan Coolers – RUNNING IN SLOW SPEED – Yes</td></tr>
<tr><td></td><td>ATC</td><td>5. Check RWST Level – GREATER THAN 6% - Yes
○ BN LI-930
○ BN LI-931
○ BN LI-932
○ BN LI-933
○ Annunciator 00-047B, RWST EMPTY – CLEAR</td></tr>
<tr><td></td><td>BOP</td><td>6. Determine Containment Spray Requirements (Suction From RWST):
a. Check Spray Pump Suction – ALIGNED TO RWST – Yes
○ BN HIS-3 – OPEN
○ BN HIS-4 – OPEN
○ EN HIS-7 – CLOSED
○ EN HIS-1 – CLOSED
b. Determine number of Spray Pumps required from table: - 0
<table>
<tr><th>RWST LEVEL</th><th>CONTAINMENT PRESSURE</th><th>FAN COOLERS RUNNING IN SLOW SPEED</th><th>SPRAY PUMPS THAT SHOULD BE RUNNING</th></tr>
<tr><td rowspan="5">GREATER THAN 36%</td><td>GREATER THAN 60 PSIG</td><td>---</td><td>2</td></tr>
<tr><td rowspan="3">BETWEEN 27 PSIG <u>AND</u> 60 PSIG</td><td>0</td><td>2</td></tr>
<tr><td>2</td><td>1</td></tr>
<tr><td>4</td><td>0</td></tr>
<tr><td>LESS THAN 27 PSIG</td><td>---</td><td>0</td></tr>
<tr><td rowspan="4">BETWEEN 6% <u>AND</u> 36%</td><td>GREATER THAN 60 PSIG</td><td>---</td><td>2</td></tr>
<tr><td rowspan="2">BETWEEN 27 PSIG <u>AND</u> 60 PSIG</td><td>2</td><td>1</td></tr>
<tr><td>3</td><td>0</td></tr>
<tr><td>LESS THAN 27 PSIG</td><td>---</td><td>0</td></tr>
<tr><td>LESS THAN 6%</td><td>---</td><td>---</td><td>0</td></tr>
</table>
c. Check Running Spray Pumps – EQUAL TO NUMBER REQUIRED – Yes</td></tr>
</table>

Op-Test No.: Dec 2019 Scenario No.: 1 Event Nos.: 5/6/7/8 Total No Pages 41		
<u>Event Description:</u> Earthquake causes Large Break LOCA (6") on Loop 4 Cold Leg. 3 valves fail to Auto CLOSE on CIAS. Both RED train CCW pumps fail to AUTO start on SIS. 'B' RHR pumps trips on SIS due to suction valve BN HV-8812B failing closed		
Time	**Position**	**Applicant's Actions or Behavior**
	BOP	7. Check if Containment Spray should be aligned for Recirculation: a. Check Spray Pumps – ANY RUNNING o EN HIS-3 For CSP A o EN HIS-9 For CSP B **RNO** a. Go to step 8
	ATC	<u>8.</u> Check RWST Level – IN ACCEPTABLE REGION ON FIGURE 1 **– *Yes***
<u>CAUTION</u> A faulted or ruptured S/G that is isolated should remain isolated		
	BOP	9. Check if S/Gs ae not faulted: ***- No*** a. Check pressure in all S/Gs: o NO S/G PRESSURE DECREASING IN AN UNCONTROLLED MANNER o NO S/G COMPLETELY DEPRESSURIZED
CAUTION If steamlines in Area 5 of Auxiliary Building are not intact, extreme caution will be necessary hen performing local surveys		
	BOP	10. Check if S/G tubes are intact: ***- Yes*** a. Direct Health Physics to survey steamlines in Area 5 of Auxiliary Building b. Condenser Air Discharge – NORMAL BEFORE ISOLATION o GEG 925 c. S/G Blowdown and Sample Radiation – NORMAL BEFORE ISOLATION o BML 256 o SJL 026 d. Turbine Driven Auxiliary Feedwater Pump Exhaust Radiation – NORMAL o FCT 381 e. S/G Steamline Radiation Monitors – NORMAL o ABS 114 For S/G A o ABS 113 For S/G B o ABS 112 For S/G C o ABS 111 For S/G D o Local Surveys

Op-Test No.: Dec 2019	Scenario No.: 1	Event Nos.: 5/6/7/8	Total No Pages 41

Event Description: **Earthquake causes Large Break LOCA (6") on Loop 4 Cold Leg. 3 valves fail to Auto CLOSE on CIAS. Both RED train CCW pumps fail to AUTO start on SIS. 'B' RHR pumps trips on SIS due to suction valve BN HV-8812B failing closed**

Time	Position	Applicant's Actions or Behavior
	BOP	11. Check Intact S/G Levels: a. Check Narrow Range Level in at least one S/G – GREATER THAN 6% [29%] b. Control feed flow to maintain narrow range level in all S/Gs between 6% [29%] and 50%
	BOP	12. Check if Condenser Air Removal should be returned to Normal: a. Check the following: ○ Main Steamline Isolation Valves – AT LEAST ONE OPEN ***- No*** **RNO** a. OBSEREVE NOTE PRIOR TO STEP 13 and got to step 13
		NOTE If high steam pressure rate setpoint (100 psi/50 sec) is exceeded after low steamline pressure SI signal is blocked, main steamline isolation will occur
	ATC	13. Check if Low Steamline Pressure SI should be blocked: a. Check RCS Pressure – LESS THAN 1970 PSIG ***– Yes*** ○ P-11 Light – LIT b. Block low steamline pressure SI ○ SB HS-9 ○ SB HS-10
		NOTE Shutdown margin shall be monitored during RCS cooldown
	BOP	14. Initiate RCS Cooldown to Cold Shutdown: a. Maintain Cooldown Rate in RCS Cold Legs – LESS THAN 100°F/HR b. Check Steam Dumps – AVAILABLE – No RNO b. Perform the following: 1) Manually dump steam from intact S/Gs: Use S/G ARV Operate Turbine Driven AFW Pump at maximum load 2) IF intact S/G is NOT available, THEN us faulted S/G ARV 3) Go to step 15 **CT3:** Initiate RCS Cooldown to Cold Shutdown before RWST level reaches the Unacceptable Region of EMG C-11, Figure 1 (68%)

Scenario Termination: After the crew has commenced cooldown to Cold Shutdown per EMG C-11 and/or at the discretion of the Lead Examiner terminate the scenario

Simulator Operator: FREEZE

Attachment 1 EMG E-0 Attachment F

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 79 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 1 of 13)
AUTOMATIC SIGNAL VERIFICATION

F1.	**Check AC Emergency Busses - ENERGIZED:**	
	o NB01 - ENERGIZED	o Depress START/RESET pushbutton for EDG A. o KJ HS-8A
	o NB02 - ENERGIZED	o Depress START/RESET pushbutton for EDG B. o KJ HS-108A

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 81 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 2 of 13)
AUTOMATIC SIGNAL VERIFICATION

F2. Verify Feedwater Isolation:

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
a. Main feedwater pumps - TRIPPED o Annunciator 00-120A, MFP A TRIP - LIT o Annunciator 00-123A, MFP B TRIP - LIT	a. Manually trip Main Feedwater Pumps. o IF MFWP A is NOT tripped, THEN depress the following: o FC HS-18A For MFWP A o FC HS-18B For MFWP A o IF MFWP B is NOT tripped, THEN depress the following: o FC HS-118A For MFWP B o FC HS-118B For MFWP B
b. Main feedwater reg valves - CLOSED o AE ZL-510 for S/G A o AE ZL-520 for S/G B o AE ZL-530 for S/G C o AE ZL-540 for S/G D	b. Manually close valves. * AE FK-510 for S/G A * AE FK-520 for S/G B * AE FK-530 for S/G C * AE FK-540 for S/G D
c. Main feedwater reg bypass valves - CLOSED o AE ZL-550 for S/G A o AE ZL-560 for S/G B o AE ZL-570 for S/G C o AE ZL-580 for S/G D	c. Manually close valves. * AE LK-550 for S/G A * AE LK-560 for S/G B * AE LK-570 for S/G C * AE LK-580 for S/G D
d. Main feedwater isolation valves - CLOSED o AE HIS-39 for S/G A o AE HIS-40 for S/G B o AE HIS-41 for S/G C o AE HIS-42 for S/G D	d. Perform the following: 1) Manually close valves. 2) IF valves can NOT be closed, THEN at SA075A OR SA075B, disconnect the following cards (2 cards total) in the MFIV sub-racks: o ALS-411-1 o ALS-411-2

(Step F2. continued on next page)

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 83 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 3 of 13)
AUTOMATIC SIGNAL VERIFICATION

Step F2. (continued from previous page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
e. Main feedwater chemical injection valves - CLOSED o AE HIS-43 for S/G A o AE HIS-44 for S/G B o AE HIS-45 for S/G C o AE HIS-46 for S/G D	e. Perform the following: 1) Manually close valve. 2) <u>IF</u> valve can <u>NOT</u> be closed, <u>THEN</u> locally isolate affected feedline. * AE-V129 for S/G A (STEAM ENCLOSURE ROOM SOUTH OF MFIV) * AE-V128 for S/G B (STEAM ENCLOSURE ROOM SOUTH OF MFIV) * AE-V131 for S/G C (STEAM ENCLOSURE ROOM SOUTH OF MFIV) * AE-V130 for S/G D (STEAM ENCLOSURE ROOM SOUTH OF MFIV)
f. Check ESFAS status panel SGBSIS section - ALL WHITE LIGHTS LIT o Red train o Yellow train	f. <u>IF</u> any SGBSIS valve <u>NOT</u> closed, <u>THEN</u> manually close valve. <u>IF</u> valve(s) can <u>NOT</u> be closed, <u>THEN</u> manually or locally isolate affected blowdown or sample line. Refer to ATTACHMENT A, VALVES CLOSED BY S/G BLOWDOWN AND SAMPLE ISOLATION SIGNAL.

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 85 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 4 of 13)
AUTOMATIC SIGNAL VERIFICATION

F3. Verify Containment Isolation Phase A:

a. Check ESFAS status panel CISA section - ALL WHITE LIGHTS LIT

- o Red train
- o Yellow train

a. Perform the following:

1) IF containment isolation phase A has NOT actuated, THEN manually actuate containment isolation phase A.

- o SB HS-47
- o SB HS-48

2) IF any CISA valve NOT closed, THEN manually close valve. IF valve(s) can NOT be closed, THEN manually or locally isolate affected containment penetration. Refer to ATTACHMENT B, VALVES CLOSED BY CONTAINMENT ISOLATION SIGNAL PHASE A.

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 87 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 5 of 13)
AUTOMATIC SIGNAL VERIFICATION

F4. Verify AFW Pumps Running:

	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	a. Check motor driven AFW pumps - BOTH RUNNING	a. Manually start pumps. o AL HIS-22A o AL HIS-23A
	b. Check turbine driven AFW pump - RUNNING	b. Perform the following: 1) Check if turbine driven AFW pump should be running: * At least 2/4 S/G narrow range level channels on 2/4 S/Gs - LESS THAN 23.5% <u>OR</u> * Loss of NB01 voltage has occurred <u>OR</u> * Loss of NB02 voltage has occurred <u>OR</u> * AMSAC actuation 2) <u>IF</u> turbine driven AFW pump should be running, <u>THEN</u> manually open steam supply valves: a) AB HIS-5A b) AB HIS-6A c) FC HIS-312A

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 89 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 6 of 13)
AUTOMATIC SIGNAL VERIFICATION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
F5.	**Verify ECCS Pumps Running:**	
	a. Check CCPs - BOTH RUNNING	a. Manually start pumps. o BG HIS-1A o BG HIS-2A
	b. Check SI pumps - BOTH RUNNING	b. Manually start pumps. o EM HIS-4 o EM HIS-5
	c. Check RHR pumps - BOTH RUNNING	c. Manually start pumps. o EJ HIS-1 o EJ HIS-2
F6.	**Verify CCW Alignment:**	
	a. Check CCW pumps - ONE RUNNING IN EACH TRAIN	a. Manually start CCW pumps as necessary to establish one running in each train. o EG HIS-21 or EG HIS-23 for red train o EG HIS-22 or EG HIS-24 for yellow train
	b. Check one pair of CCW service loop Supply And Return Valves for an operating CCW pump - OPEN * EG ZL-15 AND EG ZL-53 OR * EG ZL-16 AND EG ZL-54	b. Manually align valves as necessary to establish CCW flow to service loop and containment.
F7.	**Check ESW Pumps - BOTH RUNNING**	Manually start pumps. o EF HIS-55A o EF HIS-56A

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 91 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 7 of 13)
AUTOMATIC SIGNAL VERIFICATION

F8. Check Containment Fan Coolers - RUNNING IN SLOW SPEED

Perform the following for each Containment Cooler Fan that is still running in Fast or is not running:

a. Manually stop ANY Containment Cooler Fans running in fast.

* GN HIS-5 For Cooler 1A
* GN HIS-9 For Cooler 1B
* GN HIS-13 For Cooler 1C
* GN HIS-17 For Cooler 1D

b. Place Containment Cooler Fan Speed Selector switches in Slow.

* GN HS-5 for cooler 1A
* GN HS-9 for cooler 1B
* GN HS-13 for cooler 1C
* GN HS-17 for cooler 1D

c. Manually start containment cooler fans.

* GN HIS-5 for cooler 1A
* GN HIS-9 for cooler 1B
* GN HIS-13 for cooler 1C
* GN HIS-17 for cooler 1D

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 93 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 8 of 13)
AUTOMATIC SIGNAL VERIFICATION

F9. Verify Containment Purge Isolation:

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
a. Check ESFAS status panel CPIS section - ALL WHITE LIGHTS LIT o Red train o Yellow train	a. Perform the following: 1) IF containment purge isolation has NOT actuated, THEN manually actuate containment purge isolation. o SA HS-11 o SA HS-15 2) IF any CPIS component NOT properly aligned, THEN manually align component. 3) IF component(s) can NOT be manually aligned, THEN locally isolate instrument air to affected containment penetration. Refer to ATTACHMENT C, VALVES CLOSED BY CONTAINMENT PURGE ISOLATION SIGNAL.

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 95 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 9 of 13)
AUTOMATIC SIGNAL VERIFICATION

F10. Verify Both Trains Of Control Room Ventilation Isolation:

a. Check ESFAS status panel CRVIS section - ALL WHITE LIGHTS LIT

- o Red train
- o Yellow train

RESPONSE NOT OBTAINED:

a. Perform the following:

1) IF control room ventilation isolation has NOT actuated, THEN manually actuate control room ventilation isolation.

- o SA HS-9
- o SA HS-13

2) IF any CRVIS component NOT properly aligned, THEN manually align associated component.

3) IF neither train of CRVIS is in service, THEN establish one in service train of CRVIS using SYS GK-122, MANUAL CRVIS LINE-UP.

4) IF only one train of CRVIS can be placed in service, THEN within 90 minutes (76.5 minutes control room and 13.5 minutes local operator), isolate out of service train using SYS GK-122, MANUAL CRVIS LINE-UP.

b. Ensure Control Room outer door - CLOSED

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 97 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 10 of 13)
AUTOMATIC SIGNAL VERIFICATION

F11. Verify Main Steamline Isolation Not Required:

a. Check containment pressure - HAS REMAINED LESS THAN 17 PSIG

o GN PR-934

b. Check either condition below - SATISFIED:

* Low steamline pressure SI - NOT BLOCKED AND steamline pressure - HAS REMAINED GREATER THAN 615 PSIG

OR

* Low steamline pressure SI - BLOCKED AND steamline pressure rate - HAS REMAINED LESS THAN 100 PSI/50 SEC

RESPONSE NOT OBTAINED:

Verify steamline isolation:

1. If any main steamline isolation valve is NOT closed, THEN perform the following:

   a) Close main steamline isolation valves.

      * AB HS-79
      * AB HS-80

   b) IF any MSIV is still NOT closed, THEN at SA075A OR SA075B, disconnect the following cards (2 cards total) in the MSIV sub-rack:

      o ALS-411-1

      o ALS-411-2

2. Check ESFAS status panel SLIS section - ALL WHITE LIGHTS LIT

   o Red Train
   o Yellow Train

3. IF any SLIS valve NOT closed, THEN manually close valve. IF valve(s) can NOT be closed, THEN manually or locally isolate affected steamline. Refer to ATTACHMENT D, VALVES CLOSED BY STEAMLINE ISOLATION SIGNAL.

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 99 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 11 of 13)
AUTOMATIC SIGNAL VERIFICATION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
F12.	**Verify Containment Spray Not Required:** a. Containment pressure - HAS REMAINED LESS THAN 27 PSIG: o Annunciator 00-059A, CSAS - NOT LIT o Annunciator 00-059B, CISB - NOT LIT o GN PR-934	Perform the following: 1. Stop all RCPs. 2. IF containment spray has NOT actuated, THEN manually actuate containment spray. o SB HS-43 AND SB HS-45 o SB HS-44 AND SB HS-46 3. Check ESFAS status panel CSAS section - ALL WHITE LIGHTS LIT o Red train o Yellow train 4. IF any CSAS component NOT properly aligned, THEN manually align associated component. 5. Check ESFAS status panel CISB section - ALL WHITE LIGHTS LIT o Red train o Yellow train 6. IF any CISB valve NOT closed, THEN manually close valve. IF valve(s) can NOT be closed, THEN manually or locally isolate affected containment penetration. Refer to ATTACHMENT E, VALVES CLOSED BY CONTAINMENT ISOLATION SIGNAL PHASE B.

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 101 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 12 of 13)
AUTOMATIC SIGNAL VERIFICATION

F13. Verify ECCS Flow:

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	a. Check Centrifugal Charging Pumps To Boron Injection Tank Flow meters - FLOW INDICATED o EM FI-917A o EM FI-917B	a. Perform the following: 1) IF BIT valves have NOT been closed by operator action, THEN manually start pumps and align valves. 2) IF BIT valves are closed by operator action, THEN go to Step F14.
	b. Check RCS pressure - LESS THAN 1725 PSIG	b. Go to Step F14.
	c. Check SI Pump Discharge Flow meters - FLOW INDICATED o EM FI-918 o EM FI-922	c. Manually start pumps and align valves.
	d. Check RCS pressure - LESS THAN 325 PSIG	d. Go to Step F14.
	e. Check RHR To Accumulator Injection Loop Flow meters - FLOW INDICATED o EJ FI-618 o EJ FI-619	e. Manually start pumps and align valves.
F14.	**Verify AFW Valves - PROPERLY ALIGNED:** a. Check ESFAS status panel AFAS section - ALL WHITE LIGHTS LIT b. Check white train ESFAS status panel AFAS section - ALL WHITE LIGHTS LIT	IF any AFAS section component NOT properly aligned, THEN manually align associated component to establish desired AFAS lineup.

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 103 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 13 of 13)
AUTOMATIC SIGNAL VERIFICATION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
F15.	**Verify SI Valves - PROPERLY ALIGNED:** a. Check ESFAS status panel SIS section - SYSTEM LEVEL WHITE LIGHTS ALL LIT o Red train o Yellow train	<u>IF</u> any SIS section component <u>NOT</u> properly aligned, <u>THEN</u> manually align associated component to establish proper SIS lineup.
F16.	**Check If NCP Should Be Stopped:**	
	a. CCPs - ANY RUNNING	a. Go to Step F17
	b. Stop NCP o BG HIS-3	
F17.	**Return To Procedure And Step In Effect**	

-END-

Facility: Wolf Creek Scenario No.: 2 Op-Test No.: December 2019

Examiners: ______________________ Operators: ______________________

Initial Conditions: 100% Power, MOL, Yellow Train In Service, 'A' EDG Out service, LCO 3.8.1, COND B is entered.

Turnover: The unit is operating at 100% power, MOL Yellow Train is in Service, 'A' EDG is out of service due to repairs on the Auxiliary Lube Oil Pump. LCO 3.8.1 Condition B is entered (Actions B.1 and B.2 are current. STS NB-005 was performed 3 hours ago).

Critical Tasks: **CT-1** Manually Trip the Reactor per EMG FR-S1, Step 1, Immediate Actions **CT-2** Isolate Feed flow to Faulted 'A' S/G. **CT-3** Terminate SI prior to Rupturing PRT.

Event No.	Malf. No.	Event Type*	Event Description
1		C (ATC/CRS) Tech Specs	Breaker 4-16 to Bus SL-41 Trips, Loss of power to 'A' SW Pump. ALR 00-011D, ALR 00-08B, TR 3.7.8, COND A
2		I (BOP/CRS)	AE FI-520, B S/G Feed Flow Channel fails LOW. OFN SB-008, ATT E.
3		C (All)	'B' HDP Trips, Downpower to 95% OFN AF-025, OFN MA-038
4		I (BOP/CRS) Tech Specs	AC PT-505, Turbine Impulse Pressure Channel fails LOW OFN SB-008, ATT D LCO 3.3.1, Function 18.f, Conditions A, T
5		C (ATC/CRS)	Letdown Orifice valve BG HIS-8149BA fails closed ALR 00-0032D
6		M (All)	'D' RCP Trips, Reactor Fails to Trip in both Auto and Manual (ATWS) EMG FR-S1
7		C (BOP/CRS)	'A' MDAFW Pump fails to Auto start EMG FR-S1, Step 3
8		M (ALL)	Three S/G Safeties on 'A' S/G fail open (Faulted S/G), EMG E-0, EMG E-2, EMG ES-03
9		I (ATC/CRS)	SI Actuates on 'A' Train ONLY. EMG E-0, Step 4

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

Target Quantitative Attributes per Scenario (See Section D.5.d)	Actual Attributes	ES-301-5	CRS	ATC	BOP
1. Malfunctions after EOP entry (1–2)	2	Rx	0	0	0
2. Abnormal events (2–4)	5	Nor	0	0	0
3. Major transients (1–2)	2	I/C	7	4	4
4. EOPs entered/requiring substantive actions (1–2)	3	Maj	2	2	2
5. Entry into a contingency EOP with substantive actions (≥ 1 per scenario set)	1	TS	2	0	0
6. Preidentified critical tasks (≥ 2)	3				

Critical Task	Safety Significance	Cueing	Measurable Performance Indicators	Performance Feedback
CT 1: Given an ATWS, insert maximum negative reactivity into the core by manually inserting control rods and de-energizing the control rod drive MG sets prior to completion of EMG FR-S1 Immediate Actions.	Failure to insert negative reactivity by one of the methods listed can result in the needless continuation of an extreme or a severe challenge to the subcriticality CSF. The safeguards systems that protect the plant during accidents are designed assuming that only decay heat and pump heat are being added to the RCS.	1) Red first out annunciator 86A lit with indications of loss of RCS flow on one loop. 2) On Panel RL-004, Red lights lit for Reactor Trip Breakers *SB ZL-1 *SB ZL-2 3) On DRPI panel, ALL Rods out. 4) Reactor Not Manually Tripped after actuating Handswitches *SB HS-1 *SB HS-42 5) Reactor Power ≥5%	On Panel RL-004 RO inserts rods in MANUAL using * SF HS-2 On Panel RL-016, BOP/3rd RO opens red handled breakers: *PG HIS-16 *PG HIS-18	1) On DRPI panel, All Rod Bottom lights lit. 2) Reactor Power <5% on PR NIs. 2) Reactor power lowering on IR NI detectors * SE NI-34B * SE NI36B 3) Negative IR SUR *SE NI-35D *SE NI-36D
CT 2: Isolate feed flow into the Faulted ‘A’ S/G by closing AL HK-7A and AL HK-8A, AFW REG VLV CTRLs before ANY RCS Cold Leg temperature reaches 240°F.	Failure to isolate steam from and feed to a faulted S/G causes an unnecessary and avoidable challenge to the Integrity CSF due only to improper response by the crew.	S/G pressures, flows and level indications will make it possible to identify ‘A’ S/G as the faulted S/G. Reports from the field help identify safety valves have lifted.	Manipulates closed the following hand switches On Panel RL-005, ○ AL HK-7A, SG A MD AFP AFW Reg VLV CTRL ○ AL HK-8A, SG A TD AFP AFW REG VLV CTRL	On panel RL-005, AL HK-7A and 8A in the left latch detent position. Indicated flow on AL FI-2A is 0 lbm/hr

Critical Task	Safety Significance	Cueing	Measurable Performance Indicators	Performance Feedback
CT 3: Isolate high head ECCS flow through the BIT before overfill of the RCS results in a rupturing of the pressurizer relief tank (PRT)	Continued maximum injection causes RCS to go solid and PORV to open, passing excess inventory through PORVs to the PRT. Failure to terminate ECCS flow when it is possible to do so results in a rupture of the PRT, spread of radioactive coolant into Containment, and constitutes an avoidable degradation of a fission product barrier, as well as additional risk of stuck open PORV (SBLOCA).	RCS pressure and pressurizer level rise. PORVs open, flow indicated. PRT level, pressure, and temperature rise. When PRT ruptures at ~91 psig, PRT pressure drops and equalizes with Containment Pressure.	The Operator will isolate the BIT per EMG ES-03, Step 13, by Manipulation of the following handswitches on Panel RL018. *EM HIS-8803A *EM HIS-8803B *EM HIS-8801A *EM HIS-8801B	Green lights LIT and red lights extinguished for the following valves: *EM HIS-8803A *EM HIS-8803B *EM HIS-8801A *EM HIS-8801B CCP To BIT Flow indicators drop to 0 GPM. *EM FI-917A *EM FI-917B

Note: Causing an unnecessary plant trip or ESF actuation may constitute a Critical Task failure. Actions taken by the applicant(s) will be validated using the methodology for critical tasks in Appendix D to NUREG-1021.

SCENARIO # 2 NARRATIVE

Turnover: The Unit is operating at 100% power. Yellow Train is in service. 'A' EDG is out of service due to repairs on the Auxiliary Lube Oil pump. LCO 3.8.1 Condition B is entered (Actions B.1 and B.2 are current. STS NB-005 was performed 3 hours ago)

Event 1: Breaker 4-16 Trips, Loss of Bus SL-41 and 'A' SW Pump. The crew will dispatch an Operator to investigate loss of bus SL-41 per ALR 00-011D and start 'B' SW pump per ALR 00-08B to restore Service Water System pressure to >85 psig. Once the CRS has determined TRM 3.7.8 is applicable for loss of 'A' SW Pump, the next event will start as directed by the Lead Examiner.

Event 2: B S/G Feed Flow Channel indicator AE FI-520 fails LOW. The crew will respond by taking manual control of AE FK-520, B FRV to match feed and steam flows per ALR 00-109C and then address the instrument failure per OFN SB-008, ATT C. Once the Crew has restored automatic control, the next event will start as directed by the Lead Examiner.

Event 3: 'B' HDP Trips. Per OFN AF-025, ATTACHMENT A, Maximum unit load is at 95% for one HDP out of service. The crew will reduce load per OFN MA-038 and beginning of shift reactivity brief. Once reactor power has stabilized at the new lower power level, the next event will start as directed by the Lead Examiner.

Event 4: Turbine First Stage Pressure indictor AC PT-505 fails LOW. After control rods reach 204 steps in automatic, AC PT-505 will fail low. After confirming no load reject is in progress, the ATC operator will take rods to manual to stop inward rod motion. The crew will address the failure per OFN SB-008, ATT D. Once the CRS has determined applicable technical specifications, the next event will start at the direction of the Lead Examiner.

Event 5: Letdown Orifice valve BG HIS-8149BA fails closed: ATC will recognize loss of Letdown flow and Pressurizer Level rising. The ATC will address the failure by charging to seals only, and restoring Letdown using one of the other valves. ALR 00-032D may be initiated to control pressurizer level. The next event will start following restoration of Letdown or at the direction of the Lead Examiner

Event 6: 'D' RCP spuriously trips and the Reactor fails to Trip in BOTH Auto and Manual. The loss of flow causes multiple MCB alarms, including a Red First Out 86A, which indicates the reactor should have tripped due to RCS flow <89.9% on 3/3 loop flow instruments on1/4 RCS Loops while Reactor Power >48% (P8). After the crew attempts to manually trip the reactor unsuccessfully, they will perform Immediate Actions of EMG FR-S1, to open RDMG breaker power supplies for PG19 and PG20 to trip the Reactor.

CT 1: Given an ATWS, insert maximum negative reactivity into the core by manually Inserting control rods and deenergizing the control rod drive MG sets prior to completion of EMG FR-S1 Immediate Actions.

Event 7: 'A' MD AFW Pump fails to Auto Start. The BOP will manually start 'A' MDAFW Pump per EMG FR-S1, Step 3 RNO.

Event 8: Three S/G Safety Valves will fail open on 'A' S/G and SI will actuate on 'A' Train ONLY: As soon as the Reactor trips. Safety valves will lift on 'A', 'B' and 'C' S/Gs. The Safety valves will reseat on 'B' and 'C' S/Gs, while three 'A' S/G safety valves stick open. Steam flow noises will be heard in the control room. Once the crew closes MSIVs, the faulted 'A' S/G will be more evident, and they will transition to EMG E-2 to address the faulted 'A' S/G.

CT 2: Isolate feed flow into the Faulted 'A' S/G by closing AL HK-7A, SG A MD AFP AFW REG VLV CTRL and AL HK-8A SG A TD AFP AFW REG VLV CTRL before ANY RCS Cold Leg temperature reaches 240°F.

Once the crew isolates the Faulted S/G per EMG E-2, they will transition to EMG ES-03 to terminate SI.
CT 3: Isolate high head ECCS flow through the BIT before overfilling the RCS resulting in a rupture of the pressurizer relief tank (PRT) at 91 psig.

Event 9: SI fails to actuate on 'A' Train ONLY: SI will actuate on 'A' Train ONLY, The ATC will Manually Actuate SI on 'B' Train during performance of EMG E-0 Immediate actions before the crew continues in EMG E-0 to verify proper SI Auto actuation.

The scenario is complete when the crew has Terminated SI flow and verified ECCS Flow is NOT required per EMG ES-03, Step 18 and/or at the discretion of the Lead Examiner.

SIMULATOR SCENARIO FILES

;2019 ILO NRC Exam, Scenario 2 (IC 302)

;Initial Conditions – ‘A’ EDG Out of Service for TSEO, LCO 3.8.1, Cond B is entered. (For Predictability)
scn SimGroup\TAGDGA

;Event 1 – Key 1 – Loss of Bus SL-41 (‘A’ SW Pump) (ATC/CRS-TS)
ICM bkrSL4_16.cmf t:1 k:1

;Event 2 – Key 2 – AE FI-520,’B’ S/G Feed Flow fails LOW (BOP/CRS)
ICM trAEFT0529.cmf t:3 k:2 r:30 f:0

;Event 3 – Key 3 – ‘B’ HDP Trips (BOP/ATC/CRS)
ICM bkrDPAF01B.cmf t:1 k:3

;Event 4 – Key 4 – AC PT-505 fails LOW (BOP/CRS - TS)
ICM trACPT0505.cmf t:3 k:4 f:0

;Event 5 – Key 5 – Letdown Orifice valve BG HIS-8149BA fails closed (ATC)
ICM aovBGHV8149B.cmf t:2 k:5

;Event 6 – Key 6 – ‘D’ RCP Spuriously Trips, Reactor Fails to Trip in Auto and Manual (Major)
ICM bkrPA00204.cmf t:1 k:6
IMF mSF17A
IMF mSF17B

;Event 7 – ‘A’ MD AFW Pump fails to start on Reactor Trip (BOP – Not CT)
IMF mAL04A

;Event 8 – Three S/G Safeties on ‘A’ S/G fail to reseat after opening on ATWS.
{abp0514>1100} IMF mAB05A r:15 i:o f:300

;Event 9 - SI Train B Fails to Auto Actuate (ATC – Not CT)
IMF mSA14B f:AUTO

;Local Action – **Key 10** – Close AF V234
IRF rAF02B k:10 r:60 f:0

;Local Action – Key 11 – Open Reactor Trip Breakers
IRF rSF03A k:11 f:OPEN
IRF rSF03B k:11 d:10 f:OPEN

Booth Instructions

Ensure NRC Exam Security Established per AIF 30B-015-09, and AIF 30B-015-18

Ensure the following procedures are available, free of markings and are the most recent revision in Curator (9/25/19):

- **ALR 00-008B, SERV WTR PRESS HILO (Rev 18)**
- **ALR 00-011D, SL41 BUS TROUBLE (Rev 6)**
- **ALR 00-109B, SG B LEV DEV (Rev 10A)**
- **ALR 00-109C, SG B FLOW MISMATCH (Rev 11A)**
- **ALR 00-032D, PZR HI LEV DEV HTRS ON (Rev 11)**
- **ALR 00-042A, CHG LINE FLOW HILO (Rev 17)**
- **OFN SB-008, INSTRUMENT MALFUNCTIONS (Rev 48)**
- **OFN SB-008, ATTACHMENT D, TURBINE IMPULSE PRESSURE CHANNEL MALFUNCTION**
- **OFN SB-008, ATTACHMENT E, FEEDWATER FLOW CHANNEL MALFUNCTION**
- **OFN AF-025, UNIT LIMITATIONS (Rev 56)**
- **OFN MA-038, RAPID PLANT SHUTDOWN (Rev 30)**
- **EMG FR-S1, RESPONSE TO NUCLEAR POWER GENERATION/ATWS (Rev 23B)**
- **EMG E-0, REACTOR TRIP OR SAFETY INJECTION (Rev 40)**
- **EMG E-2, FAULTED STEAM GENERATOR ISOLATION (Rev 22)**
- **EMG ES-03, SI TERMINATION (Rev 26)**

NOTE: All events are loaded into snap **IC302**

Ensure malfunctions, including severity levels match scenario.

Ensure all meters, lamps, bistables and annunciators are correct for the initial setup. **Blue Placard is on the 'A' CCP and Caution Tags hanging for 'A' EDG on KJ HS-8A, and NE HIS-25 (in PTL). Green placard for STS NB-005 posted, showing time due in 5 hours.**

Ensure soft panel display in back is set to RP312 RCP Vibration on left screen and **AMSAC** on right screen.

Ensure no discernable history from RM11, Ovation screens, paper trend recorders, etc.

Ensure all laminated brief sheets, foldout pages, E plan boards are wiped clean.

Ensure all follow-up buttons are removed from the boards and trash cans and recycle bins are free of any potential exam material.

Ensure communications are established with the lead examiner, fresh batteries, radio check sat.

Critical Parameter Data to be collected:

- **Cold Leg Temperature.** The crew must isolate feed flow to faulted 'A' S/G prior to RCS Cold Leg Temperatures reach 240°F.
- **PRT Pressure** The crew must terminate SI by closing the BIT Isolation valves before rupturing the PRT at 91 psig.
- The crew must also trip the Reactor per EMG FR-S1 prior to dispatching an Operator to locally open the Reactor Trip Breakers.

Ensure Horns are ON and machine is in RUN

Insert Key 1 for Event 1 (Breaker 4-16, feeder to bus SL-4 Trips, 'A' SW Pump without power).

Insert Key 2 for Event 2 ('B' S/G Feed Flow fails LOW).

Insert Key 3 for Event 3 ('B' Heater Drain Pump Trips)

Insert Key 4 for Event 4 (AC PT-505 fails LOW)

Insert Key 5 for Event 5 (BG HIS-8149BA Fails closed)

Insert Key 6 for Major Event ('D' RCP Spuriously trips, Reactor fails to trip, 'A' MDAFW Pump fails to auto start, Three Safeties on 'A' S/G fail open, 'B' SI fails to Auto Actuate)

When directed to close AF V234, **Insert Key 10**
When directed to open RTBs, **Insert Key 11**

Op Test No.: Dec 2019	Scenario No.: 2	Event No.: 1 Total No Pages 51
Event Description: Breaker 4-16 to Bus SL-41 Trips, Loss of power to 'A' SW Pump		

Time	Position	Applicant's Actions or Behavior
Simulator Operator: Insert Key 1 at the lead examiners direction Diagnostics: Service Water Pump discharge pressure lowering, 1PI-WS009A Annunciators: 008B and 011D		
	CREW	Recognizes alarms affecting Service Water and bus SL-41
	CRS	Directs operator to perform ALR 00-008B, SERV WTR PRESS HI LO
ALR 00-008B, SERV WTR PRESS HI LO		
NOTE Service Water pressure low alarm is sensed downstream of Service Water Strainers. Service Water discharge indication is sensed upstream of Service Water Strainers at the pump discharge		
	ATC	1. Check Service Water Pumps Discharge Pressure – LESS THAN 80 PSIG – Yes ○ 1PI-WS009A
	ATC	2. Check Liquid Waste Release using Service Water System for dilution flow – NOT IN PROGRESS ***– Yes***
	ATC	3. Verify Service Water System Leakage is not the cause of the Service Water Low Pressure ***– Yes***
Simulator Operator: WHEN contacted as Site Watch to investigate SL-41 and the 'A' Service Water Pump, acknowledge request		
	ATC	4. Start Standby Service Water Pumps, As necessary, to establish discharge pressure greater than 85 PSIG ○ 1HS-WS002A For Pump B (SL-31, SL-3, PA01) ***– Yes***
	ATC	5. Check Service Water Pumps discharge pressure – GREATER THAN OR EQUAL TO 85 PSIG ***– Yes*** ○ 1PI-WS009A

Op Test No.: Dec 2019 Scenario No.: 2 Event No.: 1 Total No Pages 51

Event Description: **Breaker 4-16 to Bus SL-41 Trips, Loss of power to 'A' SW Pump**

Time	Position	Applicant's Actions or Behavior
	ATC	6. Check Service Water Pumps discharge pressure – GREATER THAN 140 PSIG ***– No*** RNO Return to procedure and step in effect
	CRS	**Enters TRM 3.7.8, CONDITION A – 60 days**

Event Termination: After the crew has established adequate Service Water discharge pressure and/or at the direction of the Lead Examiner

Simulator Operator: **Insert Key 2**

Op-Test No.: Dec 2019 Scenario No.: 2 Event No.: 2 Total No Pages 51		
Event Description: AE FI-520, 'B' S/G Feed Flow Fails LOW		
Time	**Position**	**Applicant's Actions or Behavior**
Simulator Operator: Insert Key 2 at direction of Lead Examiner. Diagnostics: Level rising in the 'B' S/G, indicated feedwater flow to the 'B' S/G lowering, 'B' MFRV opening Annunciators: 109C		
	CREW	Diagnoses failure of 'B' S/G level control and takes memory actions of ALR 00-109C,
	CRS	Enters and/or directs either ALR 00-109C or OFN SB-008
ALR 00-109C, SG B FLOW MISMATCH		
NOTE o Steps 1 through 3 are Memory Action steps o A slight step change on the Feedwater reg Valve controller's output could occur during the transfer between auto and manual		
	BOP	1. Check difference between Steam Generator B Steam Flow and Feed Flow – GREATER THAN 0.7 MPPH **– *Yes*** o AB FI-522A For Steam Flow o AB FI-523A For Steam Flow o AB FI-520A For Feed Flow o AB FI-521A For Feed Flow
	BOP	2. Check for Instrument Operating properly: o Steam Generator B Controlling Steam Pressure Channel – WITHIN 100 PSIG OF REMAINING CHANNELS **– *Yes*** *AB PI-524A *AB PI-525A o Steam Generator B Controlling Feedwater Flow Channel – WITHIN 0.2 MPPH OF OTHER CHANNEL **– *No*** o Steam Generator B Controlling Steam Flow Channel – WITHIN 0.2 MPPH OF OTHER CHANNEL **– *Yes*** RNO Perform the following: a. Place Feedwater Reg Valve in manual o AE FK-520 b. Adjust Feedwater Reg Valve, as necessary, to establish Steam Generator level at program value o AE FK-520 c. Go to OFN SB-008, INSTRUMENT MALFUNCTIONS, Step 1

Op-Test No.: Dec 2019	Scenario No.: 2	Event No.: 2	Total No Pages 51

Event Description: **AE FI-520, 'B' S/G Feed Flow Fails LOW**

Time	Position	Applicant's Actions or Behavior
	CRS	Transitions to OFN SB-008, INSTRUMENT MALFUNCTIONS, Step 1
		OFN SB-008, INSTRUMENT MALFUCNTIONS
	BOP, CRS	1. Check for Malfunction * Check if Secondary System Instrument Channel is Malfunctioning a. Perform appropriate attachment for malfunctioning channel from table below: Feedwater FLow (AE) — F-510, F-511, F-520 F-521, F-530, F-531 F-540, F-541 — ATTACHMENT E
		ATTACHMENT E, FEEDWATER FLOW CHANNEL MALFUNCTION
		CAUTION Feedwater flow is an input to the thermal power program. A failed feedwater flow channel could cause the thermal power program to be inaccurate
		NOTE Steps E1 through E3 are Memory Action steps
	BOP	E1. Identify failed Instrument Channel: a. Compare feedwater flow indications to confirm feedwater flow channel failure: *AE FI-520A
	BOP	E2. Check Failed Feedwater Flow channel selected on SG FW FLOW CHANNEL SEL switch: *AE FS-520C **– *Yes***
		NOTE A slight step change on the Feedwater Reg Value controllers output, could occur during the transfer between auto and manual
	BOP	E3. Check Main Feed Reg Valves in Control: a. Place Affected SG MFW REG VLV CTRL – IN MANUAL *AE FK-520 b. Adjust affected S/G MFW REG VLV CTRL, as necessary, to establish Steam Generator level at program: *AE FK-520

Op-Test No.: Dec 2019 Scenario No.: 2 Event No.: 2 Total No Pages 51

Event Description: **AE FI-520, 'B' S/G Feed Flow Fails LOW**

Time	Position	Applicant's Actions or Behavior
	BOP	E4. Select Alternate Feedwater Flow Channel on the SG FW FLOW CHANNEL SEL switch: *AE FS-520C
NOTE Feedwater flow is required to perform daily secondary calorimetric above 15% of rated thermal power		
	CRS	E5. Request I&C to repair failed channel
	CRS	E6. Check S/G Feedwater Flow Channel Failure – REPAIRED OR ALTERNATE CHANNEL SELECTED RNO WHEN the S/G feedwater flow channel failure is repaired OR alternate channel is selected, THEN go to step E7
	BOP	E7. Restore affected S/G MFW REG VLV CTRL to – AUTO
	CRS	E8. Return to procedure and step in effect

Event termination: After the crew has restored 'B' S/G Feedwater Control to Automatic and/or at the direction of the Lead Examiner

Simulator Operator: **Insert Key 3** at direction of the Lead Examiner.

Op-Test No.: Dec 2019 Scenario No.: 2 Event No.: 3 Total No Pages 51

Event Description: **'B' HDP trips, Downpower to 95%**

Time	Position	Applicant's Actions or Behavior
Simulator Operator: **Insert Key 3** at direction of Lead Examiner. Diagnostics: Main Generator load trending down Annunciators: 103E		
Examiner Note: It takes 60-70 seconds for alarm to actuate if crew does not see NPIS alarm. The trip of the Heater Drain Pump will change plant efficiency. The crew should reduce turbine load to maintain reactor power within limits. This action is NOT addressed in the ALR and the crew may either discuss lowering turbine load 30 MW using "FAST LOAD DECREASE" IAW Pre-shift reactivity brief actions, or formally enter OFN AF-025, UNIT LIMITATIONS AND/OR OFN MA-038, RAPID PLANT SHUTDOWN in accomplishing the task of reducing power within limits.		
	CREW	Diagnoses HDP Trip and performs ALR 103E
ALR 00-103E, HEATER DRN TK DUMP		
NOTE A red light on the front panel of the controller will indicate a problem with the controller's microprocessor		
	BOP	1. Check Heater Drain Dump Valves, Using NPIS Computer – OPEN **– *Yes*** ○ AFD0074A for AF LV-74A ○ AFD0074B for AF LV-74B
NOTE: Heater Drain Tank Dump valves are not designed for continuous operation. If dump valves are open for more than 2 weeks, System Engineering should be notified for erosion/corrosion concerns.		
	BOP	2. Check If Dump Valves Should Be - OPEN ○ Locally Check Heater Drain Tank Level - HIGHER THAN 20 INCHES ABOVE CENTERLINE
Simulator Operator: ○ **WHEN** contacted To determine level in Heater Drain Tank acknowledge request, **WAIT** 3 minutes and **REPORT**: "Level is above 25" and slowly rising" ○ IF asked about pump status, report breaker overcurrent flag is dropped. ○ IF contacted as WWM, acknowledge requests. ○ IF contacted as Call Supt., acknowledge status.		
	BOP	3. Check Turbine Power – Less than or equal to 25% **- *No*** **RNO** Go to step 5.

Op-Test No.: Dec 2019 Scenario No.: 2 Event No.: 3 Total No Pages 51

Event Description: 'B' HDP trips, Downpower to 95%

Time	Position	Applicant's Actions or Behavior
	BOP	5. Check Heater Drain Pumps – RUNNING ***– No*** RNO Perform the following: a. IF a Heater Drain Pump has tripped, THEN perform the following: ○ Notify Electrical Maintenance to determine and correct cause. ○ Complete shutdown of affected Heater Drain Pump per SYS AF-121, HEATER DRAIN PUMP OPERATION** **SYS AF-121, paragraph 6.4.5 directs locally closing AF-V234, HEATER DRAIN PUMP B DISCH LV-71B OUTLET ISO valve.
NOTE A red indicating light on the front panel of the controller will indicate a problem with the controller's microprocessor		
	RO	6. Locally Check Heater Drain Tank Level Control Valves - OPEN ○ AF LV-71A ○ AF LV-71B **- No** RNO Perform the following: a. Stop the affected HDP **– Tripped** b. Locally close affected level control isolation valve * AF-V234 for AF LV-71B c. Notify I&C to determine and correct cause of valve failure.
Simulator Operator: ○ WHEN directed to check AF LV-71A and 71B, acknowledge request, WAIT 5 minutes and REPORT valve AF LV-71B is closed ○ WHEN directed to locally close level control isolation valve, **INSERT Key 10**, WAIT 3 minutes and report AF V234 is closed		
NOTE At low power levels, high Condensate Pump discharge pressure may reduce Heater Drain Pump flow		
	RO	7. Check Plant Operating At A Low Power Level ***– NO*** RNO Go To Step 9
	RO	9. Verify Heater Drain Pump – RECIRCULATION FLOW a. ENSURE Heater Drain Pump Recirculation Controllers – SET AT 0.55 x10^6 LMB/HR ○ AF FIC-72B For Pump 'A' ○ AF FIC-73B For Pump 'B'

Op-Test No.: Dec 2019 Scenario No.: 2 Event No.: 3 Total No Pages 51

Event Description: **'B' HDP trips, Downpower to 95%**

Time	Position	Applicant's Actions or Behavior
	RO	10. Return To Procedure And Step in Effect
		OFN AF-025, UNIT LIMITATIONS
		NOTE Steps 1 through 12 may be done in any order
	CRS	12. Check For Conditions Requiring Unit Load Reduction: -***Yes*** a. Determine maximum unit load, using ATTACHMENT A, UNIT LOAD LIMITS. b. Reduce unit load, as necessary, to satisfy load limits using the appropriate procedure: *GEN 00-004, POWER OPERATION OR *GEN 00-005, MINIMUM LOAD TO HOT STANDBY OR *OFN MA-038, RAPID PLANT SHUTDOWN **–** ***Yes*** OR *ATTACHMENT D, TURBINE/GENERATOR LOAD DECREASE USING STEAM DUMPS
	CRS	Enters ATTACHMENT A, UNIT LOAD LIMITS
	CRS	(see table below)

FEED AND CONDENSATE (CONT.)

CONDITION REQUIRING LOAD REDUCTION	MAXIMUM UNIT LOAD
One main feed pump out of service	760 MWE 62%
One condensate pump out of service	1102 MWE 90% (1) (2)
One Htr Drain Pump out of service	3385 MWT 95% (3) (4) (5)
Two Htr Drain Pumps out of service	2140 MWT 60%

(3) Refer to SYS AF-121, HEATER DRAIN PUMP OPERATION for shutdown instructions and operating restrictions with one Heater Drain Pump OOS.

(4) If Reactor Power is greater than 60%, ensure all three Condensate Pumps are running.

(5) If Reactor Power is greater than 65%, ensure no Low Pressure Heater Strings are isolated.

Op-Test No.: Dec 2019 Scenario No.: 2 Event No.: 3 Total No Pages 51

Event Description: 'B' HDP trips, Downpower to 95%

Time	Position	Applicant's Actions or Behavior
	CRS	Enters and directs OFN MA-038, RAPID PLANT SHUTDOWN

OFN MA-038, RAPID PLANT SHUTDOWN

CAUTION:

Fast unloading rates may result in increased turbine vibration

NOTES:

- Foldout page shall be monitored throughout this procedure.
- Load reduction at greater than 65 MW (5%)/minute will arm condenser steam dumps.
- Steps 1, 2 and 3 are Memory Action Steps.

Time	Position	Applicant's Actions or Behavior
	CRS	Provide reactivity brief and bounding order for the load reduction, including unloading rate and boration rate. **Examiner Note: The initial reactivity brief for a 10% load reduction and/or shedding of 30 MW is performed prior at turnover and may not be repeated here. The Applicants have been trained to use FAST LOAD DECREASE pushbutton per step 3, but either method is acceptable.**
	BOP	1. Determine Turbine Unloading Method To Be Used: a. Check Desired Unloading Rate – LESS THAN OR EQUAL TO 65 MW/MINUTE (5%) ***– Yes, 3%/min*** b. Check Automatic Turbine Unloading Desired - ***Yes***

NOTES:

- If the High Limiter Active on Graphic 5551 is in alarm, load can only be decreased with the Load Control selected to Open Loop. When High Limiter Active is cleared as indicated by the alarm changing to Limiter Activated, the Load Control Mode may be changed.
- The following is the preferred Mode of Load Control, unless otherwise directed by another procedure:

Open Loop - When Turbine Load is not being changed or the first 10% load decrease from 100%.
MW - If making Turbine Load changes where there is no ongoing secondary side transient
FSP - If a secondary side transient requires changing Turbine Load or there is a need to keep primary side more stable.

Op-Test No.: Dec 2019 Scenario No.: 2 Event No.: 3 Total No Pages 51

Event Description: **‘B’ HDP trips, Downpower to 95%**

Time	Position	Applicant’s Actions or Behavior
	BOP, ATC	2. (ρ) Reduce Turbine Load In Automatic: a. From Graphic 5551, TURBINE CONTROL SYSTEM – OPERATION PANEL, LOAD CONTROL section – Select method of Load Control, as directed by CRS/SM. *Open Loop b. Perform the following steps to reduce Turbine Load: 1) Select CHANGE. 2) Enter TARGET MW (greater than or equal to 90% if in Open Loop) and select ENTER. 3) Enter RATE – DEC and select ENTER. 4) Select GO. c. (ρ) Energize PZR Backup Heaters, IAW SYS BB-203, PRESSURIZER BACKUP HEATER OPERATIONS. o BB HIS-51A o BB HIS-52A d. (ρ) Borate RCS And Adjust Control Rods, As Necessary, To Maintain The Following: o Target Tavg/Tref Temperature Error Between 0°F And +5°F o Control Rods Above The Rod Insertion Limits e. Maintain desired turbine unloading rate f. Go to step 4.
NOTES o When the FAST LOAD DECREASE button is depressed, Turbine load reduction will be at 2.2 MW/sec (132 MW/min) o The CURRENT REF (MW) setpoint will continue to decrease as long as the FAST LOAD DECREASE button is depressed.		
	BOP, ATC	3. (p) Reduce Turbine Load Manually. a. From Graphic 5551, TURBINE CONTROL SYSTEM – OPERATION PANEL, SETPOINTS section – select FAST LOAD DECREASE. b. On Popup 7009, FAST LOAD DECREASE, depress and hold FAST LOAD DECREASE button until desired CURRENT REF (MW) is indicated. c. (p) Borate RCS and adjust control rods, as necessary, to maintain the following. o Target Tavg/Tref Temperature Error Between 0F and +5F o Control Rods Above the Rod Insertion Limit d. (p) Energize PZR Backup Heaters. o BB HIS-51A o BB HIS-52A

Op-Test No.: Dec 2019 Scenario No.: 2 Event No.: 3 Total No Pages 51

Event Description: **'B' HDP trips, Downpower to 95%**

Time	Position	Applicant's Actions or Behavior
	ATC	4. Check PZR PORVs: a. RCS Pressure – LESS THAN 2335 PSIG **– *Yes*** b. PZR PORVs – CLOSED **– *Yes*** ○ BB HIS-455A ○ BB HIS-456A c. RCS Pressure – GREATER THAN 2185 PSIG **– *Yes*** d. PORV Block Valves – OPEN **– *Yes*** ○ BB HIS-8000A ○ BB HIS-8000B
	ATC	5. Check PZR Pressure – STABLE AT OR TRENDING TO 2235 PSIG **– *Yes***
	ATC	6. Check PZR Level – STABLE AT OR TRENDING TO PROGRAM LEVEL **– *Yes***
	RO	7. Check S/G Levels – CONTROLLING BETWEEN 45% AND 55% **– *Yes***
	RO	8. Notify Radiation Protection To Perform The Following: ○ Monitor RCS and other connecting systems for increasing Radiation levels due to unplanned crud burst. ○ Notify all personnel in the affected areas.
	RO	9. Check If Sampling Is Required: a. Check if one of the following conditions is met: - **No** * Thermal Power Change – GREATER THAN 15% IN 1 HOUR * MODE Change From 2 To 3

Simulator Operator:

- If contacted as WWM, acknowledge requests.
- If contacted as Call Supt., acknowledge status.
- If contacted as RP, acknowledge request.
- If contacted as Chemistry, acknowledge request.

Event Termination: After Control Bank D reaches 205 steps in Automatic and/or at the direction of the lead examiner.

Simulator Operator: **Insert Key 4** at direction of Lead Examiner.

Op-Test No.: Dec 2019	Scenario No.: 2	Event No.: 4	Total No Pages 51

Event Description: **AC PT-505, Turbine Impulse Pressure Channel fails LOW**

Time	Position	Applicant's Actions or Behavior
Simulator Operator: **Insert Key 4** at direction of Lead Examiner. Diagnostics: AC PT-505 trending down slow. Rods step IN due to temperature error Annunciators: 065E		
	CREW	Diagnoses Failure. BOP Communicates no runback in progress and ATC places Rods in Manual as a memory action per OFN SB-008, ATT D.
	CRS	Enters and directs ALR 00-065E, and/or OFN SB-008
ALR 00-065E, T REF/T AUCT LO		
NOTE If performing a plant startup with a positive moderator temperature coefficient, reactor power greater than turbine power, and steam dumps open, then this alarm may be expected.		
	ATC	1. Check Tavg – GREATER THAN OR EQUAL TO 551°F **–** ***Yes*** *BB TI-412 *BB TI-422
	ATC	2. Check For Turbine Runback: *Generator Load MW – LOWERING **- No** OR *Generator Load Set MW – LOWERING **– No** RNO Go to Step 4.
	ATC	4. Check Tref – 3° LOWER THAN AUTIONEERED HIGH TAVG **–** ***Yes*** *BB TR-412 OR *NPIS computer points ○ BBT0499A for Tavg ○ BBT0496A for Tref

Op-Test No.: Dec 2019	Scenario No.: 2	Event No.: 4	Total No Pages 51

Event Description: **AC PT-505, Turbine Impulse Pressure Channel fails LOW**

Time	Position	Applicant's Actions or Behavior
	ATC	5. Check For Instrument Failure: a. Check Tavg channels – NORMAL **– *Yes*** o BB TI-412 o BB TI-422 o BB TI-432 o BB TI-442 b. Check HP Turbine 1st Stage Press channels – NORMAL o AC PI-505 **– *No*** o AC PI-506 **– *Yes*** RNO Go to OFN SB-008, INSTRUMENT MALFUNCTIONS Step 1.
	CRS	Transitions to OFN SB-008, INSTRUMENT MALFUNCTIONS
		OFN SB-008, INSTRUMENT MALFUNCTIONS
	CRS	1. Check for Malfunction *Check if Secondary System Instrument Channel is malfunctioning a. Perform appropriate attachment for malfunctioning channel from the table below: Turbine Impulse Pressure (AC) — P-505 P-506 — ATTACHMENT D
		ATTACHMENT D, TURBINE IMPULSE PRESSURE CHANNEL MALFUNCTION
		NOTE Steps D1 and D2 are Memory Action steps.
	ATC	D1. Identify Failed Instrument Channel ○ AC PI-505 **– *Yes*** ○ AC PI-506
	ATC	D2. Place ROD BANK AUTO/MAN SEL In Manual. ○ SE HS-9
		CAUTION If PT-505 has failed low, a continuous (Tref-Tavg) mismatch will exist. If steam dumps arm, the mismatch signal may cause the dump valves to open. If this happens, the dump valves will have to be switched to off to stop the steam release.

Op-Test No.: Dec 2019	Scenario No.: 2	Event No.: 4	Total No Pages 51

Event Description: **AC PT-505, Turbine Impulse Pressure Channel fails LOW**

Time	Position	Applicant's Actions or Behavior
	BOP	D3. Check Failed HP TURBINE 1ST STG PRESS Channel Selected On HP TURB 1ST STG PRESS SEL Switch. o AC PS-505Z
		NOTE o Tref indication will not be available if the failed impulse pressure channel is being used to develop Tref. This will be corrected by switching the impulse pressure selector to the alternate channel. o The steam dump demand signal is derived from AC PT-505 and cannot be changed.
	BOP	D4. Select Alternate HP TURBINE 1ST STG PRESS Channel, Using HP TURB 1ST STG PRESS SEL Switch. a. AC PS-505Z b. Check Tref indication – NORMAL ***– Yes*** *NPIS point BBT0496A *BB TR-412
	ATC	D5. Check Tavg – WITHIN 1°F OF TREF RNO (ρ) Adjust rods, as necessary, to maintain Tavg within 1°F of Tref.
	ATC	D6. Place ROD BANK AUTO/MAN SEL In Auto. o SE HS-9
	ATC	D7. Place STEAM DUMP BYPASS INTERLOCK To – OFF o AB HS-63 o AB HS-64
	ATC	D8. Monitor Rod Control Response To Ensure Proper Control
		NOTE It may take several minutes for the C-7 Loss Of Load interlock to clear after the failed channel is selected out. The time is dependent on how AC PT-506 failed.
	BOP	D9. Check C-7 Loss Of Load Interlock – NOT LIT - **Yes**
	BOP	D10. Select Steam Pressure Mode: a. Set STEAM HDR PRESS CTRL to 7.28. o AB PK-507

Op-Test No.: Dec 2019	Scenario No.: 2	Event No.: 4	Total No Pages 51

Event Description: **AC PT-505, Turbine Impulse Pressure Channel fails LOW**

Time	Position	Applicant's Actions or Behavior
	BOP	D11. Place STEAM DUMP BYPASS INTERLOCK To – ON o AB HS-63 o AB HS-64
	CRS	D12. Monitor The Following Technical Specification For LCOs And Comply With Action Statements, As Appropriate: o 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION, Table 3.3.1-1, Function 18.f **Enters LCO 3.3.1, COND A – IMMEDIATE, COND T 1 hour**
	ATC	Verifies P-13 interlock in proper state to comply with LCO 3.3.1, Condition T 1 hour action.

NOTE

- When the bistable for the affected instrument is tripped, the output to that control board indication will drop to zero
- If time permits prior to tripping bistables, I&C should trouble shoot and obtain as found information including a determination of which SSPS train is affected. M-767-00310, Tables 6-3 and 6-4 may be used to aid I&C in SSPS train determination

Simulator Operator: IF contacted as WWM or Call Supt, acknowledge requests.

Time	Position	Applicant's Actions or Behavior
	BOP	D13. Place The Trip/Safeguards Bistables For Failed Channel In TRIPPED Mode: **Examiner Note: Bistables will NOT be tripped.**
	BOP	D14. Check C-16 Hold Active: o On Graphic 5570, LOAD CONTROL LOOP REJECTED – NOT RED

NOTE

For AMSAC to be armed, the LOGIC TEST INPUT switch associated with the OPERATING BYPASS switch must be placed in the LOGIC 1 position. The LOGIC 0 position may be used to disable AMSAC

Op-Test No.: Dec 2019	Scenario No.: 2	Event No.: 4	Total No Pages 51

Event Description: **AC PT-505, Turbine Impulse Pressure Channel fails LOW**

Time	Position	Applicant's Actions or Behavior
	BOP	D15. At AMSAC TEST/BYPASS Panel, Place Turbine Impulse Pressure Channel In Proper Condition For AMSAC: a. Select OPERATING BYPASS SWITCH to position associated with failed pressure channel from table below: FAILED CHANNEL: P-505 — OPERATING BYPASS SWITCH POSITION: PTI1 b. Check Reactor Power – GREATER THAN OR EQUAL TO 35% c. Place the OPERATING BYPASS toggle switch to the right hand position.
	CRS	D16. Request I&C To Repair Failed Channel
	ATC	D17. Check Control Rods In Parked Position RNO WHEN plant conditions allow, THEN perform the following to return Control Rods to their parked position: a. Place ROD BANK AUTO/MAN SEL In Manual. ○ SE HS-9 b. (ρ) Return Control Rods to their parked position, using MAN ROD CTRL joystick. ○ SF HS-2 c. WHEN Tavg is within 1°F of Tref, THEN place ROD BANK AUTO/MAN SEL in auto. ○ SE HS-9
	CRS	D18. Return To Procedure And Step In Effect

Simulator Operator: IF contacted as WWM, acknowledge requests. IF contacted as Call Supt., acknowledge status.

Event termination: After the crew has identified Technical Specifications and/or at the discretion of the Lead Examiner.

Simulator operator: **Insert Key 5** at the lead examiners direction.

Op-Test No.: Dec 2019	Scenario No.: 2	Event No.: 5	Total No Pages 51

Event Description: **Letdown Orifice valve BG HIS-8149BA fails closed**

Time	Position	Applicant's Actions or Behavior
Simulator Operator: **Insert Key 5** at direction of Lead Examiner. Diagnostics: Letdown flow stops, PZR Level rises, Depending on crew response, PZR Heaters will energize when PZR Level is 5% above program level. Annunciators: 042A & 032D		
	ATC	Determine Letdown has isolated and reports indication
	CRS	Directs charging to seals only
Examiner Note: ALR 00-032D, PZR HI LEV DEV HTRS ON, may be entered if the failure is not discovered quickly. Once charging is reduced to seals only, ALR 00-042A, CHG LINE FLOW HILO, will be entered. Both procedures restore letdown in the same way.		
ALR 00-042A, CHG LINE FLOW HILO		
CAUTION If gas binding of pumps is suspected, performance of OFN BG-045, GAS BINDING OF CCPS OR SI PUMPS, should be considered		
NOTE Step 1 is a memory action step		
	ATC	1. Check Charging Pumps – ANY RUNNING **– *Yes*** *BG HIS-1A For CCP A *BG HIS-2A For CCP B *BG HIS-3 for NCP
	ATC	2. Check Charging Header flow GREATER THAN OR EQUAL TO 150 GPM **– *No*** ○ BG FI-121A RNO Go to Step 7
	ATC	7. Check Charging Header flow – LESS THAN 45 GPM **– *Yes*** ○ BG FI-121A

Op-Test No.: Dec 2019 Scenario No.: 2 Event No.: 5 Total No Pages 51

Event Description: **Letdown Orifice valve BG HIS-8149BA fails closed**

Time	Position	Applicant's Actions or Behavior
CAUTION NCP maximum flow is 150 gpm, CCP runout is 556 gpm		
	ATC	8. Check PZR Level – AT PROGRAM VALUE ***– No*** o BB LR-459 RNO Perform the following: a. Place running charging pump flow controller in manual and adjust charging flow, as necessary, to establish PZR level at program value *BG FK-121 For CCP *BG FK-462 For NCP
	ATC	9. Check Letdown is Isolated ***– Yes***
	ATC	10. Reestablish Letdown: a. Check RCS Letdown to Regen HX valves open o BG HIS-459 o BG HIS-459 b. Place Letdown HX Outlet Pressure Control in manual o BG PK-131 c. Open Letdown HX Outlet Pressure Control between 90%-100% o BG PK-131 d. Open desired Letdown Orifice Isolation Valve(s) *BG HIS-8149AA ***– Yes*** *BG HIS-8149BA *BG HIS-8149CA ***– Possible to regain level control faster*** e. Adjust Letdown HX Outlet Pressure Control to establish Letdown HX Outlet Pressure between 340 psig and 360 psig o BG PI-131 f. Place Letdown HX Outlet Pressure Control in auto o BG PK-131
<u>CAUTION</u> NCP MAXIMUM flow is 150 gpm, CCP runout flow is 556 gpm		
	BOP	12. Check Charging Header Flow and Letdown Flow – BALANCED ***– Yes***
<u>NOTE</u> Total pump flow should be maintained above 175 gpm to minimize effects of low flow cavitation		

Op-Test No.: Dec 2019	Scenario No.: 2	Event No.: 5	Total No Pages 51

Event Description: **Letdown Orifice valve BG HIS-8149BA fails closed**

Time	Position	Applicant's Actions or Behavior
	BOP	13. Verify CCP adequate flow: a. Check CCPs – ANY RUNNING RNO a. Go to Step 14
	CRS	Return to Procedure and Step in Effect

Event Termination: After the crew has restored Letdown to service and/or at the direction of the Lead Examiner

Simulator Operator: Insert **Key 6** at the direction of the Lead Examiner

Op-Test No.: Dec 2019 Scenario No.: 2 Event No.: 6/7/8/9 Total No Pages 51

Event Description: **'D' RCP spuriously trips and the Reactor fails to trip in BOTH AUTO and MANUAL. 'A' MDAFW pumps fails to auto start. Three S/G Safety Valves will fail to open on 'A' S/G and SI will actuate on 'A' train ONLY**

Time	Position	Applicant's Actions or Behavior
Simulator Operator: **Insert Key 6** at direction of Lead Examiner. Diagnostics: Reactor Coolant flow lowering, 'D' Reactor Coolant Pump tripped, Reactor and Turbine not tripped Annunciators: 86A & 83C		
	CREW	Recognizes RCP 'D' tripped and diagnoses that the Reactor has not tripped
	CRS	Directs ATC to manually trip the Reactor, upon failure directs and enters EMG FR-S1, REPSONSE TO NUCLEAR POWER GENERATION/ATWS
EMG FR-S1, RESPONSE TO NUCLEAR POWER GENERATOR/ATWS		
CAUTION o RCPs shall not be tripped with reactor power greater than 5% o When reactor power is less than 5%, RCPs shall only be tripped if RCP support conditions are lost		
NOTE o Step 1 and 2 are immediate action steps o Foldout page shall be monitored throughout this procedure		

Op-Test No.: Dec 2019 Scenario No.: 2 Event No.: 6/7/8/9 Total No Pages 51

<u>Event Description:</u> 'D' RCP spuriously trips and the Reactor fails to trip in BOTH AUTO and MANUAL. 'A' MDAFW pumps fails to auto start. Three S/G Safety Valves will fail to open on 'A' S/G and SI will actuate on 'A' train ONLY

Time	Position	Applicant's Actions or Behavior
	ATC/BOP	1. Verify Reactor Trip a. Check all rod bottom lights – LIT ***– No*** b. Check reactor trip breakers and bypass breakers – OPEN ***– No*** ○ SB ZL-1 ○ SB ZL-2 ○ SB ZL-3 ○ SB ZL-4 c. Check intermediate range neutron flux – DECREASING ***– No*** RNO Perform the following: 1. Manually trip the reactor 2. IF reactor will NOT trip, THEN perform the following: a) Insert control in manual b) Manually deenergize rod drive motor generators: 1) Open the following breakers: ○ PG HIS-16 ○ PG HIS-18 2) WHEN all rod bottom lights OR reactor power is less than 5% with negative Intermediate Range SUR, THEN close the following breakers: ○ PG HIS-16 ○ PG HIS-18 3) Continue with Step 2 **CT1**: Given an ATWS, insert maximum negative reactivity into the core by manually inserting control rods and de-energizing the control rod drive MG sets prior to completion of EMG FR-S1 Immediate Actions.
	BOP	2. Verify Turbine Trip a. Check Main Stop Valves – ALL CLOSED – No RNO a. Perform the following: 1) Manually trip turbine

Op-Test No.: Dec 2019	Scenario No.: 2	Event No.: 6/7/8/9	Total No Pages 51

Event Description: **'D' RCP spuriously trips and the Reactor fails to trip in BOTH AUTO and MANUAL. 'A' MDAFW pumps fails to auto start. Three S/G Safety Valves will fail to open on 'A' S/G and SI will actuate on 'A' train ONLY**

Time	Position	Applicant's Actions or Behavior
	BOP	3. Verify AFW Pumps Running: a. Check motor driven AFW pumps – BOTH RUNNING ***– No*** ○ AL HIS-22A ○ AL HIS-23A – No b. Check turbine driven AFW pump – RUNNING ***– Yes*** RNO a. Manually start pumps
	BOP	4. Check Main Generator Breakers and Exciter Breaker – OPEN ***– Yes*** ○ MA ZL-3A ○ MA ZL-4A ○ MB ZL-2
	ATC	5. Check SI – NOT IN PROGRESS ***– No*** ○ CCPs – ALIGNED FOR NORMAL CHARGING ○ SI pumps – NONE RUNNING IN INJECTION MODE ○ RHR pumps – NONE RUNNING IN INJECTION MODE RNO IF total ECCS flow from RWST to RCS is greater than 90 gpm, THEN go to step 9 ○ EM FI-917A for CCP A ○ EM FI-917B for CCP B ○ EM FI-918 for SI pump A ○ EM FI-922 for SI Pump B ○ EJ FI-618 for RHR pump A ○ EJ FI-619 for RHR pump B
	ATC	9. Check PZR Pressure – LESS THAN 2335 PSIG ***– Yes***
	BOP	10. Verify Containment Purge Isolation: a. Check ESFAS status panel CPIS section – ALL WHTE LIGHTS LIT ***–Yes*** ○ Red Train ○ Yellow Train

Op-Test No.: Dec 2019	Scenario No.: 2	Event No.: 6/7/8/9 Total No Pages 51

Event Description: **'D' RCP spuriously trips and the Reactor fails to trip in BOTH AUTO and MANUAL. 'A' MDAFW pumps fails to auto start. Three S/G Safety Valves will fail to open on 'A' S/G and SI will actuate on 'A' train ONLY**

Time	Position	Applicant's Actions or Behavior
	BOP	11. Check Safety Injection Not Actuated: ***- No*** ○ Annunciator 00-030A, NF039A LOCA SEQ ACTUATED – CLEAR AND ○ Annunciator 00-031A, NF039B LOCA SEQ ACTUATED – CLEAR AND ○ ESFAS status panel SIS section – NO WHITE LIGHTS LIT AND ○ Partial Trip Status Permissive/Block status panel – SI RED LIGHT NOT LIT RNO Perform steps 1-8 of EMG E-0, REACTOR TRIP OR SAFETY INJECTION, while continuing with this procedure
Examiner Note: Steps for EMG E-0 start on page 24		
	ATC	12. Check if the following trips have occurred: a. Reactor Trip Check reactor trip breakers and bypass breakers – OPEN ***– No*** ○ SB ZL-1 ○ SB ZL-2 ○ SB ZL-3 ○ SB ZL-4 b. Turbine trip Check Main Stop Valves – ALL CLOSED ***– Yes*** RNO a. Dispatch operator to locally open reactor trip and bypass breakers
Simulator Operator: WHEN contacted as the Auxiliary Building operator, acknowledge request, wait 10 min and **Insert Key 11.** Report Reactor Trip and Bypass breakers are open		
	ATC	13. Verify Reactor Subcritical: a. Power range channels [GAMMA METRICS] – LESS THAN 5% ***- Yes*** b. Intermediate range channels – NEGATIVE STARTUP RATE [GAMMA METRICS – STABLE OR DECREASING] c. Go to Step 25
	CRS	25. Continue Boration until adequate shutdown margin is obtained

Op-Test No.: Dec 2019 Scenario No.: 2 Event No.: 6/7/8/9 Total No Pages 51

<u>Event Description:</u> 'D' RCP spuriously trips and the Reactor fails to trip in BOTH AUTO and MANUAL. 'A' MDAFW pumps fails to auto start. Three S/G Safety Valves will fail to open on 'A' S/G and SI will actuate on 'A' train ONLY

Time	Position	Applicant's Actions or Behavior
	BOP	26. Check CRDM fans – ALL AVAILABLE RUNNING – Yes o GN HIS-42 o GN HIS-43 o GN HIS-44
	CRS	27. Determine Return Procedure a. Check EMG FR-S1, RESPONSE TO NUCLEAR POWER GENRATION/ATWT – ENTERED FROM EMG E-0, REACTOR TRIP OR SAFETY INJECTION **– *Yes*** 1) Check SI signal NOT present **– *No*** Go to EMG E-0, REACTOR TRIP OR SAFETY INJECTION, Step 1 RNO 1) Go to EMG E-0, REACTOR TRIP OR SAFETY INJECTION, Step 8
EMG E-0, REACTOR TRIP OR SAFETY INJECTION		
<u>NOTE</u> o Steps 1 through 4 are immediate action steps o Foldout page shall be monitored throughout this procedure		
	ATC	1. Verify Reactor Trip: ***Yes*** a. Check all rod bottom lights – LIT b. Check reactor trip breakers and bypass breakers – OPEN o SB ZL-1 o SB ZL-2 o SB ZL-3 o SB ZL-4 c. Check intermediate range neutron flux – DECREASING o SE NI-35B [GAMMA METRICS] o SE NI-36B [GAMMA METRICS] RNO Perform the following: ****Performed in EMG FR-S1****
	BOP	2. Verify Turbine Trip: - ***Yes*** a. Check Main Stop Valves – ALL CLOSED

Op-Test No.: Dec 2019 Scenario No.: 2 Event No.: 6/7/8/9 Total No Pages 51

Event Description: **'D' RCP spuriously trips and the Reactor fails to trip in BOTH AUTO and MANUAL. 'A' MDAFW pumps fails to auto start. Three S/G Safety Valves will fail to open on 'A' S/G and SI will actuate on 'A' train ONLY**

Time	Position	Applicant's Actions or Behavior
	ATC	3. Check AC Emergency Busses – AT LEAST ONE ENERGIZED **– *Yes*** *NB01 – ENERGIZED *NB02 – ENERGIZED
	ATC	4. Check if Safety Injection is Actuated: a. Check any indication SI is actuated – LIT **– *Yes*** *Annunciator 00-030A, NF039A LOCA SEQ ACTUATED – LIT *Annunciator 00-031A, NF039B LOCA SEQ ACTUATED – LIT *ESFAS status panel SIS section – ANY WHITE LIGHTS LIT *Partial Trip Status Permissive/Block status panel – SI RED LIGHT LIT b. Check both trains of SI actuated **– *No*** o Ann 00-030A, NF039A LOCA SEQ ACTUATED – LIT o Ann 00-031A, NF039B LOCA SEQ ACTUATED – LIT RNO b. Actuate both trains of SI o SB HS-27 o SB HS-28
CAUTION If offsite power is lost after SI reset, manual action may be required to restore safeguards equipment to the required configuration		
	ATC	5. (t) Check if SI required: * SI was manually actuated AND was required **– *Yes*** * Containment pressure is currently or has been – GREATER THAN OR EQUAL TO 3.5 PSIG **– *Yes*** * RCS pressure is currently or has been – LESS THAN OR EQUAL TO 1830 PSIG **– *Yes*** * Any S/G pressure is currently or has been – LESS THAN OR EQUAL TO 615 PSIG **– *Yes***

Op-Test No.: Dec 2019 Scenario No.: 2 Event No.: 6/7/8/9 Total No Pages 51
Event Description: **'D' RCP spuriously trips and the Reactor fails to trip in BOTH AUTO and MANUAL. 'A' MDAFW pumps fails to auto start. Three S/G Safety Valves will fail to open on 'A' S/G and SI will actuate on 'A' train ONLY**

Time	**Position**	**Applicant's Actions or Behavior**
	BOP	FOLDOUT PAGE Step 3. FAULTED S/G ISOLATION CRITERIA IF any S/G pressure decreasing in an uncontrolled manner OR any S/G is completely depressurized, THEN perform the following: a. Close main steam isolation valves b. Isolate feed flow to faulted S/G(s) c. Maintain total feed flow greater than 270,000 lbm/hr until NR level in at least one S/G is greater than 6% [29%] **CT2**: Isolate feed flow into the Faulted 'A' S/G by closing AL HK-7A and AL HK-8A, AFW REG VLV CTRLs before ANY RCS Cold Leg temperature reaches 240°F.
	ATC	6. Verify Automatic Actions using Attachment F, AUTOMATIC SIGNAL VERIFICATION **Examiner Note:** See Attachment 1 for complete list of actions
	BOP	7. Check Main Generator Breakers and Exciter Breaker – OPEN **– *Yes*** ○ MA ZL-3A ○ MA ZL-4A ○ MA ZL-2
	BOP	8. Check Total AFW Flow – GREATER THAN 270,000 LBM/HR **– *Yes***

Op-Test No.: Dec 2019 Scenario No.: 2 Event No.: 6/7/8/9 Total No Pages 51

<u>Event Description:</u> 'D' RCP spuriously trips and the Reactor fails to trip in BOTH AUTO and MANUAL. 'A' MDAFW pumps fails to auto start. Three S/G Safety Valves will fail to open on 'A' S/G and SI will actuate on 'A' train ONLY

Time	Position	Applicant's Actions or Behavior
	BOP	<u>9.</u> Check RCS Cold Leg Temperatures: *Stable at or trending to 557°F for condenser steam dumps or S/G ARVs *Stable at or trending to a range of 553°F to 557°F for S/G ARVs if recovering from an inadvertent SI RNO Perform the following a. IF temperature is less than 557oF and decreasing, THEN perform the following: 1) Stop dumping steam 2) IF any MSIV is open, THEN close Main Turbine Stop And Control Valves Startup Drains ○ AC HIS-134 3) IF cooldown continues, THEN control feed flow to limit RCS cooldown. Maintain total feed flow greater than 270,000 lbm/hr until narrow range level greater than 6% [29%] in at least one S/G 4) IF cooldown continues due to excessive steam flow, THEN isolate main steamlines by depressing MS ISO VLV ALL CLOSE pushbutton(s) ○ AB HS-79 ○ AB HS-80 b. IF temperature is greater than 557oF and stable or increasing, THEN perform one of the following: *Dump steam to condenser *Reduce ARV setpoints to 1090 psig to control RCS C/L temperature less than or equal to 557°F
	BOP	10. Establish S/G Pressure Control: a. Check condenser – AVAILABLE **– *No*** ○ C-9 LIT ○ MSIV – OPEN **– *No*** ○ Circulating water pumps – RUNNING RNO a. Perform the following: 1) Use S/G ARVs 2) Go to Step 11
	ATC	11. Check PZR PORVs a. Check PZR PORVs – CLOSED **– *Yes*** ○ BB HIS-455A ○ BB HIS-456A b. Power to block valves – AVAILABLE **– *Yes*** ○ BB HIS-8000A ○ BB HIS-8000B c. RCS pressure – LESS THAN 2185 PSIG **– *Yes***

Op-Test No.: Dec 2019 Scenario No.: 2 Event No.: 6/7/8/9 Total No Pages 51

<u>**Event Description:**</u> **'D' RCP spuriously trips and the Reactor fails to trip in BOTH AUTO and MANUAL. 'A' MDAFW pumps fails to auto start. Three S/G Safety Valves will fail to open on 'A' S/G and SI will actuate on 'A' train ONLY**

Time	Position	Applicant's Actions or Behavior
	ATC	12. Check Normal PZR Spray Valves – CLOSED ***– Yes*** o BB ZL-455B o BB ZL-455C
	ATC	13. Check PZR Safety Valves – CLOSED ***– Yes*** o BB ZL-8010A o BB ZL-8010B o BB ZL-8010C
NOTE Seal injection flow shall be maintained to all RCPs		
	ATC/BOP	14. Check if RCPs should be stopped: a. Check RCPs – ANY RUNNING ***– Yes*** b. Check RCS pressure – LESS THAN 1400 PSIG ***– No*** RNO a. Go to Step 15
	CRS	15. Direct operator to Monitor Critical Safety Functions Using EMG F-0, CRITICAL SAFETY FUNCTION STATUS TREES (CSFST)
	BOP	16. Check if S/Gs are not Faulted: ***- No*** a. Check pressures in all S/Gs – o NO S/G PRESSURE DECREASING IN AN UNCONTROLLED MANNER ***– No*** o NO S/G COMPLETELY DEPRESSURIZED ***– No*** RNO a. Perform the following: 1) Ensure BIT Inlet and Outlet Valves are open – Yes o EM HIS-8803A o EM HIS-8803B o EM HIS-8801A o EM HIS-8801B 2) Go to EMG E-2, FAULTED STEAM GENERATOR ISOLATION, Step 1
EMG E-2, FAULTED STEAM GENERATOR ISOLATION		
CAUTIONS o At least on S/G shall be maintained available for RCS cooldown o If any faulted S/G or secondary break is not needed for RCS cooldown, it shall remain isolated during subsequent recovery actions		

Op-Test No.: Dec 2019 Scenario No.: 2 Event No.: 6/7/8/9 Total No Pages 51

Event Description: **'D' RCP spuriously trips and the Reactor fails to trip in BOTH AUTO and MANUAL. 'A' MDAFW pumps fails to auto start. Three S/G Safety Valves will fail to open on 'A' S/G and SI will actuate on 'A' train ONLY**

Time	Position	Applicant's Actions or Behavior
NOTE Foldout page shall be monitored throughout this procedure		
	BOP	1. Check Steamlines on all S/Gs – ISOLATED a. Ensure Main Steamline Isolation Valve(s) – CLOSED **– *Yes*** ○ AB HIS-14 For S/G A ○ AB HIS-17 For S/G B ○ AB HIS-20 For S/G C ○ AB HIS-11 For S/G D b. Ensure Main Steamline Isolation Bypass Valves – CLOSED **– *Yes*** ○ AB ZL-15A for S/G A ○ AB ZL-18A for S/G B ○ AB ZL-21A for S/G C ○ AB ZL-12A for S/G D c. Ensure Main Steamline Low Point Drain Valve(s) – CLOSED **– *Yes*** ○ AB HIS-9 For S/G A ○ AB HIS-8 For S/G B ○ AB HIS-7 For S/G C ○ AB HIS-10 For S/G D
	BOP	2. Check if Limitations for Fault in Area 5 are Required: a. Check if steam is issuing from vent openings at 2000 foot elevation on south end of Turbine Building b. Warn local operators of adverse conditions in main steam enclosure c. Use S/G ARV pressure indicating controllers on RL006 for S/G pressure indication during subsequent recovery actions d. Use pressure and flow indications to determine valve position for valves located in the main steam enclosure e. Do not reset AFAS-TD until Turbine Driven AFW Pump shutdown is required f. Use manual initiation of AFAS-TD, as necessary, to restart Turbine Driven AFW Pump
Simulator Operator: WHEN contacted as the Turbine Building Watch, acknowledge request. Wait 5 minutes and report small amount of steam between the air compressors in the Turbine Building		

Op-Test No.: Dec 2019	Scenario No.: 2	Event No.: 6/7/8/9	Total No Pages 51

Event Description: **'D' RCP spuriously trips and the Reactor fails to trip in BOTH AUTO and MANUAL. 'A' MDAFW pumps fails to auto start. Three S/G Safety Valves will fail to open on 'A' S/G and SI will actuate on 'A' train ONLY**

Time	Position	Applicant's Actions or Behavior
	BOP	3. Check if Any S/G is not Faulted – Yes a. Check pressure in all S/Gs: *ANY S/G PRESSURE STABLE OR *ANY S/G PRESSURE INCREASING
	BOP	4. Identify Faulted S/Gs: a. Check pressure in all S/Gs: *Check pressure in all S/Gs *ANY S/G PRESSURE DECREASING IN AN UNONTROLLED MANNER OR *ANY S/G COMPLETELY DEPRESURIZED
CAUTION If the Turbine Driven AFW Pump is the only available source of feed flow, steam supply to the Turbine Driven AFW pump must be maintained from at least one S/G		
	BOP	5. Isolate Faulted S/G(s) a. Close affected S/G(s) MD AFP Flow Control Valve(s) *AL HK-7A For S/G A b. Close affected S/G(s) TD AFWP Flow Control Valve(s) *AL HK-8A For S/G A c. Locally close steam supply to Turbine Driven AFW Pump from faulted S/G(s) d. Ensure S/G ARV on faulted S/G(s) – CLOSED *AB PIC-1A For S/G A e. Verify faulted S/G Main Steamline Isolation Valve - CLOSED **CT2**: Isolate feed flow into the Faulted 'A' S/G by closing AL HK-7A and AL HK-8A, AFW REG VLV CTRLs before ANY RCS Cold Leg temperature reaches 240°F.

Op-Test No.: Dec 2019 Scenario No.: 2 Event No.: 6/7/8/9 Total No Pages 51		
Event Description: **'D' RCP spuriously trips and the Reactor fails to trip in BOTH AUTO and MANUAL. 'A' MDAFW pumps fails to auto start. Three S/G Safety Valves will fail to open on 'A' S/G and SI will actuate on 'A' train ONLY**		
Time	**Position**	**Applicant's Actions or Behavior**
	BOP	6. Verify Feedline Isolated on Faulted S/G(s) a. Main Feedwater Reg Valve – CLOSED *AE ZL-510 For S/G A b. Main Feedwater Reg Bypass Valve – CLOSED *AE ZL-550 For S/G A c. Main Feedwater Isolation Valve – CLOSED *AE HIS-39 For S/G A d. Main Feedwater Chemical Injection Valves – CLOSED *AE HIS-43 for A/G A **CT2**: Isolate feed flow into the Faulted 'A' S/G by closing AL HK-7A and AL HK-8A, AFW REG VLV CTRLs before ANY RCS Cold Leg temperature reaches 240°F.
	BOP	7. Verify Blowdown, Lower, and Upper sampling Isolated on Faulted S/Gs: a. S/G Blowdown Containment Isolation Valves – CLOSED *BM HIS-1A For S/G A b. S/G Upper Sample Isolation Valves – CLOSED *BM HIS-19 For S/G A c. S/G Lower Sample Isolation Valves – CLOSED *BM HIS-35 For S/G A
CAUTION If any PZR PORV opens because of high PZR pressure, the PORV shall be monitored to ensure it recloses after pressure decreases to less than 2335 psig		

Op-Test No.: Dec 2019 Scenario No.: 2 Event No.: 6/7/8/9 Total No Pages 51

Event Description: **'D' RCP spuriously trips and the Reactor fails to trip in BOTH AUTO and MANUAL. 'A' MDAFW pumps fails to auto start. Three S/G Safety Valves will fail to open on 'A' S/G and SI will actuate on 'A' train ONLY**

Time	Position	Applicant's Actions or Behavior
	ATC	8. Check PZR PORVs and Block Valves: a. Power to Block Valves – AVAILABLE **– *Yes*** o BB HIS-8000A o BB HIS-8000B b. PZR PORVs – CLOSED** o BB HIS-455A o BB HIS-456A c. RCS Pressure – LESS THAN 2185 PSIG** RNO b. IF PZR pressure less than 2335 psig, THEN manually close PORV. IF any PORV can NOT be closed, THEN manually close its block valve c. IF PZR PORV is closed, THEN ensure associated block valve is open *BB HIS-8000A For BB HIS-455A *BB HIS-8000B For BB HIS-456A ****Examiner Note:** Once the S/G drys out, pressure will rise and RCS pressure will be controlled on the PORVs until SI flow can be reduced and RCS pressure control regained
	ATC	9. Check if Uncontrolled Cooldown has Stopped: a. Check RCS Hot Leg Temperatures – STABLE OR INCREASING **– *Yes*** b. Perform the following to maintain stable RCS hot leg temperatures: Decrease ARV setpoints of intact S/Gs to stabilize intact S/G pressures *AB PIC-2A For S/G B *AB PIC-3A For S/G C *AB PIC-4A For S/G D Adjust AFW flow to intact S/Gs as necessary *AL HK-9A For S/G B *AL HK-10A For S/G B *AL HK-11A For S/G C *AL HK-12A For S/G C *AL HK-5A For S/G D *AL HK-6A For S/G D

CAUTIONS

- If steamlines in area 5 of Aux Bldg are not intact, extreme caution will be necessary when performing local surveys
- If offsite power is lost after SI reset, manual action may be required to restore safeguards equipment to the required configuration

Op-Test No.: Dec 2019   Scenario No.: 2   Event No.: 6/7/8/9   Total No Pages 51

Event Description: **'D' RCP spuriously trips and the Reactor fails to trip in BOTH AUTO and MANUAL. 'A' MDAFW pumps fails to auto start. Three S/G Safety Valves will fail to open on 'A' S/G and SI will actuate on 'A' train ONLY**

Time	Position	Applicant's Actions or Behavior
	BOP	10. Determine Secondary Radiation Levels: a. Direct Health Physics to survey steamlines in area 5 of Aux Bldg b. Check S/G Sampling – ISOLATED **– *Yes*** c. Ensure SI – RESET ○ SB HS-42A ○ SB HS-43A d. Check Instrument Air Pressure – GREATER THAN 105 PSIG **– *Yes*** ○ KA PI-40 e. Open CCW to Radwaste System Isolation Valves ○ EG HS-69 ○ EG HS-70 f. Open all S/G sample isolation valves ○ BM HIS-65 For S/G A ○ BM HIS-35 For S/G A ○ BM HIS-65 For S/G B ○ BM HIS-36 For S/G B ○ BM HIS-67 For S/G C ○ BM HIS-37 For S/G C ○ BM HIS-68 For S/G D ○ BM HIS-38 For S/G D g. Direct Chemistry to sample all S/Gs for activity

Simulator Operator: WHEN contacted as HP and Chemistry, acknowledge requests

NOTE

Locally opening EF-HV-43, ESW A TO AIR COMPRESSOR or EG HV-44, ESW B TO AIR COMPRESSOR requires the associated ESW train to be declared inoperable. Local opening of the valve, on 2000' NORTH END AUX BLDG, will preclude it from automatically isolating on a high flow condition

Op-Test No.: Dec 2019 Scenario No.: 2 Event No.: 6/7/8/9 Total No Pages 51

<u>Event Description:</u> 'D' RCP spuriously trips and the Reactor fails to trip in BOTH AUTO and MANUAL. 'A' MDAFW pumps fails to auto start. Three S/G Safety Valves will fail to open on 'A' S/G and SI will actuate on 'A' train ONLY

Time	Position	Applicant's Actions or Behavior
	BOP	11. Verify Instrument Air Compressor is Running: a. Ensure at least one ESW TRN TO AIR COMPRESSOR Valve – OPEN **– *Yes*** *EF HIS-43 *EF HIS-44 b. Check AIR COMPRESSOR BRKR RESET switch associated with open ESW Valve(s) – CLOSED **– *No*** *KA HIS-3C *KA HIS-2C RNO b. Reset and close AIR COMPRESSIR BRKR RESET Switch *KA HIS-3C *KA HIS-2C c. Check INST AIR PRESS – GREATER THAN 105 PSIG **– *Yes*** o KA PI-40 d. Check neither ESW TO AIR COMPRESSOR Valve – Locally Opened **– *No*** o EF HV-43 o EF HV-44 e. Check both ESW TRN TO AIR COMPRESSOR Valves – OPEN **– *Yes*** o EF HIS-43 o EF HIS-44 f. Check both AIR COMPRESSOR BRKR RESET switches – CLOSED **– *Yes*** o KA HIS-3C o KA HIS-2C

Op-Test No.: Dec 2019 Scenario No.: 2 Event No.: 6/7/8/9 Total No Pages 51

<u>Event Description:</u> 'D' RCP spuriously trips and the Reactor fails to trip in BOTH AUTO and MANUAL. 'A' MDAFW pumps fails to auto start. Three S/G Safety Valves will fail to open on 'A' S/G and SI will actuate on 'A' train ONLY

Time	Position	Applicant's Actions or Behavior
	BOP	12. Check if S/G tubes are intact: ***- Yes*** a. Condenser Air Discharge – NORMAL BEFORE ISOLATION o GEG 925 b. S/G Blowdown and Sample Radiation – NORMAL BEFORE ISOLATION o BML 256 o SJL 026 c. Turbine Driven Auxiliary Feedwater Pump Exhaust Radiation – NORMAL o FCT 381 d. S/G Steamline Radiation Monitors – NORMAL o ABS 114 For S/G A o ABS 113 For S/G B o ABS 112 For S/G C o ABS 111 For S/G D o Local Surveys e. S/G levels – NO LEVEL INCREASING IN AN UNCONTROLLED MANNER
	ATC	<u>13.</u> Check if Containment Spray should be stopped: a. Check Spray Pumps – ANY RUNNING ***– No*** RNO a. Go to Step 14
	BOP	14. Check if ECCS Flow should be reduced: ***- Yes*** a. RCS Subcooling – GREATER THAN 30°F [45°F] b. Secondary heat sink: *Total Feed Flow to intact S/Gs – GREATER THAN 270,000 LBM/HR OR *Narrow Range Level in at least one intact S/G – GREATER THAN 6% [29%] c. RCS Pressure – STABLE OR INCREASING d. PZR Level – GREATER THAN 6% [32%] e. Go to EMG ES-03, SI TERMINATION, Step 1

EMG ES-03, SI TERMINATION

<u>CAUTION:</u>

If offsite power is lost after SI reset, manual action may be required to restore safeguards equipment to the required configuration

Op-Test No.: Dec 2019 Scenario No.: 2 Event No.: 6/7/8/9 Total No Pages 51

<u>Event Description:</u> 'D' RCP spuriously trips and the Reactor fails to trip in BOTH AUTO and MANUAL. 'A' MDAFW pumps fails to auto start. Three S/G Safety Valves will fail to open on 'A' S/G and SI will actuate on 'A' train ONLY

Time	Position	Applicant's Actions or Behavior
		NOTES: o Foldout page shall be monitored throughout this procedure o RWST switchover SI signal shall not be reset until SI flow has been terminated
	ATC	1. Reset SI: o SB HS-42A o SB HS-43A
	ATC	2. Reset Containment Isolation Phase A and Phase B: o SB HS-56 For Phase A o SB HS-53 For Phase A o SB HS-55 For Phase B o SB HS-52 For Phase B
	BOP	3. Verify Instrument Air Compressor Is Running: **(Previously completed)**
	BOP	4. Verify Instrument Air To Containment: a. Check PZR PRESS MASTER CTRL Output – LESS THAN 55% o BB PK-455A RNO Perform the following: 1) Place PZR PRESS MASTER CTRL in manual. 2) Set PZR PRESS MASTER CTRL to less than 55% output signal. 3) <u>WHEN</u> instrument air has been established to containment <u>AND</u> pressurizer pressure control is established, <u>THEN</u> place PZR PRESS MASTER CTRL in automatic. b. Open INST AIR SPLY CTMT ISO VLV. o KA HIS-29
	ATC	5. Reduce Charging Flow: a. Check Shutdown Sequencers – NOT ACTUATED o Annunciator 00-018C, NF039A S/D SEQ ACTUATED – CLEAR o Annunciator 00-021C, NF039B S/D SEQ ACTUATED – CLEAR b. Stop all but one CCP and place in standby. *** BG HIS-1A** <u>OR</u> * BG HIS-2A (**Discharge valve open to charging header)**

Op-Test No.: Dec 2019 Scenario No.: 2 Event No.: 6/7/8/9 Total No Pages 51

<u>Event Description:</u> 'D' RCP spuriously trips and the Reactor fails to trip in BOTH AUTO and MANUAL. 'A' MDAFW pumps fails to auto start. Three S/G Safety Valves will fail to open on 'A' S/G and SI will actuate on 'A' train ONLY

Time	Position	Applicant's Actions or Behavior
	ATC	6. Check If NCP Should Be Stopped: a. CCPs – ANY RUNNING **– *Yes*** b. Stop NCP o BG HIS-3 **(Stopped in EMG E-0, ATT F)**
	ATC	7. Check RCS Pressure – Stable or Rising ***- Yes***
	BOP	8. Verify CCW To Service Loop: a. Ensure CCW Pumps – AT LEAST ONE RUNNING **– *Yes*** b. Ensure One Pair of CCW Service Loop Supply and Return Valves for an Operating CCW Pump – OPEN o EG ZL-15 AND EG ZL-53 <u>OR</u> o EG ZL-16 AND EG ZL-54. c. Open CCW To Radwaste System Isolation Valves. o EG HS-69 o EG HS-70
	BOP	9. Verify CCW to Containment a. Check CCW To RCS Flow – LESS THAN $1.25x10^6$ LBM/HR **– *No*** o EG FI-128 o EG FI-129 **RNO** Go To Step 10
	BOP	10. Verify RCP Thermal Barrier Cooling: a. Check ANY of the following annunciators – IN ALARM: ***- No*** o 00-070C, RCP A THRM BAR CCW FLOW o 00-071C, RCP B THRM BAR CCW FLOW o 00-072C, RCP C THRM BAR CCW FLOW o 00-073C, RCP D THRM BAR CCW FLOW **RNO** Go To Step 11

Op-Test No.: Dec 2019 Scenario No.: 2 Event No.: 6/7/8/9 Total No Pages 51

Event Description: 'D' RCP spuriously trips and the Reactor fails to trip in BOTH AUTO and MANUAL. 'A' MDAFW pumps fails to auto start. Three S/G Safety Valves will fail to open on 'A' S/G and SI will actuate on 'A' train ONLY

Time	Position	Applicant's Actions or Behavior
	ATC	11. Align CCPs For Normal Charging a. Check CCPs – AT LEAST ONE RUNNING – YES * BG HIS-1A * BG HIS-2A b. Check CCP Discharge To Charging Header Isolation Valve For Running CCP – OPEN * BG-8483A For CCP A (1974' AUX BLDG, CCP A ROOM) ***- No*** * BG-8483C For CCP B (1974' AUX BLDG, CCP B ROOM) ***- OPEN*** c. Reset CCP Recirc Valves. o BG HS-8110 o BG HS-8111 d. Open CCP Recirc Valves. o BG HIS-8110 o BG HIS-8111
	RO	12. Align Charging System: a. Throttle CCP Discharge Flow Control valve to 7% open o BG FK-121 b. Close Charging Header Back Pressure Control Valve. o BG HC-182 c. Open Charging Pumps To Regenerative Heat Exchanger Containment Isolation valves. o BG HIS-8105 o BG HIS-8106 d. Align Regenerative Heat Exchanger To Loop Cold Leg valves, to establish only one open. o BG HIS-8146 For Loop 1 o BG HIS-8147 For Loop 4.
	RO	13. Isolate BIT: a. Close BIT Inlet Valves o EM HIS-8803A o EM HIS-8803B b. Close BIT Outlet Valves o EM HIS-8801A o EM HIS-8801B **CT 3: Reduce high head ECCS flow through the BIT before overfill of the RCS results in a rupturing of the pressurizer relief tank (PRT).**

Scenario Termination: After the crew has isolated 'A' S/G and isolated ECCS flow through the BIT and/or at the direction of the Lead Examiner terminate the scenario

Simulator Operator: FREEZE

Attachment 1 EMG E-0 Attachment F

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 79 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 1 of 13)
AUTOMATIC SIGNAL VERIFICATION

F1.	**Check AC Emergency Busses - ENERGIZED:**	
	o NB01 - ENERGIZED	o Depress START/RESET pushbutton for EDG A. o KJ HS-8A
	o NB02 - ENERGIZED	o Depress START/RESET pushbutton for EDG B. o KJ HS-108A

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 81 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 2 of 13)
AUTOMATIC SIGNAL VERIFICATION

F2. Verify Feedwater Isolation:

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
a. Main feedwater pumps - TRIPPED o Annunciator 00-120A, MFP A TRIP - LIT o Annunciator 00-123A, MFP B TRIP - LIT	a. Manually trip Main Feedwater Pumps. o <u>IF</u> MFWP A is <u>NOT</u> tripped, <u>THEN</u> depress the following: o FC HS-18A For MFWP A o FC HS-18B For MFWP A o <u>IF</u> MFWP B is <u>NOT</u> tripped, <u>THEN</u> depress the following: o FC HS-118A For MFWP B o FC HS-118B For MFWP B
b. Main feedwater reg valves - CLOSED o AE ZL-510 for S/G A o AE ZL-520 for S/G B o AE ZL-530 for S/G C o AE ZL-540 for S/G D	b. Manually close valves. * AE FK-510 for S/G A * AE FK-520 for S/G B * AE FK-530 for S/G C * AE FK-540 for S/G D
c. Main feedwater reg bypass valves - CLOSED o AE ZL-550 for S/G A o AE ZL-560 for S/G B o AE ZL-570 for S/G C o AE ZL-580 for S/G D	c. Manually close valves. * AE LK-550 for S/G A * AE LK-560 for S/G B * AE LK-570 for S/G C * AE LK-580 for S/G D
d. Main feedwater isolation valves - CLOSED o AE HIS-39 for S/G A o AE HIS-40 for S/G B o AE HIS-41 for S/G C o AE HIS-42 for S/G D	d. Perform the following: 1) Manually close valves. 2) <u>IF</u> valves can <u>NOT</u> be closed, <u>THEN</u> at SA075A <u>OR</u> SA075B, disconnect the following cards (2 cards total) in the MFIV sub-racks: o ALS-411-1 o ALS-411-2

(Step F2. continued on next page)

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 83 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 3 of 13)
AUTOMATIC SIGNAL VERIFICATION

Step F2. (continued from previous page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
e. Main feedwater chemical injection valves - CLOSED o AE HIS-43 for S/G A o AE HIS-44 for S/G B o AE HIS-45 for S/G C o AE HIS-46 for S/G D	e. Perform the following: 1) Manually close valve. 2) IF valve can NOT be closed, THEN locally isolate affected feedline. * AE-V129 for S/G A (STEAM ENCLOSURE ROOM SOUTH OF MFIV) * AE-V128 for S/G B (STEAM ENCLOSURE ROOM SOUTH OF MFIV) * AE-V131 for S/G C (STEAM ENCLOSURE ROOM SOUTH OF MFIV) * AE-V130 for S/G D (STEAM ENCLOSURE ROOM SOUTH OF MFIV)
f. Check ESFAS status panel SGBSIS section - ALL WHITE LIGHTS LIT o Red train o Yellow train	f. IF any SGBSIS valve NOT closed, THEN manually close valve. IF valve(s) can NOT be closed, THEN manually or locally isolate affected blowdown or sample line. Refer to ATTACHMENT A, VALVES CLOSED BY S/G BLOWDOWN AND SAMPLE ISOLATION SIGNAL.

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 85 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 4 of 13)
AUTOMATIC SIGNAL VERIFICATION

F3. Verify Containment Isolation Phase A:

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
a. Check ESFAS status panel CISA section - ALL WHITE LIGHTS LIT o Red train o Yellow train	a. Perform the following: 1) <u>IF</u> containment isolation phase A has <u>NOT</u> actuated, <u>THEN</u> manually actuate containment isolation phase A. o SB HS-47 o SB HS-48 2) <u>IF</u> any CISA valve <u>NOT</u> closed, <u>THEN</u> manually close valve. <u>IF</u> valve(s) can <u>NOT</u> be closed, <u>THEN</u> manually or locally isolate affected containment penetration. Refer to ATTACHMENT B, VALVES CLOSED BY CONTAINMENT ISOLATION SIGNAL PHASE A.

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 87 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 5 of 13)
AUTOMATIC SIGNAL VERIFICATION

F4. Verify AFW Pumps Running:

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
a. Check motor driven AFW pumps - BOTH RUNNING	a. Manually start pumps. o AL HIS-22A o AL HIS-23A
b. Check turbine driven AFW pump - RUNNING	b. Perform the following: 1) Check if turbine driven AFW pump should be running: * At least 2/4 S/G narrow range level channels on 2/4 S/Gs - LESS THAN 23.5% <u>OR</u> * Loss of NB01 voltage has occurred <u>OR</u> * Loss of NB02 voltage has occurred <u>OR</u> * AMSAC actuation 2) <u>IF</u> turbine driven AFW pump should be running, <u>THEN</u> manually open steam supply valves: a) AB HIS-5A b) AB HIS-6A c) FC HIS-312A

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 89 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 6 of 13)
AUTOMATIC SIGNAL VERIFICATION

F5. Verify ECCS Pumps Running:

a. Check CCPs - BOTH RUNNING

a. Manually start pumps.

- o BG HIS-1A
- o BG HIS-2A

b. Check SI pumps - BOTH RUNNING

b. Manually start pumps.

- o EM HIS-4
- o EM HIS-5

c. Check RHR pumps - BOTH RUNNING

c. Manually start pumps.

- o EJ HIS-1
- o EJ HIS-2

F6. Verify CCW Alignment:

a. Check CCW pumps - ONE RUNNING IN EACH TRAIN

a. Manually start CCW pumps as necessary to establish one running in each train.

- o EG HIS-21 or EG HIS-23 for red train
- o EG HIS-22 or EG HIS-24 for yellow train

b. Check one pair of CCW service loop Supply And Return Valves for an operating CCW pump - OPEN

* EG ZL-15 AND EG ZL-53

OR

* EG ZL-16 AND EG ZL-54

b. Manually align valves as necessary to establish CCW flow to service loop and containment.

F7. Check ESW Pumps - BOTH RUNNING

Manually start pumps.

- o EF HIS-55A
- o EF HIS-56A

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 91 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 7 of 13)
AUTOMATIC SIGNAL VERIFICATION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
F8.	**Check Containment Fan Coolers - RUNNING IN SLOW SPEED**	Perform the following for each Containment Cooler Fan that is still running in Fast or is not running: a. Manually stop ANY Containment Cooler Fans running in fast. * GN HIS-5 For Cooler 1A * GN HIS-9 For Cooler 1B * GN HIS-13 For Cooler 1C * GN HIS-17 For Cooler 1D b. Place Containment Cooler Fan Speed Selector switches in Slow. * GN HS-5 for cooler 1A * GN HS-9 for cooler 1B * GN HS-13 for cooler 1C * GN HS-17 for cooler 1D c. Manually start containment cooler fans. * GN HIS-5 for cooler 1A * GN HIS-9 for cooler 1B * GN HIS-13 for cooler 1C * GN HIS-17 for cooler 1D

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 93 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 8 of 13)
AUTOMATIC SIGNAL VERIFICATION

F9. Verify Containment Purge Isolation:

	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
a.	Check ESFAS status panel CPIS section - ALL WHITE LIGHTS LIT o Red train o Yellow train	a. Perform the following: 1) IF containment purge isolation has NOT actuated, THEN manually actuate containment purge isolation. o SA HS-11 o SA HS-15 2) IF any CPIS component NOT properly aligned, THEN manually align component. 3) IF component(s) can NOT be manually aligned, THEN locally isolate instrument air to affected containment penetration. Refer to ATTACHMENT C, VALVES CLOSED BY CONTAINMENT PURGE ISOLATION SIGNAL.

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 95 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 9 of 13)
AUTOMATIC SIGNAL VERIFICATION

F10. Verify Both Trains Of Control Room Ventilation Isolation:

a. Check ESFAS status panel CRVIS section - ALL WHITE LIGHTS LIT

- o Red train
- o Yellow train

RESPONSE NOT OBTAINED:

a. Perform the following:

1) IF control room ventilation isolation has NOT actuated, THEN manually actuate control room ventilation isolation.

- o SA HS-9
- o SA HS-13

2) IF any CRVIS component NOT properly aligned, THEN manually align associated component.

3) IF neither train of CRVIS is in service, THEN establish one in service train of CRVIS using SYS GK-122, MANUAL CRVIS LINE-UP.

4) IF only one train of CRVIS can be placed in service, THEN within 90 minutes (76.5 minutes control room and 13.5 minutes local operator), isolate out of service train using SYS GK-122, MANUAL CRVIS LINE-UP.

b. Ensure Control Room outer door - CLOSED

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 97 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 10 of 13)
AUTOMATIC SIGNAL VERIFICATION

F11. Verify Main Steamline Isolation Not Required:

a. Check containment pressure - HAS REMAINED LESS THAN 17 PSIG

o GN PR-934

b. Check either condition below - SATISFIED:

* Low steamline pressure SI - NOT BLOCKED AND steamline pressure - HAS REMAINED GREATER THAN 615 PSIG

OR

* Low steamline pressure SI - BLOCKED AND steamline pressure rate - HAS REMAINED LESS THAN 100 PSI/50 SEC

RESPONSE NOT OBTAINED:

Verify steamline isolation:

1. If any main steamline isolation valve is NOT closed, THEN perform the following:

   a) Close main steamline isolation valves.

      * AB HS-79
      * AB HS-80

   b) IF any MSIV is still NOT closed, THEN at SA075A OR SA075B, disconnect the following cards (2 cards total) in the MSIV sub-rack:

      o ALS-411-1

      o ALS-411-2

2. Check ESFAS status panel SLIS section - ALL WHITE LIGHTS LIT

   o Red Train
   o Yellow Train

3. IF any SLIS valve NOT closed, THEN manually close valve. IF valve(s) can NOT be closed, THEN manually or locally isolate affected steamline. Refer to ATTACHMENT D, VALVES CLOSED BY STEAMLINE ISOLATION SIGNAL.

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 99 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 11 of 13)
AUTOMATIC SIGNAL VERIFICATION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
F12.	**Verify Containment Spray Not Required:** a. Containment pressure - HAS REMAINED LESS THAN 27 PSIG: o Annunciator 00-059A, CSAS - NOT LIT o Annunciator 00-059B, CISB - NOT LIT o GN PR-934	Perform the following: 1. Stop all RCPs. 2. <u>IF</u> containment spray has <u>NOT</u> actuated, <u>THEN</u> manually actuate containment spray. o SB HS-43 <u>AND</u> SB HS-45 o SB HS-44 <u>AND</u> SB HS-46 3. Check ESFAS status panel CSAS section - ALL WHITE LIGHTS LIT o Red train o Yellow train 4. <u>IF</u> any CSAS component <u>NOT</u> properly aligned, <u>THEN</u> manually align associated component. 5. Check ESFAS status panel CISB section - ALL WHITE LIGHTS LIT o Red train o Yellow train 6. <u>IF</u> any CISB valve <u>NOT</u> closed, <u>THEN</u> manually close valve. <u>IF</u> valve(s) can <u>NOT</u> be closed, <u>THEN</u> manually or locally isolate affected containment penetration. Refer to ATTACHMENT E, VALVES CLOSED BY CONTAINMENT ISOLATION SIGNAL PHASE B.

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 101 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 12 of 13)
AUTOMATIC SIGNAL VERIFICATION

F13. Verify ECCS Flow:

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	a. Check Centrifugal Charging Pumps To Boron Injection Tank Flow meters - FLOW INDICATED o EM FI-917A o EM FI-917B	a. Perform the following: 1) IF BIT valves have NOT been closed by operator action, THEN manually start pumps and align valves. 2) IF BIT valves are closed by operator action, THEN go to Step F14.
	b. Check RCS pressure - LESS THAN 1725 PSIG	b. Go to Step F14.
	c. Check SI Pump Discharge Flow meters - FLOW INDICATED o EM FI-918 o EM FI-922	c. Manually start pumps and align valves.
	d. Check RCS pressure - LESS THAN 325 PSIG	d. Go to Step F14.
	e. Check RHR To Accumulator Injection Loop Flow meters - FLOW INDICATED o EJ FI-618 o EJ FI-619	e. Manually start pumps and align valves.
F14.	**Verify AFW Valves - PROPERLY ALIGNED:** a. Check ESFAS status panel AFAS section - ALL WHITE LIGHTS LIT b. Check white train ESFAS status panel AFAS section - ALL WHITE LIGHTS LIT	IF any AFAS section component NOT properly aligned, THEN manually align associated component to establish desired AFAS lineup.

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 103 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 13 of 13)
AUTOMATIC SIGNAL VERIFICATION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
F15.	**Verify SI Valves - PROPERLY ALIGNED:**	IF any SIS section component NOT properly aligned, THEN manually align associated component to establish proper SIS lineup.
	a. Check ESFAS status panel SIS section - SYSTEM LEVEL WHITE LIGHTS ALL LIT o Red train o Yellow train	
F16.	**Check If NCP Should Be Stopped:**	
	a. CCPs - ANY RUNNING	a. Go to Step F17
	b. Stop NCP o BG HIS-3	
F17.	**Return To Procedure And Step In Effect**	

-END-

Facility: Wolf Creek Scenario No.: 3 Op-Test No.: December 2019

Examiners: ______________ Operators: ______________

Initial Conditions: 59% Power, MOL, Yellow Train In Service, Benton Line is out of service.

Turnover: The unit is operating at 59% power, MOL Yellow Train is in Service, Benton Line was removed from service yesterday to replace multiple damaged poles expected to return tomorrow.

Critical Tasks: **CT-1** ALL CLOSE MSIVs to isolate steam to the Turbine **CT-2** Given an open ARV on the Ruptured ‘C’ S/G, Isolate Feed flow and steam from Ruptured ‘C’ S/G prior to transition to either EMG E-2, or EMG C-31. **CT-3** Depressurize the RCS per EMG E-3 to minimize break flow prior to overfilling the Ruptured ‘C’ S/G.

Event No.	Malf. No.	Event Type*	Event Description
1		C (All)	‘B’ Stator Water Pump Trips, ‘A’ Stator Water Pump fails to Auto Start, Turbine Runback ALR 00-112C, OFN MA-001
2		I (ATC/CRS) Tech Specs	BB TI-421, Loop 2 TC Instrument channel fails LOW OFN SB-008, ATT L LCO 3.3.1, Functions 6 and 7, Conditions A, E
3		C (ATC/CRS)	BG TCV-130 fails closed in Auto ALR 00-039 B/A
4		I (BOP/CRS)	AE PT-508, Feed Header Pressure channel fails LOW OFN SB-008, ATT B
5		C (ALL) Tech Specs	‘C’ S/G Tube Leak, 50 gpm OFN BB-07A LCO 3.4.13, Condition B
6		M (ALL)	“C’ S/G Tube leak grows to 400 gpm SGTR EMG E-0, EMG E-3
7		C (BOP/CRS)	Turbine fails to trip in both Auto and Manual, MSIV ALL CLOSE Push Button Works. EMG E-0, Step 2
8		C (BOP/CRS)	‘C’ ARV opens to 20% on Reactor Trip, Closes Manually AP 15C-003, EMG E-3, Step 3.b

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

Target Quantitative Attributes per Scenario (See Section D.5.d)		Actual Attributes	ES-301-5	CRS	ATC	BOP
1.	Malfunctions after EOP entry (1–2)	2	Rx	0	0	0
2.	Abnormal events (2–4)	5	Nor	0	0	0
3.	Major transients (1–2)	1	I/C	7	4	5
4.	EOPs entered/requiring substantive actions (1–2)	1	Maj	1	1	1
5.	Entry into a contingency EOP with substantive actions (≥ 1 per scenario set)	0	TS	2	0	0
6.	Preidentified critical tasks (≥ 2)	3				

Critical Task	Safety Significance	Cueing	Measurable Performance Indicators	Performance Feedback
CT1 Manually ALL CLOSE main steamline isolation valves before a severe (orange-path) challenge develops to either the subcriticality (Positive IR SUR) or the integrity CSF (RCS Cold Leg Temperature <240°F)	Failure to isolate steam to the turbine given failure of auto and manual turbine trips will cause an unnecessary uncontrolled cooldown and avoidable challenges to the subcriticality and Integrity CSFs due only to lack of proper response by the crew.	Main Stop valves remain open despite reactor trip, and manual turbine trip.	On Panel RL-006 Manipulates either of the following handswitches: * AB HS-78 * AB HS-80	Green lights LIT on ○ AB HIS-14 ○ AB HIS-17 ○ AB HIS-20 ○ AB HIS-11 Indicated steam flow will drop to 0 MPPH on all four S/Gs.
CT2 Given a Ruptured 'C' S/G, Isolate feed flow into and steam flow from the ruptured 'C' S/G before making an unnecessary transition to EMG E-2 from EMG E-0, Step 16 or to EMG C-31 due to * RCS Subcooling <30°F, * PZR Level <6% or * Ruptured S/G Pressure <380 psig, by closing the following: *AB PIC-3A, ARV *AB HIS-20, MSIV *AL HK-11A MD AFW REG VLV CTRL *AL HK-12A TD AFW REG VLVL CTRL * AB V087 TDAFW Steam Supply from C S/G * AB-V082, C S/G Low Point Drain	Feedwater is isolated to prevent overfill of ruptured S/G. Steam flow out of S/G is isolated to minimized radiological release. It also maintains ruptured S/G pressure higher than non-ruptured, which prevents transition from E-3, the preferred procedure, to C-31, which will release radiation to the public.	Radiation Monitor alarms, S/G levels and S/G pressures make it possible to identify S/G 'C' as ruptured.	Manipulate controls as required to: * Close AB PIC-3A, ARV * Close AB HIS-20, MSIV * Close AL HK-11A and 12A, AFW REG VLVL CTRLs Dispatch Operator to close * AB V087 TDAFW Steam Supply * AB-V082, Low Point Drain	Green light on *AB HIS-20 0% output: *AL HK-12A *AL HK-11A *AB PIC-3A Report from Local Operator that valves are closed: *AB V-087 *AB V-082

Critical Task	Safety Significance	Cueing	Measurable Performance Indicators	Performance Feedback
CT3 Depressurize the RCS to meet the following SI termination criteria: • RCS subcooling > 30F • RCS pressure stable or rising • PZR level >6% prior to overfilling the ruptured S/G (90% WR).	Depressurizing the RCS to equalize with Ruptured S/G pressure prior to overfilling the ruptured S/G minimizes radioactive release to the environment from the ruptured S/G, minimizes stress to the Main Steam Lines, and allows for a subcooled recovery vice a potential saturated recovery.	S/G Level rising in an uncontrolled manner with feed flow isolated. Radiation monitor alarms	Manipulation of Normal Spray controls as required to depressurize the RCS. *BB PK-455A, PZR PRESS MASTER CTRL	RCS Pressure reducing in a controlled manner, subcooling maintained, leak rate to ruptured S/G drops, PZR Level >6%, Ruptured S/G Level <90% WR.

Note: Causing an unnecessary plant trip or ESF actuation may constitute a Critical Task failure. Actions taken by the applicant(s) will be validated using the methodology for critical tasks in Appendix D to NUREG-1021.

SCENARIO #3 NARRATIVE

Turnover: The Unit is operating at 59% power. Yellow Train is in service. Benton Line was removed from service yesterday to replace multiple damaged poles expected to return tomorrow

Event 1: 'B' Stator Water Pump Trips and 'A' Stator Water Pump fails to Auto start. An automatic runback of the turbine will occur. The crew will address the runback per ALR 0112C and/or OFN MA-001. Once the crew has started 'A' Stator Water Pump, and stabilized plant conditions, the next event will start at the direction of the Lead Examiner.

Event 2: Loop 2 TC instrument, BB TI-421) Fails LOW. There is no automatic plant response due to the channel failure in the low direction. Multiple MCB Annunciators will actuate, including 067D, LOOP 2 T AVG LO DEV which will help the crew diagnose which instrument failed. The crew will address the instrument failure using OFN SB-008, ATT L. Once the crew has evaluated technical specifications, the next event will start at the direction of the Lead Examiner.

Event 3: BG TCV-130 fails CLOSED in Auto. Annunciators 039B, LTDN HX DISCH TEMP HI will actuate and depending on timeliness of the crew response, Annunciator 039A may also alarm indicating letdown demineralizers have been bypassed due to high temperature. The crew will perform ALR 039B and/or 039A actions. Once crew has taken manual control of BG TCV-130 with letdown heat exchanger outlet temperature lowering, the next event will commence at the direction of the Lead Examiner.

Event 4: AE PT-508, Feed water header pressure channel fails LOW. In response to rising MFP speed, rising feed water flow and rising S/G levels, the BOP should take manual control of MFP TURBS MASTER SPEED CTRL and refer to the posted figure for programmed feedwater ΔP to manually control feedwater flow as a Memory Action. The crew will address the instrument failure per OFN SB-008, ATT B. The next event will start at the direction of the Lead Examiner.

Event 5: 'C' S/G Tube Leak. Annunciator 062A will actuate for Process Radiation levels at the ALERT level. When the crew investigates which PRM is alarming they will diagnose the S/G tube leak and enter OFN BB-07A. When S/G Tube leakage exceeds 150 gpd, the CRS will enter LCO 3.4.13, COND B.

Event 6: 'C" S/G Tube Leak grows to 400 gpm SGTR. As the leak size grows, the crew will maximize charging, isolate letdown and Trip the Reactor and Actuate SI per foldout page direction. The next two post-trip events will also be addressed by the crew.

Event 7: Main Turbine fails to auto trip and will not trip using manual push buttons. While performing immediate actions, the BOP will note the turbine failed to trip and attempt to trip the turbine manually using the two pushbuttons. When that is unsuccessful, the BOP will use the ALL CLOSE push buttons to close MSIVs to isolate steam to the main turbine.

CT1: Manually ALL CLOSE main steamline isolation valves before a severe (orange-path) challenge develops to either the subcriticality (Positive IR SUR) or the integrity CSF (RCS Cold Leg Temperature <240°F

Event 8: Ruptured S/G 'C' ARV opens to 20% on Reactor Trip: The crew will identify high steam flow rate for 'C' S/G and/or open indication on 'C' ARV and the BOP will manually close the valve.

CT2: Given an open ARV on ruptured S/G, Isolate feed flow into and steam flow from the ruptured 'C' S/G in time to prevent a transition to EMG E-2 from EMG E-0, Step 16 or to EMG C-31 due to RCS Subcooling <30°F, PZR Level <6%, or Ruptured S/G Pressure <380 psig.

The crew will transition to EMG E-3 to isolate 'C' S/G and cool down and depressurize the RCS to meet SI Termination criteria to minimize break flow though 'C' S/G tube rupture.

CT3: Commence controlled RCS depressurization to allow for SI termination per EMG E-3 prior to overfilling the ruptured S/G (90% WR).

The scenario is complete when the crew has depressurized the RCS per EMG E-3 Step 25 and/or at the discretion of the Lead Examiner.

SIMULATOR SCENARIO FILES

;2019 ILO NRC Exam, Scenario 3 (IC 103)

;Initial Conditions - IC32,59%, Benton Line out, PZR heaters in auto, rods in auto
IMF mSY03F

;Event 1 – Key 1 - 'B' Stator Water Pump Trips, 'A' Stator Water Pump Fails to Auto Start (Reactivity)
ICM bkrDPCE01B.cmf t:1 k:1
ICM swCEPS0001.cmf t:1 k:1
ICM swCEPS0002.cmf t:1 k:1

;Event 2 – Key 2 – Failure of Loop 2 TC, BB TI-421 Fails LOW (ATC/CRS-TS)
ICM trBBTE0421B.cmf t:3 k:2 f:510

;Event 3 – Key 3 – BG TCV-130 fails closed in auto (ATC/CRS)
ICM cdBGTC-130.cmf t:5 k:3 f:0

;Event 4 – Key 4 - AE PT-508 fails LOW (BOP/CRS)
ICM trAEPT0508.cmf t:1 k:4

;Event 5 – Key 5 – Steam Generator Tube Leak on 'C' S/G (BOP/ATC/CRS-TS)
IMF mBB02C f:50 r:180 k:5

Event 6 – Key 6 – Steam Generator Tube Leak becomes a rupture
{Key[6]} IMF mBB02C f:400

;Event 7 – Turbine fails to Trip in both Auto and Manual, MSIVs fail to Auto Close. (BOP-CT)
IMF mAC02A
IMF mAC02B
IMF mSA27AB01
IMF mSA27AB02
IMF mSA27AB03
IMF mSA27AB04

;Event 8 – 'C' ARV fails to 20% open on plant trip in auto, manually closes. (BOP-CT)
{jpplp4} ICM cntABPIC0003A t:1 f:20

;Local Action – **Key 9** – Close AB-V087
IRF rAB04B k:9 r:60 f:0

;Local Action – **Key 10** – Close AB-V082
IRF rAB03C k:10 r:60 f:0

; End

Booth Instructions

Ensure NRC Exam Security Established per AIF 30B-015-09, and AIF 30B-015-18

Ensure the following procedures are available, free of markings and are the most recent revision in Curator (9/25/19):

- **ALR 00-039A, LTDN HX TEMP HI DIVERT (Rev 11)**
- **ALR 00-039B, LTDN HX DISCH TEMP HI (Rev 8)**
- **ALR 00-112C, AUTO TURB R/B ACT (Rev 9A)**
- **OFN MA-001, LOAD REJECTION OR TURBINE TRIP (Rev 25)**
- **OFN BB-07A, STEAM GENERATOR TUBE LEAKAGE (Rev 22)**
- **OFN SB-008, INSTRUMENT MALFUNCTIONS (Rev 48)**
- **OFN SB-008, ATTACHMENT B, STEAM OR FEEDWATER HEADER PRESSURE CHANNEL MALFUNCTION**
- **OFN SB-008, ATTACHMENT L, NARROW RANGE RTD MALFUNCTION**
- **EMG E-0, REACTOR TRIP OR SAFETY INJECTION (Rev 40)**
- **EMG E-3, STEAM GENERATOR TUBE RUPTURE (Rev 38)**

NOTE: All events are loaded into snap **IC303**

Ensure malfunctions, including severity levels match scenario.
Ensure all meters, lamps, bistables and annunciators are correct for the initial setup. **Blue Placard is on the 'A' CCP.**
Ensure soft panel display in back is set to RP312 RCP Vibration on left screen and AMSAC on right screen.
Ensure no discernable history from RM11, Ovation screens, paper trend recorders, etc.
Ensure all laminated brief sheets, foldout pages, E plan boards are wiped clean.
Ensure all follow-up buttons are removed from the boards and trash cans and recycle bins are free of any potential exam material.
Ensure communications are established with the lead examiner, fresh batteries, radio check sat.

Critical Parameter Data to be collected:

- **Cold Leg Temperature.** The crew must close MSIVs to isolate steam to the Turbine before RCS Cold Leg Temperatures reach 240°F.
- **'C' S/G WR Level.** The crew must depressurize the RCS to meet SI termination criteria prior to overfilling the ruptured S/G (90% WR)
- **RCS Subcooling.** The crew must maintain RCS Subcooling >30°F to prevent transition to EMG C-31 from EMG E-3 foldout page.
- **PZR Level.** The crew must maintain PZR Level >6% to prevent transition to EMG C-31 from EMG E-3 foldout page.
- **Ruptured S/G Pressure.** The crew must isolate the faulted and Ruptured 'C' S/G prior to being required to transition to EMG C-31 from EMG E-3, Step 9.

Ensure Horns are ON and machine is in RUN

- **Insert Key 1** for Event 1 ('B' Stator cooling water pump trips, 'A' pump fails to auto start).
- **Insert Key 2** for Event 2 (BB TI-421, Loop 2 TC Instrument channel fails LOW).
- **Insert Key 3** for Event 3 (BG TCV-130 fails closed in Auto)
- **Insert Key 4** for Event 4 (AE PT-508 fails LOW)
- **Insert Key 5** for Event 5 ('C' S/G tube leak)
- **Insert Key 6** for Major Event ('C' S/G tube leak grows to 400 gpm SGTR Turbine fails to trip in both Auto and Manual, Ruptured C S/G ARV opens to 20%)
- When directed to locally close AB V-087, 'C' S/G Steam Isolation to TDAFW Pump, **Insert Key 9**
- When directed to locally close AB V-082, 'C' S/G Main Steamline low point drain, **Insert Key 10**

Op-Test No.: Dec 2019	Scenario No.: 3	Event No.: 1	Total No Pages 44

Event Description: **'B' Stator Water Pump trips, 'A' Stator Water Pump fails to auto start, Turbine Runback**

Time	Position	Applicant's Actions or Behavior
Simulator Operator: **Insert Key 1** at direction of Lead Examiner. Diagnostics: MWe load lowering, Runback Active red banner on Graphic 5551 Annunciators: 112C & 115D		
Examiner NOTE: ○ ALR 00-112C, if referenced, directs the crew to go to OFN MA-001. ○ Crew will start the standby Stator Cooling Water Pump per AP15C-003, Manual Backup ○ Crew may note DNB when RCS pressure drops below 2220 psig and enter **LCO 3.4.1, COND A – 2 hours**		
	CREW	Detects Stator Cooling pump has tripped and starts the standby pump
	CRS	Enters and directs OFN MA-001
OFN MA-001, LOAD REJECTION OR TURBINE TRIP		
CAUTION Main Turbine Vibration may rise due to transient differential expansion. The rate of load reduction will have a significant impact on the transient differential expansion that occurs between the rotor and shell of the turbine.		
	BOP	1. Check Turbine - NOT TRIPPED - **Yes**
	BOP	2. Check CWP Setback – IN PROGRESS: - ***No*** **RNO** Go to Step 7

Op-Test No.: Dec 2019 Scenario No.: 3 Event No.: 1 Total No Pages 44

Event Description: **'B' Stator Water Pump trips, 'A' Stator Water Pump fails to auto start, Turbine Runback**

Time	Position	Applicant's Actions or Behavior
	BOP	7. Check Stator Cooling: a. Stator Outlet Temperature – NORMAL – Yes ○ CE TI-38A b. Stator Cooling Water Inlet Temperature – NORMAL – Yes ○ CE TI-39 c. Stator Inlet Pressure – NORMAL – ***No*** ○ CE TI-38A RNO Perform the following: 1. Start second Stator Cooling Pump. *CE HIS-1 – Yes *CE HIS-2 – **Tripped** 2. Dispatch an operator to Stator Cooling skid and alarm panel to investigate trouble.
Simulator Operator: IF contacted as turbine building watch, acknowledge requests. Wait 5 minutes and report the breaker is tripped		
NOTE IF moderator temperature coefficient is positive and rod control is in auto, then control rods will insert initially and then withdraw to stop Tavg decrease		
	ATC	8. Ensure Rod Controller In – AUTO ○ Verify Rod Insertion **- Yes**
	ATC	9. Check PZR Pressure – STABLE AT OR TRENDING TO 2235 PSIG **– *Yes***
	ATC	10. Check PZR Level – STABLE AT OR TRENDING TO PROGRAM LEVEL **– *Yes***
	BOP	11. Check S/G Levels – STABLE BETWEEN 45% AND 55% ***- Yes***
	BOP	12. Check If Turbine Load Reduction/Rejection Has Stopped: **- Yes**
NOTE If the turbine runback is caused by an OTDT or OPDT and Turbine load is at or below 254 MWe with the condition still active, the Turbine will have to be runback manually until the condition is clear		

Op-Test No.: Dec 2019 Scenario No.: 3 Event No.: 1 Total No Pages 44		
Event Description: 'B' Stator Water Pump trips, 'A' Stator Water Pump fails to auto start, Turbine Runback		

Time	Position	Applicant's Actions or Behavior
	BOP	13. Check OTDT and OPDT alarms - NOT LIT **- Yes** o Annunciator 82B – NOT LIT o Annunciator 82C - NOT LIT
	CRS	14. Check Moderator Temperature Coefficient - ZERO OR NEGATIVE – **Yes (Note prior to step 14 is N/A - Positive MTC)**
	BOP	15. Verify S/G Atmospheric Relief Valves Closed: a. Ensure S/G ARVs set at 1125 psig **– *Yes*** o AB PIC-1A o AB PIC-2A o AB PIC-3A o AB PIC-4A b. Check S/G Pressure - ≤1125 psig **– *Yes*** c. Check S/G ARVs CLOSED **– *Yes***
	BOP	16. Check If Condenser Steam Dumps Should Be Reset: a. Check C-7 Light – LIT **– *No*** RNO Go to Step 17
	BOP	17. Notify Radiation Protection To Perform The Following: o Monitor RCS and other connecting systems for increasing Radiation levels due to unplanned crud burst. o Notify all personnel in the affected areas.

Op-Test No.: Dec 2019	Scenario No.: 3	Event No.: 1	Total No Pages 44

Event Description: 'B' Stator Water Pump trips, 'A' Stator Water Pump fails to auto start, Turbine Runback

Time	Position	Applicant's Actions or Behavior
Simulator Operator: ○ IF contacted as WWM, acknowledge requests ○ IF contacted as Call Supt., acknowledge status ○ IF contacted as RP, acknowledge requests ○ IF contacted as Chemistry, acknowledge status		
	ATC	18. Maintain Stable Plant Conditions: ○ PZR Pressure – Between 2220 psig and 2250 psig. ○ PZR Level - Within 5% of program level. ○ SG NR Level – Between 45% and 55%.
	CRS	19. Ensure Compliance With Appropriate Technical Specifications: ○ 3.1.6 Control Rod Insertion Limits **– Met** ○ 3.2.3 Axial Flux Difference - **Met**
	BOP	20. Check S/G Safety Valves - REMAINED CLOSED DURING TURBINE LOAD REJECTION - **Yes**
	CRS/ATC	21. Check If Sampling Is Required: a. Check Thermal Power Change - GREATER THAN 15% IN 1 HOUR b. Direct Chemistry to take samples, as required by AP 02-007, ABNORMAL CONDITIONS GUIDELINES.

Event termination: After the crew has started the standby Stator Water Cooling Pump, controlled the Turbine Runback, and/or at the direction of the Lead Examiner

Simulator Operator: **Insert Key 2** at direction of the Lead Examiner.

Op Test No.: Dec 2019	Scenario No.: 3	Event No.: 2	Total No Pages 44

Event Description: **BB TI-421, Loop 2 Tc Instrument channel fails LOW**

Time	Position	Applicant's Actions or Behavior
Simulator Operator: **Insert Key 2** at the lead examiners direction Diagnostics: Multiple alarms, No plant response since instrument failed low and no power ascension in progress. C-16 Actuated, OTΔT/OPΔT inputs to C3 and C4 active on Panel SC066W for Channel **II**. OTΔT/OPΔT/LO TAVG lights for Loop 2 lit on Panel SB-069. Annunciators: 066B, 067D, 068B, 069B, 082B, 082C, 083C, 130F		
	CREW	Recognizes failure, no load rejection in progress, and a failure of the temperature instrument
Examiner Note: Any ALR that is referenced for this failure confirms an instrument failure and directs performance of OFN SB-008. If a power ascension was in progress, ALR 00-030F directs stopping turbine loading due to C-16, but that is NOT applicable in this scenario.		
	CRS	Enters and directs OFN SB-008, INSTRUMENT MALFUNCTIONS
OFN SB-008, INSTRUMENT MALFUNCTIONS		
	CRS	1. Check for Malfunction: *Check if Reactor Coolant System Instrument Channel or Controller is Malfunctioning: a. Perform appropriate attachment for malfunctioning channel or controller from the table below: RCS Temperature (BB) | T-411, T-421, T-431 T-441 | ATTACHMENT L
ATTACHMENT L, NARROW RANGE RTD MALFUNCTION		
NOTE: Steps L1 and L2 are Memory Action steps		
EXAMINER NOTE: Operating crew may energize Pressurizer Back Up heaters to assist in pressure control		
	BOP	L1. Check Load Rejection – NOT IN PROGRESS ○ Generator Load MW – STABLE **– *Yes***

Op Test No.: Dec 2019	Scenario No.: 3	Event No.: 2	Total No Pages 44
Event Description: **BB TI-421, Loop 2 Tc Instrument channel fails LOW**			

Time	Position	Applicant's Actions or Behavior
	ATC	L2. Switch ROD BANK AUTO/MAN SEL Switch To – MANUAL ○ SE HS-9
	BOP	L3. Check Steam Dumps: a. Check STEAM DUMP SEL Switch – IN TAVG MODE ***– Yes*** ○ AB US-500Z b. Check Steam Dumps – CLOSED ***– Yes***
	ATC	L4. Identify Failed Instrument Channel: a. Compare loop Tavg and ΔT indications to confirm a NR RTD failure: ***- Loop 2***
	ATC	L5. Remove Failed Temperature Channel From Tavg And dT Auctioneering Circuits, Using DELTA T DEFEAT And ROD CTRL T AVG INPUT CHANNEL DEFEAT Switches: ○ BB TS-411F –**T421 Position** ○ BB TS-412T – **T422 Position**
Simulator Operator: IF contacted as WWM, acknowledge requests. IF contacted as Call Supt., acknowledge status.		
	ATC	L6. Check (Tavg/Tref) Error Signal Within 1°F **- Yes**
NOTE: It may take several minutes for power and temperature rate circuitry outputs to return to normal before switching back to automatic rod control		
	ATC	L7. Check ROD BANK AUTO/MAN SEL Switch In Auto. ***– No*** ○ SE HS-9 **RNO** – Place Rods in Auto, when Tavg within 1°F of Tref
	ATC	L8. Monitor Rod Control System Response To Ensure Proper Control
	BOP	L9. Check, C-7 Loss Of Load Interlock – NOT LIT ***– Yes***
	BOP	L10. Check STEAM DUMP BYPASS INTERLOCK Switches In – ON ***– Yes*** ○ AB HS-63 ○ AB HS-64

Op Test No.: Dec 2019 Scenario No.: 3 Event No.: 2 Total No Pages 44 Event Description: **BB TI-421, Loop 2 Tc Instrument channel fails LOW**		
	BOP	L11. Monitor Steam Dump Control System To Ensure Proper Operation
	BOP	L12. Check Failed Temperature Channel Not Selected On OP DT/OT DT LOOP RECORD SEL. ***– Yes (Loop 1 selected)***
	CRS	L13. Monitor The Following Technical Specification LCOs And Comply With Action Statements, As Appropriate: o 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION, Table 3.3.1-1, Functions 6 And 7 **Enters LCO 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION, Table 3.3.1-1, Functions 6 and 7, Condition A – Immediately, Condition E – 72 hrs.**
	RO	L14. Check Control Rods In Parked Position ***– Yes***
	CRS	Conduct Reactivity Brief.
	BOP	L15. Check C-16 Hold Active: o Graphic 5570, LOAD CONTROL LOOP REJECTED–NOT RED - **No** RNO Acknowledge alarm condition on Graphic 5570 – MAN ACTION ALARM ACK.
Event Termination: After the crew has identified Tech Specs and C-16 alarm acknowledged and/or at the direction of the Lead Examiner **Simulator Operator:** **Insert Key 3** at direction of the Lead Examiner		

Op-Test No.: Dec 2019 Scenario No.: 3 Event No.: 3 Total No Pages 44

Event Description: **BG TCV-130 Fails CLOSED in Auto**

Time	Position	Applicant's Actions or Behavior
Simulator Operator: **Insert Key 3** at direction of Lead Examiner. Diagnostics: ○ Output on BG TK-130 at 0%, ○ LTDN HX Outlet Temp BG TI-130 temperature indication higher than 120F (Green band), ○ CVCS DEMIN INLET DIVERT VLV, BG HIS-129 shifts from 'DEMIN' to 'VCT' Position Annunciators: 039B and possibly 039A, depending on timeliness of crew action		
Examiner Note: Crew may take manual control and may bypass the demineralizers prior to alarm panel being lit.		
	CRS	Enters and directs ALR 00-038B or ALR 00-039A
ALR 00-039B, LTDN HX DISCH TEMP HI		
	ATC	1. Check Letdown Heat Exchanger Outlet Temperature - >120°F ○ BG TI-130. - ***Yes***
	ATC	2. Check Annunciator ALR 00-039A, LTDN HX TEMP HI DIVERT Clear ○ ***Yes – Continue to Step 3*** ○ ***No – RNO Go to ALR 00-039A.***
	ATC	3. Check Letdown Heat Exchanger Outlet Temperature Control Valve – FULLY OPEN (BG TK-130) – ***No*** ○ BG TK-130 **RNO** Perform the following: a. Place valve in manual and establish temperature between 110°F and 120°F.
	ATC	4. Check Letdown Heat Exchanger Outlet Flow <120 GPM – ***Yes*** ○ BG FI-132
	ATC	5. Check Letdown Heat Exchanger Outlet Temperature – DECREASING – Yes ○ BG TI-130
	CRS	6. Return to procedure and step in effect.
ALR 00-039A, LTDN HX TEMP HI DIVERT		
	ATC	1. Check Letdown Heat Exchanger Outlet Temperature >137°F – ***Yes*** ○ BG TI-130

Op-Test No.: Dec 2019	Scenario No.: 3	Event No.: 3	Total No Pages 44

Event Description: **BG TCV-130 Fails CLOSED in Auto**

Time	Position	Applicant's Actions or Behavior
	ATC	2. Check CVCS Demineralizer Inlet Divert Valve in VCT Position – ***Yes*** ○ BG HIS-129
	BOP	3. Check Annunciator 00-038A, LTDN REGEN HX TEMP HI – CLEAR – ***Yes***
	ATC	4. Check Letdown Heat Exchanger Outlet Temperature Control Valve – Responding Properly – ***No*** ○ BG TK-130 **RNO** Perform the following: a. Place valve in manual and establish temperature between 110°F and 120°F
	ATC	5. Check Letdown Heat Exchanger Outlet Flow <120 GPM – ***Yes*** ○ BG FI-132
	ATC	6. Check Letdown Heat Exchanger Outlet Temperature DECREASING OR STABLE BETWEEN 110°F to 120°F – ***Yes*** ○ BG TI-130
	ATC	7. Check Letdown Heat Exchanger Outlet Temperature <120°F **–** ***Yes*** ○ BG TI-130
	ATC	8. Place BG HIS-129, CVCS Demineralizer Inlet Divert Valve in DEMIN Position ○ BG HIS-129
	CRS	9. Return to Procedure and Step in Effect.

Simulator Operator: IF contacted as WWM, acknowledge requests. IF contacted as Call Supt., acknowledge status.

Event Termination: After the crew has manual control with Letdown Heat Exchanger Outlet Temperature LOWERING and/or at the direction of the Lead Examiner

Simulator Operator: **Insert Key 4** at the direction of Lead Examiner

Op-Test No.: Dec 2019	Scenario No.: 3	Event No.: 4	Total No Pages 44

Event Description: **AE PT-508, Feed Header Pressure channel fails LOW**

Time	Position	Applicant's Actions or Behavior
Simulator Operator: **Insert Key 4** at direction of Lead Examiner. Diagnostics: Both MFW pump speeds rise, ALL S/G levels rise, FRVs close, MWe lowers Annunciators: 108-111B and/or 108-111C		
Examiner Note: Crew may take actions to control MFPs prior to ALR and/or OFN entry		
	CREW	Recognizes changing conditions and diagnoses failure of AE PT-508
	CRS	Enters and directs OFN SB-008, INSTRUMENT MALFUNCTIONS
OFN SB-008, INSTRUMENT MALFUCNTIONS		
	CRS	1. Check for Malfunction: *Check if Secondary System Instrument Channel is Malfunctioning a. Perform appropriate attachment for malfunctioning channel from table below: Steam or Feedwater Header Pressure (AB, AE) | P-507 P-508 | ATTACHMENT B
ATTACHMENT B, STEAM OR FEEDWATER HEADER PRESSURE CHANNEL MALFUNCTION		

NOTES

- N/A (Failure of PT-507)
- At full power, head loss in steam lines will cause steam header pressure indication to read approximately 20 psi lower than S/G pressure indications.
- Step B1 is a Memory Action step.

Op-Test No.: Dec 2019 Scenario No.: 3 Event No.: 4 Total No Pages 44
Event Description: **AE PT-508, Feed Header Pressure channel fails LOW**

Time	Position	Applicant's Actions or Behavior
	BOP	B1. Verify Proper Main Feedwater Pump Speed Control ○ Main Feedwater Pump speed is stable for plant conditions **– *No*** ○ FC SK-88 ○ FC SK-188 RNO: Perform the following a. Place MFP TURBS MASTER SPEED CTRL in manual. ○ FC SK-509A b. Control pump speed to PROGRAMMED FEEDWATER ΔP in accordance with programmed value. (Refer to Figure 1) ○ FC SK-509A
	BOP	B2. Verify Steam Header Pressure Channel Malfunction: **– *No*** RNO Go to step B10
	BOP	B10. Verify Feedwater Header Pressure Channel Malfunction: **- *Yes*** *Feed Header Pressure – ABNORMALLY HIGH OR LOW <u>OR</u> *Steam Header/Feedwater Header ΔP – ABNORMAL FOR EXISTING PLATN POWER (Refer To FIGURE 1)
<u>Simulator Operator:</u> <u>IF</u> contacted as WWM, acknowledge requests. <u>IF</u> contacted as Call Supt., acknowledge status.		
	CRS	B11. Request I&C repair failed channel
	BOP	B12. WHEN Failed Channel is repaired, THEN restore MFP TURBS MASTER SPEED CTRL to auto, as directed by SM/CRS ○ FC SK-509A
	CRS	B13. Return to procedure and step in effect
<u>Event termination:</u> After the crew has restored S/G levels and/or at the discretion of the Lead Examiner. **<u>Simulator operator:</u> Insert Key 5** at the lead examiners direction.		

Op-Test No.: Dec 2019	Scenario No.: 3	Event No.: 5	Total No Pages 44

Event Description: S/G 'C' Tube Leak

Time	Position	Applicant's Actions or Behavior
Simulator Operator: **Insert Key 5** at direction of Lead Examiner. Diagnostics: Slowly lowering level and pressure in the Pressurizer, slowing rising level in the 'C' S/G, slowly rising trend on process rad monitors Annunciators: 061A & 061B		
	CREW	Recognizes alarms and indications that there is a tube leak into the 'C' S/G
	CRS	Enters and directs OFN BB-07A
OFN BB-07A, STEAM GENERATOR TUBE LEAKAGE		
CAUTION If reactor trip or safety injection actuates during this procedure, go to EMG E-0, REACTOR TRIP OR SAFETY INJECTION, step 1		
	ATC	1. Check PZR Level – GREATER THAN 6% ***- Yes***
	ATC	2. Check PZR Level – GREATER THAN 17% ***- Yes***
	ATC	3. Check PZR Level – STABLE OR RISING ***– No*** RNO IF PZR level is less than program level, THEN perform the following: a. Control charging flow, as necessary, to maintain PZR level b. IF pressurizer level can NOT be maintained, THEN close letdown orifice valves, as necessary, to stabilize PZR level *BG HIS-8149AA *BG HIS-8149BA *BG HIS-8149CA

Op-Test No.: Dec 2019 Scenario No.: 3 Event No.: 5 Total No Pages 44

Event Description: S/G 'C' Tube Leak

Time	Position	Applicant's Actions or Behavior
	ATC	Monitors Foldout page Criteria: 1. SI ACTUATION CRITERIA IF any condition listed occurs, THEN trip the Reactor, actuate SI and go to EMG E-0, REACTOR TRIP OR SAFETY INJECTION, Step 1. * RCS Subcooling based on subcooling monitor <30F SUBCOOLING WITH REACTOR TRIPPED OR * Pressurizer Pressure – CANNOT BE MAINTAINED OR * Pressurizer Level – CANNOT BE MAINTAINED >6% OR * ALL of the following conditions exist: o Normal charging is maximized from one pump. AND o Letdown is Isolated AND o Pressurizer Level is lowering.
	ATC/BOP	4. Try To Identify Leaking S/G: *Unexpected rise in any S/G narrow range level **– *Yes*** OR *Radiation from any S/G steamline radiation monitor *ABS 114 For S/G A *ABS 113 For S/G B *ABS 112 For S/G C **– *Yes*** *ABS 111 For S/G D OR *Radiation from any S/G steamline survey OR *Radiation from and S/G sample OR *Radiation from any S/G blowdown cation column at RM172 (Micro-R meter or equivalent)

NOTES

- If VCT level cannot be maintained, the Rx is tripped since after swapover to the RWST the high boron injection flowrate makes an orderly shutdown difficult
- If the leak rate is still within the capacity of a charging pump, after swapover to the RWST, it is not desirable to actuate SI and go to EMG E-3

Op-Test No.: Dec 2019	Scenario No.: 3	Event No.: 5	Total No Pages 44

Event Description: **S/G 'C' Tube Leak**

Time	Position	Applicant's Actions or Behavior
	ATC	5. Check VCT Level – BEING MAINTAINED BY NORMAL MAKEUP **– *Yes***

NOTE

STS CH-033, PRIMARY TO SECONDARY LEAKAGE DETERMINATION, will determine which steam generator(s) are leaking and also determine the leak rate

Time	Position	Applicant's Actions or Behavior
	BOP	6. Ensure Chemistry Is Performing the Following Procedures: ○ STS CH-033, PRIMARY TO SECONDARY LEAKAGE DETERMINATION, ○ AI 21D-004, SECONDARY RADIATION MONITOR SETPOINT CALCULATIONS

Simulator Operator: IF contacted as RP and/or Chemistry, acknowledge requests

NOTES

- When leakage is less than 30 gpd, the YELLOW ALERT setpoints should not be increased to greater than 30 gpd. When leakage is greater than 30 gpd, the YELLOW ALERT setpoints should not be increased to greater than 75 gpd
- The theoretical graphs only apply to GR RE-92 and cannot be used to adjust the setpoint on BM RE-24 or SJ RE-02
- Receipt of a YELLOW ALERT indication will cause annunciator 00-061B, PROCESS RAD HI to alarm. Receipt of a RED HIGH indication will cause annunciator 00-061A, PROCESS RAD HIHI to alarm

Time	Position	Applicant's Actions or Behavior
	CREW	7. Determine If Steam Generator Blowdown And Sampling Can Be Restored: a. Check S/G Total Leakage – ESTIMATED TO BE LESS THAN 75 GPD **– *No*** RNO: Go to Step 9

Op-Test No.: Dec 2019 Scenario No.: 3 Event No.: 5 Total No Pages 44

Event Description: **S/G 'C' Tube Leak**

Time	Position	Applicant's Actions or Behavior
	CRS	9. Check Plant Shutdown And Monitoring Requirements: a. Monitor Attachment C, STEAM GENERATOR TUBE LEAKAGE MONITORING, action level table and take appropriate actions, as directed by table b. Refer to ATTACHMENT D, GUIDANCE FOR OPERATION WITH SG TUBE LEAK c. Check Plant Shutdown – NOT REQUIRED **– *No***

Event Termination: After the crew has determined leak rate and/or at the direction of the Lead Examiner

Simulator Operator: **Insert Key 6** at the direction of the Lead Examiner

Op-Test No.: Dec 2019	Scenario No.: 3	Event No.: 6/7/8	Total No Pages 44

Event Description: **S/G 'C' Tube leak grows to 400 gpm SGTR. Turbine fails to trip in both Auto and Manual, MSIV ALL CLOSE pushbuttons work. 'C' ARV opens to 20% on Reactor Trip, closes manually**

Time	Position	Applicant's Actions or Behavior
Simulator Operator: **Insert Key 6** at direction of Lead Examiner. Diagnostics: Pressurizer level lowering with charging flow maximized and letdown isolated. OFN BB-07A Foldout page criteria is met to trip the Reactor and Actuate SI.		
	CRS	Directs tripping the Reactor and Actuating Safety Injection, enters and directs EMG E-0
EMG E-0, REACTOR TRIP OR SAFETY INJECTION		
NOTE ○ Steps 1 through 4 are immediate action steps ○ Foldout page shall be monitored throughout this procedure		
	ATC	1. Verify Reactor Trip: - ***Yes*** a. Check all rod bottom lights – LIT b. Check reactor trip breakers and bypass breakers – OPEN ○ SB ZL-1 ○ SB ZL-2 ○ SB ZL-3 ○ SB ZL-4 c. Check intermediate range neutron flux – DECREASING ○ SE NI-35B [GAMMA METRICS] ○ SE NI-36B [GAMMA METRICS]
	BOP	2. Verify Turbine Trip: a. Check Main Stop Valves – ALL CLOSED **– *No*** RNO a. Perform the following: 1) Manually trip the turbine – No 2) IF Turbine will NOT trip, THEN close main steam isolation valves and main steam bypass valves *AB HS-79 *AB HS-80 **CT1**: Manually ALL CLOSE main steamline isolation valves before a severe (orange path) challenge develops to either the subcriticality (Positive IR SUR) or the integrity CSF (RCS Cold Leg Temperature <240°F)

Op-Test No.: Dec 2019	Scenario No.: 3	Event No.: 6/7/8	Total No Pages 44

Event Description: **S/G 'C' Tube leak grows to 400 gpm SGTR. Turbine fails to trip in both Auto and Manual, MSIV ALL CLOSE pushbuttons work. 'C' ARV opens to 20% on Reactor Trip, closes manually**

Time	Position	Applicant's Actions or Behavior
	ATC	3. Check AC Emergency Busses – AT LEAST ONE ENERGIZED **– *Yes*** *NB01 – ENERGIZED *NB02 – ENERGIZED
	ATC	4. Check if Safety Injection is Actuated: a. Check any indication SI is actuated – LIT **– *Yes*** *Annunciator 00-030A, NF039A LOCA SEQ ACTUATED – LIT *Annunciator 00-031A, NF039B LOCA SEQ ACTUATED – LIT *ESFAS status panel SIS section – ANY WHITE LIGHTS LIT *Partial Trip Status Permissive/Block status panel – SI RED LIGHT LIT b. Check both trains of SI actuated **– *Yes*** ○ Ann 00-030A, NF039A LOCA SEQ ACTUATED – LIT ○ Ann 00-031A, NF039B LOCA SEQ ACTUATED – LIT
CAUTION If offsite power is lost after SI reset, manual action may be required to restore safeguards equipment to the required configuration		
	ATC	5. (t) Check if SI required: * SI was manually actuated AND was required **– *Yes*** * Containment pressure is currently or has been – GREATER THAN OR EQUAL TO 3.5 PSIG **– *No*** * RCS pressure is currently or has been – LESS THAN OR EQUAL TO 1830 PSIG **– *No*** * Any S/G pressure is currently or has been – LESS THAN OR EQUAL TO 615 PSIG **– *No***
	BOP	Monitoring Foldout page: Recognizes 'C' S/G ARV is open, takes manual control and closes the valve, reports to CRS **CT2**: Given a Ruptured 'C' S/G, Isolate feed flow into and steam flow from the ruptured 'C' S/G before making an unnecessary transition to EMG E-2 or EMG C-31 by closing the following: ***AB PIC-3A, C ARV** *AB HIS-20, C MSIV *AL HK-11A MD AFW REG VLV CTRL *AL HK-12A TD AFW REG VLVL CTRL *AB V087 TDAFW Steam Supply from C S/G *AB-V082, C S/G Low Point Drain

Op-Test No.: Dec 2019 Scenario No.: 3 Event No.: 6/7/8 Total No Pages 44

<u>Event Description:</u> S/G 'C' Tube leak grows to 400 gpm SGTR. Turbine fails to trip in both Auto and Manual, MSIV ALL CLOSE pushbuttons work. 'C' ARV opens to 20% on Reactor Trip, closes manually

Time	Position	Applicant's Actions or Behavior
	ATC	6. Verify Automatic Actions using Attachment F, AUTOMATIC SIGNAL VERIFICATION **<u>Examiner Note:</u>** See Attachment 1 for complete list of actions
	BOP	7. Check Main Generator Breakers and Exciter Breaker – OPEN **– *Yes*** ○ MA ZL-3A ○ MA ZL-4A ○ MA ZL-2
	BOP	8. Check Total AFW Flow – GREATER THAN 270,000 LBM/HR **– *Yes***
	BOP	<u>9.</u> Check RCS Cold Leg Temperatures: *Stable at or trending to 557°F for condenser steam dumps or S/G ARVs *Stable at or trending to a range of 553°F to 557°F for S/G ARVs if recovering from an inadvertent SI
	BOP	10. Establish S/G Pressure Control: a. Check condenser – AVAILABLE **– *Yes*** ○ C-9 LIT ○ MSIV – OPEN ○ Circulating water pumps - RUNNING b. Place Steam Header Pressure Control in Manual ○ AB PK-507 c. Manually set Steam Header Pressure Control output to zero ○ AB PK-507 d. Place Steam Dump Select Switch in STEAM PRESS position ○ AB US-500Z e. Place Steam Header Pressure Control in Automatic ○ AB PK-507
	ATC	11. Check PZR PORVs a. Check PZR PORVs – CLOSED **– *Yes*** ○ BB HIS-455A ○ BB HIS-456A b. Power to block valves – AVAILABLE **– *Yes*** ○ BB HIS-8000A ○ BB HIS-8000B c. RCS pressure – LESS THAN 2185 PSIG

Op-Test No.: Dec 2019 Scenario No.: 3 Event No.: 6/7/8 Total No Pages 44

Event Description: **S/G 'C' Tube leak grows to 400 gpm SGTR. Turbine fails to trip in both Auto and Manual, MSIV ALL CLOSE pushbuttons work. 'C' ARV opens to 20% on Reactor Trip, closes manually**

Time	Position	Applicant's Actions or Behavior
	ATC	13. Check PZR Safety Valves – CLOSED **– *Yes*** ○ BB ZL-8010A ○ BB ZL-8010B ○ BB ZL-8010C
		NOTE Seal injection flow shall be maintained to all RCPs
	ATC/BOP	14. Check if RCPs should be stopped: a. Check RCPs – ANY RUNNING **– *Yes*** b. Check RCS pressure – LESS THAN 1400 PSIG – No RNO b. Go to Step 15
	CRS	15. Direct operator to Monitor Critical Safety Functions Using EMG F-0, CRITICAL SAFETY FUNCTION STATUS TREES (CSFST)
	BOP	16. Check if S/Gs are not Faulted: ***- Yes*** a. Check pressures in all S/Gs – ○ NO S/G PRESSURE DECREASING IN AN UNCONTROLLED MANNER ○ NO S/G COMPLETELY DEPRESSURIZED

Op-Test No.: Dec 2019	Scenario No.: 3	Event No.: 6/7/8	Total No Pages 44

Event Description: **S/G 'C' Tube leak grows to 400 gpm SGTR. Turbine fails to trip in both Auto and Manual, MSIV ALL CLOSE pushbuttons work. 'C' ARV opens to 20% on Reactor Trip, closes manually**

Time	Position	Applicant's Actions or Behavior
	BOP	17. (t) Check if S/G tubes are intact: o Check S/G Levels – NOT INCREASING IN AN UNCONTROLLED MANNER – ***No*** o Narrow range o Wide range o Condenser air discharge radiation – NORMAL BEFORE ISOLATION – ***No*** o GEG 925 o S/G blowdown and sample radiation – NORMAL BEFORE ISOLATION – ***No*** o BML 256 o SJL 026 o Turbine driven auxiliary feedwater pump exhaust radiation – NORMAL – ***No*** o FCT 381 o S/G steamline radiation – NORMAL – ***No*** o ABS 114 for S/G A o ABS 113 for S/G B o ABS 112 for S/G C o ABS 111 for S/G D **RNO** Perform the following: a. Direct Health Physics to survey steamlines in Area 5 of the Auxiliary Building b. Ensure BIT and Outlet Valves are open – ***Yes*** o EM HIS-8803A o EM HIS-8803B o EM HIS-8801A o EM HIS-8801B c. Check S/G B or S/G C – RUPTURED – ***Yes*** 1) Dispatch operator to locally close steam supply to Turbine Driven AFW Pump from ruptured S/G(s) *AB-V087 For S/G C (MAIN STEAM ENCLOSURE BELOW GRATING) d. Go to EMG E-3, STEAM GENERATOR TUBE RUPTURE, Step 1 **CT2**: Given a Ruptured 'C' S/G, Isolate feed flow into and steam flow from the ruptured 'C' S/G before making an unnecessary transition to EMG E-2 or EMG C-31 by closing the following: *AB PIC-3A, C ARV *AB HIS-20, C MSIV *AL HK-11A MD AFW REG VLV CTRL *AL HK-12A TD AFW REG VLVL CTRL ***AB V087 TDAFW Steam Supply from C S/G** *AB-V082, C S/G Low Point Drain

Op-Test No.: Dec 2019	Scenario No.: 3	Event No.: 6/7/8	Total No Pages 44

Event Description: **S/G 'C' Tube leak grows to 400 gpm SGTR. Turbine fails to trip in both Auto and Manual, MSIV ALL CLOSE pushbuttons work. 'C' ARV opens to 20% on Reactor Trip, closes manually**

Time	Position	Applicant's Actions or Behavior
Simulator Operator: o WHEN contacted as Health Physics, acknowledge request o WHEN contacted as Building Watch, acknowledge request, wait 5 minutes, **Insert Key 9**, and report AB-V087 is closed		
EMG E-3, STEAM GENERATOR TUBE RUPTURE		
NOTES o Foldout page shall be monitored throughout this procedure o Personnel should be available for sampling during this procedure o Seal injection flow shall be maintained to all RCPs.		
	ATC	1. Check if RCPs should be stopped: a. Check RCPs – ANY RUNNING **– *Yes*** b. Check RCS pressure – LESS THAN 1400 PSIG – No RNO b. OBSERVE CAUTION PRIOR TO STEP 2 and go to step 2
CAUTION If steamlines are not intact, extreme caution will be necessary when performing local surveys.		
Simulator Operator: IF contacted as Health Physics, acknowledge requests		

Op-Test No.: Dec 2019 Scenario No.: 3 Event No.: 6/7/8 Total No Pages 44

Event Description: **S/G 'C' Tube leak grows to 400 gpm SGTR. Turbine fails to trip in both Auto and Manual, MSIV ALL CLOSE pushbuttons work. 'C' ARV opens to 20% on Reactor Trip, closes manually**

Time	Position	Applicant's Actions or Behavior
	BOP	2. Identify Ruptured S/Gs: *Level Increasing In An Uncontrolled Manner – **C S/G** OR *High Turbine Driven AFW exhaust radiation. o FCT 381 OR *High radiation from any S/G steamline radiation o ABS 114 For S/G A o ABS 113 For S/G B o ABS 112 For S/G C **– *Yes*** o ABS 111 For S/G D OR *High Radiation From Any S/G Steamline Survey OR *High Radiation From Any S/G Sample
CAUTION If the Turbine Driven AFW Pump is the only available source of feed flow, steam supply to the Turbine Driven AFW Pump must be maintained from at least one S/G.		
	BOP	3. Isolate flow from Ruptured S/Gs: a. Adjust ruptured S/Gs ARV controller setpoint to 1160 psig b. Check Ruptured S/Gs ARV – CLOSED c. Locally close steam supply to Turbine Driven AFW Pump from ruptured S/G(s) *AB-V087 for S/G C (MAIN STEAM ENCLOSURE BELOW GRATING) – Already Dispatched d. Locally isolate main steamline low point drain valve(s) from ruptured S/G(s) *Close AB V-082 For S/G C (MAIN STEAM ENCLOSURE BELOW GRATING) **CT2**: Given a Ruptured 'C' S/G, Isolate feed flow into and steam flow from the ruptured 'C' S/G before making an unnecessary transition to EMG E-2 or EMG C-31 by closing the following: ***AB PIC-3A, C ARV** *AB HIS-20, C MSIV *AL HK-11A MD AFW REG VLV CTRL *AL HK-12A TD AFW REG VLVL CTRL ***AB V087 TDAFW Steam Supply from C S/G** ***AB-V082, C S/G Low Point Drain**
Simulator Operator: WHEN contacted to as Building Operator to close AB-V082, acknowledge request. **Insert Key 10**, wait 5 minutes are report AB-V082 closed		

Op-Test No.: Dec 2019	Scenario No.: 3	Event No.: 6/7/8 Total No Pages 44

Event Description: **S/G 'C' Tube leak grows to 400 gpm SGTR. Turbine fails to trip in both Auto and Manual, MSIV ALL CLOSE pushbuttons work. 'C' ARV opens to 20% on Reactor Trip, closes manually**

Time	Position	Applicant's Actions or Behavior
	BOP	4. Verify Blowdown, Lower, and Upper Sampling Isolated on Ruptured S/G(s) – ***verified in previous procedure***
		CAUTION At least one S/G shall be maintained available for RCS cooldown.
	BOP	5. Isolate Steamline on Ruptured S/G(s): a. Close main steamline isolation valve *AB HIS-20 For S/G C b. Ensure Main Steamline Isolation Bypass Valves – CLOSED ○ AB ZL-21A for S/G C
		CAUTION If any ruptured S/G is also faulted and the affected S/G is not needed for RCS cooldown, feed flow to that S/G shall remain isolated during subsequent recovery actions.
	BOP	6. Check If Feed Flow Should Be Isolated to Ruptured S/G(s): a. Check Ruptured S/G(s) Narrow Range Level – GREATER THAN 6% [29%] – ***No*** **RNO** Perform the following: 1) IF ruptured S/G pressure is lowering in an uncontrolled manner OR ruptured S/G is completely depressurized THEN go to step 7. 2) Maintain feed flow to ruptured S/G(s), until level >6% [29%] 3) WHEN ruptured S/G level >6% [29%], THEN go to step 7, continue with step 8.
	BOP	7. Stop Feed Flow To Ruptured S/G(s) a. Close affected S/G(s) MD AFP Flow Control Valve(s). *AL HK-11A For S/G C b. Close affected S/G(s) TD AFWP Flow Control Valve(s). *AL HK-12A For S/G C **CT2**: Given a Ruptured 'C' S/G, Isolate feed flow into and steam flow from the ruptured 'C' S/G before making an unnecessary transition to EMG E-2 or EMG C-31 by closing the following: *AB PIC-3A, C ARV *AB HIS-20, C MSIV ***AL HK-11A MD AFW REG VLV CTRL** ***AL HK-12A TD AFW REG VLVL CTRL** *AB V087 TDAFW Steam Supply from C S/G *AB-V082, C S/G Low Point Drain

Op-Test No.: Dec 2019	Scenario No.: 3	Event No.: 6/7/8	Total No Pages 44

<u>Event Description:</u> S/G 'C' Tube leak grows to 400 gpm SGTR. Turbine fails to trip in both Auto and Manual, MSIV ALL CLOSE pushbuttons work. 'C' ARV opens to 20% on Reactor Trip, closes manually

Time	Position	Applicant's Actions or Behavior
	BOP	8. Verify Ruptured S/G(s) Isolation: a. Check Ruptured S/G (s) – NOT NEEDED FOR RCS COOLDOWN b. Verify ruptured S/G(s) steamline has been isolated from at least one intact S/G: *Main Steam Isolation Valve and Bypass Valve on Ruptured S/G(s) – CLOSED <u>OR</u> *Main Steam Isolation Valve and Bypass Valve on at least on intact S/G – CLOSED c. Check Main Steam Isolation Valve and Bypass Valve on Ruptured S/G(s) – CLOSED d. Verify Steam Supply to Turbine Driven AFW Pump from Ruptured SG(s) – CLOSED *AB-V085 For S/G B *AB-V087 For S/G C **CT2**: Given a Ruptured 'C' S/G, Isolate feed flow into and steam flow from the ruptured 'C' S/G before making an unnecessary transition to EMG E-2 or EMG C-31 by closing the following: *AB PIC-3A, C ARV ***AB HIS-20, C MSIV** *AL HK-11A MD AFW REG VLV CTRL *AL HK-12A TD AFW REG VLVL CTRL ***AB V087 TDAFW Steam Supply from C S/G** *AB-V082, C S/G Low Point Drain

<u>CAUTION</u>

At EOL, if a control rod is stuck or SI flow is reduced, an inadvertent restart may occur. Symptoms for subcriticality red path and transition to EMG FR-S1, RESPONSE TO NUCLEAR POWER GENERATION/ATWS, shall be closely monitored during subsequent steps.

Time	Position	Applicant's Actions or Behavior
	BOP	9. Check Ruptured S/G(s) Pressure – GREATER THAN 380 PSIG

<u>NOTE</u>

If high steam pressure rate setpoint (100 psi/50 sec) is exceeded after low steamline pressure SI signal is blocked, main steamline isolation will occur

Op-Test No.: Dec 2019 Scenario No.: 3 Event No.: 6/7/8 Total No Pages 44

Event Description: **S/G 'C' Tube leak grows to 400 gpm SGTR. Turbine fails to trip in both Auto and Manual, MSIV ALL CLOSE pushbuttons work. 'C' ARV opens to 20% on Reactor Trip, closes manually**

Time	Position	Applicant's Actions or Behavior
	BOP	10. Check if Low Steamline Pressure SI should be Blocked: a. Check RCS Pressure – LESS THAN 1970 PSIG ○ P-11 Light – LIT RNO a. WHEN RCS pressure is less than 1970 psig, THEN block low steamline pressure SI. Continue with step 11 b. Block low steamline pressure SI ○ SB HIS-9 ○ SB HIS-10
	ATC	11. Determine Target Plant Conditions from Table below: **(Based on Ruptured S/G Pressure)**

CAUTION

If RCPs are not running, the cooldown and depressurization steps may cause a red or orange path condition on the integrity status tree for the ruptured loop. Step 52 shall be completed before reevaluating the red or orange path condition and transition to EMG FR-P1, RESPONSE TO IMMINENT PRESSURIZED THERMAL SHOCK CONDITIONS, if required.

NOTE

- After Operator initiated RCS cooldown has been started, RCP trip criteria no longer applies.
- Once the maximum rate cooldown is started, it must be maintained until the target temperature is reached.

Time	Position	Applicant's Actions or Behavior
	BOP	12. Determine method used to Cooldown RCS at Maximum rate: a. Check Steam Dumps – AVAILABLE **RNO** a. Go to Step 14 Examiner Note: Based on crew response time, steam dumps may not be available and RNO step utilized.

Op-Test No.: Dec 2019 Scenario No.: 3 Event No.: 6/7/8 Total No Pages 44

Event Description: **S/G 'C' Tube leak grows to 400 gpm SGTR. Turbine fails to trip in both Auto and Manual, MSIV ALL CLOSE pushbuttons work. 'C' ARV opens to 20% on Reactor Trip, closes manually**

Time	Position	Applicant's Actions or Behavior
	BOP	13. Perform RCS Cooldown Using Steam Dumps: a. Check P-12 Interlock – LIGHT LIT **RNO** a. Dump steam using AB UK-33, STEAM DUMP COOLDOWN CTRL: 1) Ensure STEAM DUMP COOLDOWN CTRL in manual AB UK-33 2) Adjust STEAM DUMP COOLDOWN CTRL to 100% AB UK-33 3) WHEN P-12 interlock actuates, THEN complete steps 13.b through 13.h 4) Continue with step 15 b. Place both STEAM DUMP BYPASS INTERLOCK switches to BYB/INTLK o AB HS-63 o AB HS-64 c. Ensure STEAM DUMP COOLDOWN CTRL in manual o AB UK-33 d. Adjust STEAM DUMP COOLDOWN CTRL to 100% o AB UK-33 e. Ensure STEAM DUMP SEL in STM PRESS position o AB US-500Z f. Set STEAM HDR PRESS CTRL potentiometer to target setpoint value determined in step 11 o AB PK-507 g. Ensure STEAM HDR PRESS CTRL in auto o AB PK-507 h. Check RCS Temperatures – LESS THAN TARGET TEMPERATURE *Core Exit TCs OR *RCS Hot Leg RTDs **RNO** h. Perform the following: 1) WHEN RCS temperature is less than target temperature, THEN perform step 13.i 2) Go to step 15 i. Check Automatic Temperature Control – DESIRED 1) Place STEAM DUMP COOLDOWN CTRL in auto AB UK-33 **RNO** i. Perform the following: a) Adjust STEAM DUMP CTRL to stabilize RCS temperature less than target temperature AB UK-33 b) Go to Step 15 j. Go to Step 15

Op-Test No.: Dec 2019	Scenario No.: 3	Event No.: 6/7/8	Total No Pages 44

Event Description: **S/G 'C' Tube leak grows to 400 gpm SGTR. Turbine fails to trip in both Auto and Manual, MSIV ALL CLOSE pushbuttons work. 'C' ARV opens to 20% on Reactor Trip, closes manually**

Time	Position	Applicant's Actions or Behavior
	BOP	14. Perform RCS Cooldown using ARVs or TDAFP: a. Check intact S/G(s) – AVAILABLE 1) Dump steam at maximum rate: *Use intact S/G ARVs in manual at 100% OR *Operate Turbine Driven AFW Pump at Maximum Load b. Adjust Controller setpoint of each ARV used for cooldown to a value less than or equal to setpoint target value from step 11 *AB PIC-1A for S/G A *AB PIC-2A for S/G B *AB PIC-4A for S/G D c. Check RCS Temperatures – LESS THAN TARGET TEMPERATURE *Core Exit TCs Or *RCS Hot Leg RTDs **RNO** c. Perform the following: 1) WHEN RCS temperature is less than target temperature, THEN perform step 14.d 2) Go to step 15 d. Check Automatic Temperature Control – DESIRED 1) Place ARV controller IN AUTO 2) Adjust ARV controllers as needed, to maintain RCS temperature less than target temperature RNO d. Manually maintain RCS temperature stable below target temperature: a) Manually control steam flow from intact S/Gs: *Use intact S/G ARVs OR *Operate Turbine Driven AFW Pump b) IF intact S/G is NOT available, THEN use faulted S/G ARVs

Op-Test No.: Dec 2019 Scenario No.: 3 Event No.: 6/7/8 Total No Pages 44

Event Description: **S/G ‘C’ Tube leak grows to 400 gpm SGTR. Turbine fails to trip in both Auto and Manual, MSIV ALL CLOSE pushbuttons work. ‘C’ ARV opens to 20% on Reactor Trip, closes manually**

Time	Position	Applicant’s Actions or Behavior
	BOP	15. Check Intact S/G Levels: a. Check Narrow Range Level in at least one S/G – GREATER THAN 6% [29%] RNO a. Maintain total feed flow greater than 270,000 lbm/hr, until narrow range level greater than 6% [29%] in at least one S/G b. Control feed flow to maintain narrow range level in all S/Gs between 29% [29%] and 50%
CAUTION: If any PZR PORV opens because of high PZR pressure, the PORV shall be monitored to ensure it recloses after pressure decreases to less than 2335 psig		
	ATC	16. Check PZR PORVs and Block Valves: a. Power to Block Valves – AVAILABLE **– *Yes*** o BB HIS-8000A o BB HIS-8000B b. PZR PORV – CLOSED **– *Yes*** o BB HIS-455A o BB HIS-456A c. RCS Pressure – LESS THAN 2185 **– *Yes***
	ATC	17. Check PZR Safety Valves – CLOSED **– *Yes*** o BB ZL-8010A o BB ZL-8010B o BB ZL-8010C
CAUTION If offsite power is lost after SI reset, manual action may be required to restore safeguards equipment to the required configuration		
	ATC	18. Reset SI: o SB HS-42A o SB HS-43A

Op-Test No.: Dec 2019	Scenario No.: 3	Event No.: 6/7/8	Total No Pages 44

<u>Event Description:</u> S/G 'C' Tube leak grows to 400 gpm SGTR. Turbine fails to trip in both Auto and Manual, MSIV ALL CLOSE pushbuttons work. 'C' ARV opens to 20% on Reactor Trip, closes manually

Time	Position	Applicant's Actions or Behavior
	ATC	19. Reset Containment Isolation Phase A and Phase B ○ SB HS-56 For Phase A ○ SB HS-53 For Phase A ○ SB HS-55 For Phase B ○ SB HS-52 For Phase B
		<u>NOTE</u> Locally opening EF HV-43, ESW A TO AIR COMPRESSOR or EF HV-44, ESW B TO AIR COMPRESSOR requires the associated ESW Train to be declared inoperable. Local opening of the valve, on 2000' NORTH END AUX BLDG, will preclude it from automatically isolating on a high flow condition
	BOP	20. Verify Instrument Air Compressor Running: a. Ensure At Least One ESW TRN TO AIR COMPRESSOR Valve – OPEN **– *Yes*** *EF HIS-43 *EF HIS-44 b. Check AIR COMPRESOSR BRKR RESET Switch Associated With Open ESW Valve(s) ***- No*** *KA HIS-3C *KA HIS-2C **RNO:** Reset and Close AIR COMPRESSOR BRKR RESET Switch *KA HIS-3C *KA HIS-2C c. Check INST AIR PRESS – GREATER THAN 105 PSIG ○ KA PI-40 **– *Yes*** d. Check Neither ESW TO AIR COMPRESSOR Valve – Locally Opened ***- No*** ○ EF HV-43 ○ EF HV-44 e. Check Both ESW TRN TO AIR COMPRESSOR Valves – OPEN **– *Yes*** ○ EF HIS-43 ○ EF HIS-44 f. Check Both AIR COMPRESSOR BRKR RESET Switches – CLOSED **– *Yes*** ○ KA HIS-3C ○ KA HIS-2C

Op-Test No.: Dec 2019 Scenario No.: 3 Event No.: 6/7/8 Total No Pages 44
Event Description: **S/G 'C' Tube leak grows to 400 gpm SGTR. Turbine fails to trip in both Auto and Manual, MSIV ALL CLOSE pushbuttons work. 'C' ARV opens to 20% on Reactor Trip, closes manually**

Time	Position	Applicant's Actions or Behavior
	BOP	21. Verify Instrument Air to Containment: a. Check PZR PRESS MASTER CTRL Output – LESS THAN 55% ***- Yes*** o BB PK-455A b. Open INST AIR SPLY CTMT ISO VLV o KA HIS-29
CAUTION After RHR Pumps have been stopped, RCS pressure shall be monitored for RHR Pump restart criteria		
	ATC	22. Check if RHR Pumps should be Stopped: ***- Yes*** a. Check RHR Pumps – ANY RUNNING ***– Yes*** b. Check RHR System – ALIGNED FOR INJECTION ***– Yes*** c. Check RCS Pressure – GREATER THAN 325 PSIG ***– Yes*** d. Stop RHR Pumps and place in standby o EJ HIS-1 o EJ HIS-2 e. Check RCS pressure greater than 325 psig during subsequent recovery actions
	ATC	23. Check if RCS Cooldown Should be Stopped: a. Check RCS Temperatures – LESS THAN TARGET TEMPERATURES *Core Exit TCs OR *RCS Hot Leg RTDs
	BOP	24. Check Ruptured S/G Pressure – STABLE OR INCREASING ***– Yes***
	ATC	25. Check RCS Subcooling – GREATER THAN 50°F [65°F] – Yes

Op-Test No.: Dec 2019	Scenario No.: 3	Event No.: 6/7/8 Total No Pages 44

Event Description: **S/G 'C' Tube leak grows to 400 gpm SGTR. Turbine fails to trip in both Auto and Manual, MSIV ALL CLOSE pushbuttons work. 'C' ARV opens to 20% on Reactor Trip, closes manually**

Time	Position	Applicant's Actions or Behavior
	ATC	26. Depressurize RCS Using Normal Spray To Minimize Break Flow and Refill PZR: a. Verify Normal PZR Spray Available. **– *Yes*** b. Spray PZR with maximum available spray until any of the following conditions are satisfied: * PZR Level >76% [62%] <u>OR</u> * RCS Subcooling <30F [45F] <u>OR</u> *Both of the following: 1) RCS Pressure < Ruptured S/G Pressure 2) PZR Level >6% [29%] <u>OR</u> * Both of the Following 1) RCS Pressure <300 psig of Ruptured S/G Pressure 2) PZR Level >36% [50%] c. Close Normal PZR Spray Valves d. Observe Caution prior to Step 32 and go to step 32.
		CT3: Depressurize the RCS to meet the following SI termination criteria: * RCS subcooling >30°F * RCS pressure stable or rising * PZR level >6% Prior to overfilling the ruptured S/G (90% WR)

<u>Scenario Termination:</u> After the crew has commenced RCS depressurization and/or at the direction of the Lead Examiner terminate the scenario

<u>Simulator Operator:</u> FREEZE

Attachment 1 EMG E-0 Attachment F

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 79 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 1 of 13)
AUTOMATIC SIGNAL VERIFICATION

F1.	**Check AC Emergency Busses - ENERGIZED:**	
	o NB01 - ENERGIZED	o Depress START/RESET pushbutton for EDG A. o KJ HS-8A
	o NB02 - ENERGIZED	o Depress START/RESET pushbutton for EDG B. o KJ HS-108A

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 81 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 2 of 13)
AUTOMATIC SIGNAL VERIFICATION

F2. Verify Feedwater Isolation:

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
a. Main feedwater pumps - TRIPPED o Annunciator 00-120A, MFP A TRIP - LIT o Annunciator 00-123A, MFP B TRIP - LIT	a. Manually trip Main Feedwater Pumps. o <u>IF</u> MFWP A is <u>NOT</u> tripped, <u>THEN</u> depress the following: o FC HS-18A For MFWP A o FC HS-18B For MFWP A o <u>IF</u> MFWP B is <u>NOT</u> tripped, <u>THEN</u> depress the following: o FC HS-118A For MFWP B o FC HS-118B For MFWP B
b. Main feedwater reg valves - CLOSED o AE ZL-510 for S/G A o AE ZL-520 for S/G B o AE ZL-530 for S/G C o AE ZL-540 for S/G D	b. Manually close valves. * AE FK-510 for S/G A * AE FK-520 for S/G B * AE FK-530 for S/G C * AE FK-540 for S/G D
c. Main feedwater reg bypass valves - CLOSED o AE ZL-550 for S/G A o AE ZL-560 for S/G B o AE ZL-570 for S/G C o AE ZL-580 for S/G D	c. Manually close valves. * AE LK-550 for S/G A * AE LK-560 for S/G B * AE LK-570 for S/G C * AE LK-580 for S/G D
d. Main feedwater isolation valves - CLOSED o AE HIS-39 for S/G A o AE HIS-40 for S/G B o AE HIS-41 for S/G C o AE HIS-42 for S/G D	d. Perform the following: 1) Manually close valves. 2) <u>IF</u> valves can <u>NOT</u> be closed, <u>THEN</u> at SA075A <u>OR</u> SA075B, disconnect the following cards (2 cards total) in the MFIV sub-racks: o ALS-411-1 o ALS-411-2

(Step F2. continued on next page)

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 83 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 3 of 13)
AUTOMATIC SIGNAL VERIFICATION

Step F2. (continued from previous page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
e. Main feedwater chemical injection valves - CLOSED o AE HIS-43 for S/G A o AE HIS-44 for S/G B o AE HIS-45 for S/G C o AE HIS-46 for S/G D	e. Perform the following: 1) Manually close valve. 2) IF valve can NOT be closed, THEN locally isolate affected feedline. * AE-V129 for S/G A (STEAM ENCLOSURE ROOM SOUTH OF MFIV) * AE-V128 for S/G B (STEAM ENCLOSURE ROOM SOUTH OF MFIV) * AE-V131 for S/G C (STEAM ENCLOSURE ROOM SOUTH OF MFIV) * AE-V130 for S/G D (STEAM ENCLOSURE ROOM SOUTH OF MFIV)
f. Check ESFAS status panel SGBSIS section - ALL WHITE LIGHTS LIT o Red train o Yellow train	f. IF any SGBSIS valve NOT closed, THEN manually close valve. IF valve(s) can NOT be closed, THEN manually or locally isolate affected blowdown or sample line. Refer to ATTACHMENT A, VALVES CLOSED BY S/G BLOWDOWN AND SAMPLE ISOLATION SIGNAL.

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 85 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 4 of 13)
AUTOMATIC SIGNAL VERIFICATION

F3. Verify Containment Isolation Phase A:

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	a. Check ESFAS status panel CISA section - ALL WHITE LIGHTS LIT o Red train o Yellow train	a. Perform the following: 1) IF containment isolation phase A has NOT actuated, THEN manually actuate containment isolation phase A. o SB HS-47 o SB HS-48 2) IF any CISA valve NOT closed, THEN manually close valve. IF valve(s) can NOT be closed, THEN manually or locally isolate affected containment penetration. Refer to ATTACHMENT B, VALVES CLOSED BY CONTAINMENT ISOLATION SIGNAL PHASE A.

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 87 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 5 of 13)
AUTOMATIC SIGNAL VERIFICATION

F4.	**Verify AFW Pumps Running:**	
	a. Check motor driven AFW pumps - BOTH RUNNING	a. Manually start pumps. o AL HIS-22A o AL HIS-23A
	b. Check turbine driven AFW pump - RUNNING	b. Perform the following: 1) Check if turbine driven AFW pump should be running: * At least 2/4 S/G narrow range level channels on 2/4 S/Gs - LESS THAN 23.5% OR * Loss of NB01 voltage has occurred OR * Loss of NB02 voltage has occurred OR * AMSAC actuation 2) IF turbine driven AFW pump should be running, THEN manually open steam supply valves: a) AB HIS-5A b) AB HIS-6A c) FC HIS-312A

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 89 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 6 of 13)
AUTOMATIC SIGNAL VERIFICATION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
F5.	**Verify ECCS Pumps Running:**	
	a. Check CCPs - BOTH RUNNING	a. Manually start pumps. o BG HIS-1A o BG HIS-2A
	b. Check SI pumps - BOTH RUNNING	b. Manually start pumps. o EM HIS-4 o EM HIS-5
	c. Check RHR pumps - BOTH RUNNING	c. Manually start pumps. o EJ HIS-1 o EJ HIS-2
F6.	**Verify CCW Alignment:**	
	a. Check CCW pumps - ONE RUNNING IN EACH TRAIN	a. Manually start CCW pumps as necessary to establish one running in each train. o EG HIS-21 or EG HIS-23 for red train o EG HIS-22 or EG HIS-24 for yellow train
	b. Check one pair of CCW service loop Supply And Return Valves for an operating CCW pump - OPEN * EG ZL-15 AND EG ZL-53 <u>OR</u> * EG ZL-16 AND EG ZL-54	b. Manually align valves as necessary to establish CCW flow to service loop and containment.
F7.	**Check ESW Pumps - BOTH RUNNING**	Manually start pumps. o EF HIS-55A o EF HIS-56A

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 91 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 7 of 13)
AUTOMATIC SIGNAL VERIFICATION

F8.	**Check Containment Fan Coolers - RUNNING IN SLOW SPEED**	Perform the following for each Containment Cooler Fan that is still running in Fast or is not running: a. Manually stop ANY Containment Cooler Fans running in fast. * GN HIS-5 For Cooler 1A * GN HIS-9 For Cooler 1B * GN HIS-13 For Cooler 1C * GN HIS-17 For Cooler 1D b. Place Containment Cooler Fan Speed Selector switches in Slow. * GN HS-5 for cooler 1A * GN HS-9 for cooler 1B * GN HS-13 for cooler 1C * GN HS-17 for cooler 1D c. Manually start containment cooler fans. * GN HIS-5 for cooler 1A * GN HIS-9 for cooler 1B * GN HIS-13 for cooler 1C * GN HIS-17 for cooler 1D

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 93 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 8 of 13)
AUTOMATIC SIGNAL VERIFICATION

F9. Verify Containment Purge Isolation:

a. Check ESFAS status panel CPIS section - ALL WHITE LIGHTS LIT

- o Red train
- o Yellow train

RESPONSE NOT OBTAINED:

a. Perform the following:

1) IF containment purge isolation has NOT actuated, THEN manually actuate containment purge isolation.

- o SA HS-11
- o SA HS-15

2) IF any CPIS component NOT properly aligned, THEN manually align component.

3) IF component(s) can NOT be manually aligned, THEN locally isolate instrument air to affected containment penetration. Refer to ATTACHMENT C, VALVES CLOSED BY CONTAINMENT PURGE ISOLATION SIGNAL.

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 95 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 9 of 13)
AUTOMATIC SIGNAL VERIFICATION

F10. Verify Both Trains Of Control Room Ventilation Isolation:

a. Check ESFAS status panel CRVIS section - ALL WHITE LIGHTS LIT

- o Red train
- o Yellow train

RESPONSE NOT OBTAINED:

a. Perform the following:

1) IF control room ventilation isolation has NOT actuated, THEN manually actuate control room ventilation isolation.

- o SA HS-9
- o SA HS-13

2) IF any CRVIS component NOT properly aligned, THEN manually align associated component.

3) IF neither train of CRVIS is in service, THEN establish one in service train of CRVIS using SYS GK-122, MANUAL CRVIS LINE-UP.

4) IF only one train of CRVIS can be placed in service, THEN within 90 minutes (76.5 minutes control room and 13.5 minutes local operator), isolate out of service train using SYS GK-122, MANUAL CRVIS LINE-UP.

b. Ensure Control Room outer door - CLOSED

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 97 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 10 of 13)
AUTOMATIC SIGNAL VERIFICATION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
F11.	**Verify Main Steamline Isolation Not Required:** a. Check containment pressure - HAS REMAINED LESS THAN 17 PSIG o GN PR-934 b. Check either condition below - SATISFIED: * Low steamline pressure SI - NOT BLOCKED <u>AND</u> steamline pressure - HAS REMAINED GREATER THAN 615 PSIG <u>OR</u> * Low steamline pressure SI - BLOCKED <u>AND</u> steamline pressure rate - HAS REMAINED LESS THAN 100 PSI/50 SEC	Verify steamline isolation: 1. If any main steamline isolation valve is <u>NOT</u> closed, <u>THEN</u> perform the following: a) Close main steamline isolation valves. * AB HS-79 * AB HS-80 b) <u>IF</u> any MSIV is still <u>NOT</u> closed, <u>THEN</u> at SA075A <u>OR</u> SA075B, disconnect the following cards (2 cards total) in the MSIV sub-rack: o ALS-411-1 o ALS-411-2 2. Check ESFAS status panel SLIS section - ALL WHITE LIGHTS LIT o Red Train o Yellow Train 3. <u>IF</u> any SLIS valve <u>NOT</u> closed, <u>THEN</u> manually close valve. <u>IF</u> valve(s) can <u>NOT</u> be closed, <u>THEN</u> manually or locally isolate affected steamline. Refer to ATTACHMENT D, VALVES CLOSED BY STEAMLINE ISOLATION SIGNAL.

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 99 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 11 of 13)
AUTOMATIC SIGNAL VERIFICATION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
F12.	**Verify Containment Spray Not Required:** a. Containment pressure - HAS REMAINED LESS THAN 27 PSIG: o Annunciator 00-059A, CSAS - NOT LIT o Annunciator 00-059B, CISB - NOT LIT o GN PR-934	Perform the following: 1. Stop all RCPs. 2. IF containment spray has NOT actuated, THEN manually actuate containment spray. o SB HS-43 AND SB HS-45 o SB HS-44 AND SB HS-46 3. Check ESFAS status panel CSAS section - ALL WHITE LIGHTS LIT o Red train o Yellow train 4. IF any CSAS component NOT properly aligned, THEN manually align associated component. 5. Check ESFAS status panel CISB section - ALL WHITE LIGHTS LIT o Red train o Yellow train 6. IF any CISB valve NOT closed, THEN manually close valve. IF valve(s) can NOT be closed, THEN manually or locally isolate affected containment penetration. Refer to ATTACHMENT E, VALVES CLOSED BY CONTAINMENT ISOLATION SIGNAL PHASE B.

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 101 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 12 of 13)
AUTOMATIC SIGNAL VERIFICATION

F13. Verify ECCS Flow:

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	a. Check Centrifugal Charging Pumps To Boron Injection Tank Flow meters - FLOW INDICATED o EM FI-917A o EM FI-917B	a. Perform the following: 1) IF BIT valves have NOT been closed by operator action, THEN manually start pumps and align valves. 2) IF BIT valves are closed by operator action, THEN go to Step F14.
	b. Check RCS pressure - LESS THAN 1725 PSIG	b. Go to Step F14.
	c. Check SI Pump Discharge Flow meters - FLOW INDICATED o EM FI-918 o EM FI-922	c. Manually start pumps and align valves.
	d. Check RCS pressure - LESS THAN 325 PSIG	d. Go to Step F14.
	e. Check RHR To Accumulator Injection Loop Flow meters - FLOW INDICATED o EJ FI-618 o EJ FI-619	e. Manually start pumps and align valves.
F14.	**Verify AFW Valves - PROPERLY ALIGNED:** a. Check ESFAS status panel AFAS section - ALL WHITE LIGHTS LIT b. Check white train ESFAS status panel AFAS section - ALL WHITE LIGHTS LIT	IF any AFAS section component NOT properly aligned, THEN manually align associated component to establish desired AFAS lineup.

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 103 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 13 of 13)
AUTOMATIC SIGNAL VERIFICATION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
F15.	**Verify SI Valves - PROPERLY ALIGNED:**	IF any SIS section component NOT properly aligned, THEN manually align associated component to establish proper SIS lineup.
	a. Check ESFAS status panel SIS section - SYSTEM LEVEL WHITE LIGHTS ALL LIT o Red train o Yellow train	
F16.	**Check If NCP Should Be Stopped:**	
	a. CCPs - ANY RUNNING	a. Go to Step F17
	b. Stop NCP o BG HIS-3	
F17.	**Return To Procedure And Step In Effect**	

-END-

Facility: Wolf Creek Scenario No.: 4 Op-Test No.: December 2019

Examiners: ______________________ Operators: ______________________

Initial Conditions: 100% Power, MOL, Red Train In Service, Letdown is at 120 gpm, 'B' MD AFW Pump is out of service.

Turnover: The unit is operating at 100% power, MOL, Red Train is in Service, 'B' MD AFW Pump was taken out of service 12 hours ago; LCO 3.7.5, Condition B is entered.

Critical Tasks: **CT-1** Manually Start 'B' ESW Pump prior to loaded 'B' EDG Tripping on high Jacket Water Temperature **CT-2** Remove heat input from the RCS per EMG FR-H1 by stopping RCPs and securing PZR heaters. **CT-3** Restore Secondary Heat Sink using NS AFW Pump prior to being required to commence primary bleed and feed.

Event No.	Malf. No.	Event Type*	Event Description
1		I (ATC/CRS) Tech Specs	BB LI-459, Upper Selected PZR Level Channel fails HIGH. OFN SB-008, ATT J LCO 3.3.1, Functions 9, CONDs A, M
2		I (BOP/CRS)	AB FT-543, 'D' S/G Steam Flow Instrument fails LOW OFN SB-008, ATT A
3		C (ALL) Tech Specs	XNB02 Failure which results in AC Emergency Bus NB02 UV. ALR 00-022E, ALR 00-021C, OFN NB-030 LCO 3.8.1, COND A
4		C (ATC/CRS)	'B' ESW Pump fails to Auto Start on S/D Sequencer ALR 00-021C, Step 6
5		M (All)	Loss of Off Site Power EMG E-0, EMG ES-02
6		C (ATC/CRS)	Four Control Rods fail to fully insert. EMG E-0, Step 1, EMG ES-02, Step 12.
7		C (None)	TDAFW Pump fails to restart in both Auto and Manual
8		C (BOP/CRS)	Blowdown Containment Isolation valves fail to close (BM01/2/3/4) EMG FR-H1, Step 3a
9		C (All)	'A' MD AFW Pump Trips on Overcurrent EMG FR-H1, SYS AP-122

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

Target Quantitative Attributes per Scenario (See Section D.5.d)	Actual Attributes	ES-301-5	CRS	ATC	BOP
1. Malfunctions after EOP entry (1–2)	3	Rx			
2. Abnormal events (2–4)	4	Nor			
3. Major transients (1–2)	1	I/C			
4. EOPs entered/requiring substantive actions (1–2)	2	Maj			
5. Entry into a contingency EOP with substantive actions (≥ 1 per scenario set)	1	TS			
6. Preidentified critical tasks (≥ 2)	3				

Critical Task	Safety Significance	Cueing	Measurable Performance Indicators	Performance Feedback
CT1: Manually start 'B' ESW pump before loaded 'B' EDG trips on High Jacket Water Temperature at 195°F.	The onsite standby power system includes the Class 1E ac and dc power for equipment used to maintain a cold shutdown of the plant and to mitigate the consequences of a DBA. Not starting the ESW pumps in a timely manner could result in the loss of the EDG.	With the EDG running loaded: Green light lit on handswitch * EF HIS-56A No indicated ESW flow on * EF FI-54 No indicated ESW pressure on *EF PI-2	On Panel RL019, Manipulation of EF HIS-56A to Run Position.	Red light lit on handswitch * EF HIS-56A Indicated ESW flow on * EF FI-54 Indicated ESW pressure on *EF PI-2
CT2: Commence Emergency Boration due to more than one control rod stuck out before Positive IR SUR develops causing the crew to transition to EMG FR-S1 on an ORANGE path challenge to subcriticality CSF.	The shutdown reactivity margin must be made up through emergency boration to account for the reactivity worth of the stuck rods. Failure to emergency borate could cause an unnecessary challenge to Subcriticality CSF.	When Bus NB01 is reenergized power to DRPI panel is restored - Rods F8, B6, K10 and M4 are not on bottom.	On Panel RL001, manipulates control as necessary to start at least one BAT Pump: * BG HIS-5A OR * BG HIS-6A AND Open * BG HIS-8104	Red lights lit for operated components: BG HIS-5A BG HIS-6A BG HIS-8104 Indicated Flow >30 gpm on BG FI-121
CT3: Restore AFW Flow >270,000 lbm/hr using NSAFW Pump per EMG FR-H1 before 3 of 4 S/G levels degrade to <12% [28%] WR level.	Establishing at least 270,000 lbm/hr feedwater flow rate to the S/Gs before RCS bleed and feed is initiated restores secondary heat sink and ensures the core will remain covered and adequately cooled. An otherwise preventable Feed and Bleed causes CTMT contamination and equipment damage due to rupturing PRT disk.	No Operating AFW Pumps Indicated flow at 0 lbm/hr on: *AL FI-2A *AL FI-3A *AL FI-4A *AL FI-1A	On panel RL005, Manipulation of AFW REG VLV CTRL *AL HK-8A *AL HK-10A *AL HK-12A *AL HK-6A	On panel RL005, Combined Indicated AFW TO SG FLOW >270,000 lbm/hr *AL FI 2A *AL FI-3A *AL FI-4A *AL FI-1A

Note: Causing an unnecessary plant trip or ESF actuation may constitute a Critical Task failure. Actions taken by the applicant(s) will be validated using the methodology for critical tasks in Appendix D to NUREG-1021.

SCENARIO # 4 NARRATIVE

Turnover: The Unit is operating at 100% power. Red Train is in service. 'B' MD AFW Pump was removed from service 12 hours ago for emergent work. LCO 3.7.5, Condition B is entered.

Event 1: BB LI-459, Upper Selected PZR Level Channel fails HIGH. Annunciator 032A will actuate for high PZR Level and charging flow will lower, causing actual PZR level to lower. The crew will address using OFN SB-008, ATTACHMENT J to remove the failed channel from service and restoring automatic control. Once the CRS has determined applicable Technical Specifications, the next event will start as directed by the Lead Examiner.

Event 2: AB FT-543, 'D' S/G Steam Flow instrument fails LOW. MCB Annunciator 111C will actuate due to feed/steam flow mismatch. The BOP will take manual control of AE FK-540, 'D' FRV to match steam and feed flows as a Memory Action Step. The crew will address the instrument failure using OFN SB-008, ATT A. Once AE FK-540 is restored to Automatic, the next event will start at the direction of the Lead Examiner.

Event 3: NB02 Bus Degraded Voltage leading to power interruption and S/D Sequencer Actuation. NB02 bus voltage drops to 3755v due to a fault on XNB02 transformer. Annunciator 022E will alarm once voltage is <3760v for 25 seconds. The crew will reference ALR 00-022E and in 94 seconds, the normal feeder breaker will trip open as designed. 'B' EDG will start and load. The crew will address the interruption of power to NB02 per ALR 00-21C and OFN NB-030, ATT B, including reducing turbine loading to maintain reactor power ≤99% due to AFAS-T Actuation. Once the crew has stabilized plant conditions, determined applicable Technical Specifications, and secured the TDAFW Pump, the major event will start at the direction of the Lead Examiner.

Event 4: 'B' ESW Pump fails to Auto Start on the S/D Sequencer. While responding to momentary loss of NB02, the ATC will note the failure of the 'B' ESW pump to auto start and manually start the pump within ~3 minutes of the EDG starting and loading to prevent the EDG from tripping on high temperature.
CT1: Manually start 'B' ESW pump before loaded 'B' EDG trips on High Jacket Water Temperature at 195°F.

Event 5: Offsite Power is Lost. The reactor will trip and the crew will perform EMG E-0 immediate actions and transition to EMG ES-02. The next four post-trip events will also be addressed by the Crew.

Event 6: Four Control Rods fail to fully insert. The ATC, while performing EMG E-0 Immediate Actions will note the four control rods not fully inserted and manually trip the Reactor per Step 1 RNO using SB HS-1. EMG ES-02, Step 12 directs the crew to Emergency Borate per OFN BG-009 for this condition.
CT 2: Commence Emergency Boration due to more than one control rod stuck out before Positive IR SUR develops causing the crew to transition to EMG FR-S1 on an ORANGE path challenge to subcriticality CSF

Event 7: TD AFW Pump fails to start in both Auto and Manual. The BOP will identify the TD AFW Pump failed to auto start. Any attempts to start manually will be unsuccessful.

Event 8: SGBSIS fails to actuate in Auto. Steam Generator Blowdown Containment Isolation Valves fail to close on S/G LoLo level immediately following the reactor trip. The crew may or may not notice the failure since there is no SIS. The crew will exit EMG E-0 without performing Attachment F, which would have prompted the crew to verify SGBSIS actuation. Both EMG ES-02, Step 1 RNO and EMG FR-H1, Step 3a directs the crew to manually close the four valves that failed to Auto Close. While not specifically a critical task, failure to manually close these valves will contribute to S/G dry-out conditions, requiring the crew to bleed and feed when WR S/G levels degrade to <12% [28%].

Event 9: ‘A’ MD AFW Pump trips on overcurrent: After the crew has commenced Emergency Boration as required per EMG ES-02, Step 12, and/or at the direction of the Lead Examiner, the ‘A’ MDAFW Pump will trip on overcurrent causing the crew to transition to EMG FR-H1.

The crew will be successful restoring aux feed water flow using the NS AFW Pump per SYS AP-122, NON-SAFETY AUX FEED PUMP OPERATION.
CT3: Restore AFW Flow >270,000 lbm/hr using NSAFW Pump per EMG FR-H1 before S/G levels degrade to 12% [28%] WR level.

The scenario is complete when the crew has restored the Secondary Heat Sink per EMG FR-H1, Step 8 and/or at the discretion of the Lead Examiner.

SIMULATOR SCENARIO FILES

;2019 ILO NRC Exam, Scenario 4 (IC 304)

;Initial Conditions – IC29, 100% Red Train in Service, ‘B’ MDAFW Pump OOS. (LCO 3.7.5 COND B)
scn SimGroup\Tag B MDAFW

;Event 1 – Key 1 – BB LI-459, Upper Selected PZR Level Channel fails HIGH (ATC/CRS, Tech Specs)
ICM trBBLT0459 t:3 f:468.2 r:30 k:1

;Event 2 – Key 2 – AB FT-543, D S/G Steam Flow fails LOW (BOP/CRS)
ICM trABFT0543.cmf t:3 k:2 r:30 f:0

;**Event 3 – Key 3** – Degraded Bus Voltage on NB02 (XNB02 Failure) (Reactivity/CRS–TS)
IMF mNB05B k:3 i:4158.69 f:3755
{bkNB00209.state=0} DMF mNB05B

;**Event 4** – ‘B’ ESW Pump fails to autostart (ATC - CT)
IMF mEF05B

;Event 5 – Key 5 – Loss Of Offsite Power (Major)
IMF mSY01 K:5

;Event 6 – Control Rods F14, P8, K8, and H8 fail to fully insert on Reactor Trip. (ATC)
{Key[5]} IMF mSF12F14 f:MECH
{Key[5]} IMF mSF12P8 f:MECH
{Key[5]} IMF mSF12H8 f:MECH
{Key[5]} IMF mSF12K8 f:MECH

;Event 7 – TDAFW Pump fails to Restart on Loss of Power, both Auto and Manual (Scenario)
{Key[5]} IMF mAL01
{Key[5]} IMF mAL02

;Event 8 – SGBSIS Fails to Actuate (BOP – Not CT)
IMF mSA27BM01
IMF mSA27BM02
IMF mSA27BM03
IMF mSA27BM04

;Event 9 – Key 9 - ‘A’ MDAFW Pump Trips on overcurrent (Scenario)
ICM bkrDPAL01A t:1 k:9

;Local Action – **Key 10** – to start NS AFW Pump per SYS AF-122
{Key[10]} scn SimGroup\Start PAP01-SBO DGs Standby

;End

Booth Instructions

Ensure NRC Exam Security Established per AIF 30B-015-09, and AIF 30B-015-18

Ensure the following procedures are available, free of markings and are the most recent revision in Curator (9/25/19):

- **SYS AP-122, NON-SAFETY AUX FEED PUMP OPERATION (Rev 13)**
- **SYS AL-120, MOTOR DRIVEN OR TURBINE DRIVEN AFW PUMP OPERATIONS (Rev 55)**
- **ALR 00-021C, NF039B S/D SEQ ACTUATED (Rev 17)**
- **ALR 00-022E, NB02 BUS DGRD VOLT (Rev 7)**
- **ALR 00-111C, SG D FLOW MISMATCH (Rev 10A)**
- **OFN BG-009, EMERGENCY BORATION (Rev 27)**
- **OFN SB-008, INSTRUMENT MALFUNCTIONS (Rev 48)**
- **OFN SB-008, ATTACHMENT A, STEAM FLOW CHANNEL MALFUNCTION**
- **OFN SB-008, ATTACHMENT J, PZR LEVEL MALFUNCTION**
- **OFN NB-030, LOSS OF AC EMERGENCY BUS NB01 (NB02) (Rev 38)**
- **EMG E-0, REACTOR TRIP OR SAFETY INJECTION (Rev 40)**
- **EMG ES-02, REACTOR TRIP RESPONSE (Rev 38)**
- **EMG FR-H1, RESPONSE TO LOSS OF SECONDARY HEAT SINK (Rev 35)**

NOTE: All events are loaded into snap **IC304**

Ensure malfunctions, including severity levels match scenario.

Ensure all meters, lamps, bistables and annunciators are correct for the initial setup. **Blue Placard is on the 'B' CCP. 'B' MDAFW Pump handswitch, AL HIS-22A, in PTL with Caution Tag affixed.**

Ensure soft panel display in back is set to RP312 RCP Vibration on left screen and AMSAC on right screen.

Ensure no discernable history from RM11, Ovation screens, paper trend recorders, etc.
Ensure all laminated brief sheets, foldout pages, E plan boards are wiped clean.

Ensure all follow-up buttons are removed from the boards and trash cans and recycle bins are free of any potential exam material.

Ensure communications are established with the lead examiner, fresh batteries, radio check sat.

Critical Parameter Data to be collected:

- **IR SUR (SE NI-35D, 36D)** The crew must commence Emergency Boration per EMG ES-02, Step 12 prior to being required to transition to EMG FR-S1 on an ORANGE path due to positive SUR.
- **S/G WR Levels.** The crew must remove heat input to the RCS and restore secondary heat sink prior to WR S/G levels degrading to 12% [28%].
- The crew must also manually start 'B' ESW Pump prior to loaded 'B' EDG tripping on high temperature.

Ensure Horns are ON and machine is in RUN

- **Insert Key 1** for Event 1 (BB LI-459, Upper Selected PZR Level Channel fails HIGH).
- **Insert Key 2** for Event 2 (AB FT-543, 'D' S/G Steam Flow Instrument fails LOW).
- **Insert Key 3** for Events 3 and 4 (NB02 bus UV due to XNB02 failure, and failure of 'B' ESW Pump to auto start)
- **Insert Key 5** for First Major Event (LOOP, four control rods fail to fully insert, TDAFW Pump fails to re-start, and Blowdown Isolation Fails to Auto Actuate)
- **Insert Key 9** for Second Major Event ('A' MD AFW pump trips on overcurrent)
- When directed to locally start NSAFW Pump, **Insert Key 10.**

Op-Test No.: Dec 2019 Scenario No.: 4	Event No.: 1	Total No Pages 25

Event Description: **BB LI-459, Upper selected PZR Level Channel fails HIGH**

Time	Position	Applicant's Actions or Behavior
Simulator Operator: **Insert Key 1** at direction of Lead Examiner. Diagnostics: BB LI-459A indicates 100%, Annunciators 32A alarms, BG FK-462 trends to 0% output, Charging flow trends down to minimum. Actual level lowers. Annunciators: 032A, 042A, 083C		
Examiner Note: Crew may decide to energize PZR heaters and adjust Master Pressure Controller output to crack open the spray valves for precise RCS pressure control		
	CREW	Recognizes alarms and PZR level trends, diagnosis failure of Pressurizer Level instrument, enters ALR
	CRS	Reviews ALR or enters OFN SB-008 directly
ALR 00-032A, PZR LEV HI		
	ATC	1. Check PZR Level >70% o BB LI-459A **- Yes**
	ATC	2. Check for Instrument Failure: a. Check PZR Level Channels – WITHIN 6% OF EACH OTHER **–** ***No*** RNO Perform the following: 1. IF failed pressurizer level channel is selected on PZR LEV CTRL SEL switch, THEN select alternative level channel. o BB LS-459D – **L461 over L460 position** 2. Go to OFN SB-008, INSTRUMENT MALFUNCTIONS, Step 1
OFN SB-008, INSTRUMENT MALFUNCTIONS		
	BOP	1. Check for Malfunction: * Check if Reactor Coolant System Instrument Channel Or Controller is Malfunctioning: a. Perform appropriate attachment for malfunctioning channel or controller from table Below: PZR Level (BB) | L-459, L-460, L-461 | ATTACHMENT J

Op-Test No.: Dec 2019	Scenario No.: 4	Event No.: 1	Total No Pages 25

Event Description: **BB LI-459, Upper selected PZR Level Channel fails HIGH**

Time	Position	Applicant's Actions or Behavior
		ATTACHMENT J, PZR LEVEL CHANNEL MALFUNCTION
	ATC	J1. Identify Failed Instrument Channel: a. Compare PZR Level indications to confirm a pressurizer level channel failure: ○ BB LI-459A **– *Yes*** ○ BB LI-456A ○ BB LI-461
	ATC	J2. Ensure Alternate Pressurizer Level Channel On PZR LEV CTRL SEL Switch is Selected. ○ BB LS-459D
	ATC	J3. Check Failed Pressurizer Level Channel Failed LOW **– *No*** RNO Go to step J8
	ATC	J8. Monitor Pressurizer Level Response To Ensure Proper Control
	ATC	J9. ENSURE Failed PZR Level Channel – NOT USED FOR RECORDER. **– *No*** RNO select alternate pressurizer level channel as input to recorder
	CRS	J10. Monitor the Following Technical Specification LCOs And Comply With Action Statements, As Appropriate: ○ LCO 3.3.1, Function 9 ○ LCO 3.3.4, Function 12 **– *Minimum met*** ○ LCO 3.3.3, Function 11 **– *Minimum met*** **Enters LCO 3.3.1, Function 9, Cond A – Immediate and M – 72 hrs**

NOTES

- When the last bistable for the affected instrument is tripped, the output to that control board indication will drop to zero.
- If time permits prior to tripping bistables, I&C should troubleshoot and obtain as found information including a determination of which SPS train is affected. M-767-00319, Tables 6-3 and 6-4 may be used to aid I&C in SSPS train determination
- Avoid introduction of 2/3 high pressurizer level signals, which can initiate a Rx Trip.

Op-Test No.: Dec 2019	Scenario No.: 4	Event No.: 1	Total No Pages 25

Event Description: **BB LI-459, Upper selected PZR Level Channel fails HIGH**

Time	Position	Applicant's Actions or Behavior
	BOP	J11. Place Appropriate Reactor Trip / Safeguards Bistables for Failed Level Channel in TRIPPED mode:

FAILED CHANNEL	BISTABLE	TEST SWITCH	PROTECTION SET CABINET	FRAME	CARD	SWITCH
L-459	LB-459A	LS-459A	1	08	47	BS1
L-460	LB-460A	LS-460A	2	08	47	BS1
L-461	LB-461A	LS-461A	3	08	44	BS1

Examiner Note: Bistables will NOT be tripped.

Simulator Operator: IF contacted as WWM, acknowledge requests. IF contacted as Call Supt., acknowledge status.

Time	Position	Applicant's Actions or Behavior
	CRS	J12. Request I&C to repair failed channel.
	CRS	J13. Review Attachment S For Post Accident And Remote Shutdown Instrumentation Requirements
	ATC	J14. Check Pressurizer Level Master Controller – IN AUTO ○ BB LK-459
	CRS	J15. Return to Procedure and Step in Effect.

Event termination: After the crew has returned PZR level control to Auto and identified applicable Tech Specs and/or at the direction of the Lead Examiner

Simulator Operator: **Insert Key 2** at direction of the Lead Examiner.

Op Test No.: Dec 2019	Scenario No.: 4	Event No.: 2	Total No Pages 25

Event Description: **AB FT-543, 'D' S/G Steam Flow Instrument fails LOW**

Time	Position	Applicant's Actions or Behavior
Simulator Operator: **Insert Key 2** at the lead examiners direction Diagnostics: 'D' S/G FWRV will start closing, Level in D S/G lowers Annunciators: 111C & 111B		
	CREW	Recognizes alarm and 'D' S/G level and FRV position changing, diagnoses problem with steam flow instrumentation
Examiner Note: Annunciator 111B, SG D LEV DEV, may also actuate depending on timeliness of crew responses. ALR 00-111B mitigating actions to take manual control of FWRV AE FK-540 and restore level to program are the same. Crew may take manual control of MFPs in order to stabilize initial feed flow		
	CRS	Enters and directs ALR 00-111D or OFN SB-008
ALR 00-111C SG D FLOW MISMATCH		
NOTE: Steps 1 through 3 are Memory Action Steps		
	BOP	1. Check Difference Between Steam Generator D Steam Flow and Feed Flow >0.7 MPPH ○ AE FI-541A For Feed Flow **– *Yes***
	BOP	2. Check For Instruments Operating Properly. ○ SG D Controlling Feedwater Flow Channel – WITHIN 0.2 MPPH OF OTHER CHANNEL **– *No*** RNO: Perform the Following: a. Place AE FK-540 in Manual. b. Adjust AE FK-540, as necessary, to establish S/G level at program. c. Go to OFN SB-008, INSTRUMENT MALFUNCTIONS, Step 1.
OFN SB-008, INSTRUMENT MALFUNCTIONS		
	CRS	1. Check for Malfunction: * Check if Secondary System Instrument Channel is Malfunctioning: a. Perform appropriate attachment for malfunctioning channel from table below:

Steam Flow (AB)	F-512, F-513, F-522 F-523, F-532, F-533 F-542, F-543	ATTACHMENT A

Op Test No.: Dec 2019	Scenario No.: 4	Event No.: 2	Total No Pages 25
Event Description:	**AB FT-543, 'D' S/G Steam Flow Instrument fails LOW**		

Time	Position	Applicant's Actions or Behavior
		ATTACHMENT A, STEAM FLOW CHANNEL MALFUNCTION
		CAUTION Steam flow is an input to the thermal power program. A failed steam flow channel could cause the thermal power program to be inaccurate.
		NOTES ○ The pressure compensation channel supplying the steam flow channel may be the reason for a failed steam flow indications. ○ Steps A1 through A3 are Memory Action Steps.
	BOP	A1. Identify Failed Steam Flow Channel: ○ Compare steam flow indications to confirm a steam flow channel failure ○ AB FI 543A
	BOP	A2. Check if Failed Steam Flow Channel Selected on SG STEAM FLOW CHANNEL SEL Switch: ○ AB FS-542C **– *Yes***
		NOTE A slight step change on the Feedwater Reg Valve controllers output, could occur during the transfer between auto and manual
	BOP	A3. Check Main Feed Reg Valves in Control: a. Place Affected SG MFW REG VLV CTRL – IN MANUAL *AE FK-540 b. Adjust affected S/G MFW REG VLV CTRL, as necessary, to establish Steam Generator level at program: *AE FK-540
	BOP	A4. Select Alternate Steam Flow Channel on SG STEAM FLOW CHANNEL SEL Switch: *AB FS-542C

Op Test No.: Dec 2019 Scenario No.: 4 Event No.: 2 Total No Pages 25

Event Description: **AB FT-543, 'D' S/G Steam Flow Instrument fails LOW**

	BOP	A5. Check S/G Pressure Channels – OPERATION NORMAL **– *Yes***
Simulator Operator: IF contacted as WWM, acknowledge requests. IF contacted as Call Supt., acknowledge status.		
	CRS	A6. Request I&C To Repair Failed Channel.
	BOP	A7. Check Steam Flow Channel Failure – REPAIRED OR ALTERNATE CHANNEL SELECTED **– *Yes***
	BOP	A8. Restore affected S/G MFW REG VLV CTRL To – AUTO
	CRS	A9. Return to Procedure and Step In Effect.

Event Termination: After the crew has returned AE FK-540 to Auto and/or at the direction of the Lead Examiner

Simulator Operator: **Insert Key 3** at direction of the Lead Examiner

Op-Test No.: Dec 2019 Scenario No.: 4 Event No.: 3/4 Total No Pages 25

Event Description: **AC EMERGENCY BUS NB02 UV due to XNB02 failure**

Time	Position	Applicant's Actions or Behavior
Simulator Operator: **Insert Key 3** at direction of Lead Examiner. Diagnostics: Multiple annunciators. 94 Seconds after alarm Bus NB02 normal feeder trips, TDAFW pump starts. EDG 'B' starts, reenergized bus NB02 **Examiner Note:** The voltage has to be low for 25 seconds before annunciator alarms. Annunciators: 022E & 021C		
	CRS	Enters and directs ALR 00-022E
ALR 00-022E, NB02 BUS DGRD VOLT		
NOTE If NB02 bus voltage is NOT restored to greater than the Degraded Voltage Relay (DVR) reset value of 3825.15 volts within 94 seconds of receipt of this annunciator, the normal and alternate supply breakers will trip.		
	ATC	1. Check Bus NB02 Voltage - Less Than 3760 Volts. o NB EI-2 ***- Yes***
	ATC	2. Check Switchyard Voltage: a. Check BKR SEL Switch – NOT IN OFF ***- Yes*** o MA HS-2 b. Check SWITCHYARD VOLT NORMAL ***- Yes*** o MA EI-9
	ATC	3. Check Bus NB02 – ENERGIZED FROM NORMAL POWER SOURCE **- Yes**: o NB02 NORM SPLY BKR NB0209 - CLOSED o NB HIS-4 o NB02 ALT SPLY BKR NB0212 - OPEN o NB HIS-5 o NB02 EMERG SPLY BKR NB0211 – OPEN o NE HIS-26
	ATC	4. Reduce Load From Startup Transformer As Directed by SM or CRS to Restore NB02 Voltage to normal.
Examiner Note: The normal feeder breaker opens 94 seconds after the alarm, NB02 will deenergize and B EDG will start but NOT reenergize bus NB02 because NB02 Bus will be locked out		

Op-Test No.: Dec 2019 Scenario No.: 4 Event No.: 3/4 Total No Pages 25

Event Description: **AC EMERGENCY BUS NB02 UV due to XNB02 failure**

Time	Position	Applicant's Actions or Behavior
		ALR 00-021C, NB039B S/D SEQ ACTUATED
	ATC	1. Check Reactor – CRITICAL PRIOR TO S/D SEQUENCER ACTUATION **–** ***Yes***
	ATC	2. Check if Reactor – TRIPPED ***– No*** ○ Rod Bottom Lights – LIT ○ Reactor Trip and Bypass Breakers – OPEN RNO Go to step 4
	BOP	4. Check reactor Power – LESS THAN or EQUAL to 99% - No **RNO** Perform the following: a. Ensure reactor power less than or equal to 99% ****BOP will perform "Fast load decrease" of 30 MW as discussed during pre-shift brief***
		NOTE While train B shutdown sequencer is energized, automatic start signals for Component Cooling Water Pump B, Component Cooling water Pump D, Control Room A/C Unit B and Class IE Equipment A/C Unit B are blocked.

	ATC	5. Verify Shutdown Sequencer Actuation Signal – VALID - **Yes**
		○ Bus NB02 Normal Supply Breaker NB0209 OPEN
		  ○ NB HIS-4
		○ Bus NB02 Alternate Supply Breaker NB0212 OPEN
		  ○ NB HIS-5
		○ Bus NB02 Emergency Supply Breaker NB0211 – CLOSED
		  ○ NE HIS-26

Op-Test No.: Dec 2019 Scenario No.: 4 Event No.: 3/4 Total No Pages 25

Event Description: **AC EMERGENCY BUS NB02 UV due to XNB02 failure**

Time	Position	Applicant's Actions or Behavior
	BOP	6. Verify the following loads started: ○ CCP B ○ CCW Pump B or CCW Pump D ○ ESW Pump B **– *No*** RNO When shutdown sequencer has timed out (≥60 sec), THEN manually start loads with times as referenced in 2.3. **CT1**: Manually start 'B' ESW pump before loaded 'B' EDG trips on High Jacket Water Temperature at 195°F. ○ Control Room A/C Unit B ○ Class 1E Equipment A/C Unit B ○ Motor Driven AFW Pump B ○ Containment Cooling Fan B ○ Containment Cooling Fan D
	BOP	7. Establish Train A Essential Service Water a. Start ESW Pump A ○ EF HIS-55A b. Open ESW to Ultimate Heat Sink Valve ○ EF HIS-37 – OPEN c. Close ESW to Service Water Isolation Valves ○ EF HIS-39 – CLOSED ○ EF HIS-41 – CLOSED d. Close ESW service water cross connect valves. ○ EF HIS-23 – CLOSED ○ EF HIS-25 - CLOSED
	CRS	8. Refer to Technical Specifications 3.8.9 and 3.8.10 **Enters LCO 3.8.1, Cond A for loss of one off site circuit, 1 hour** **Examiner Note:** Tech Spec 3.8.9, Condition B, 8 hours and Tech Spec 3.7.5, Condition B, 72 hours should be referenced and would be logged as entered and exited. Once the EDG is supplying NB02 3.8.9 can be exited, once the TDAFWP is returned to standby 3.7.5 can be exited
Simulator Operator: IF contacted as WWM, acknowledge requests. IF contacted as Call Supt., acknowledge status.		
	CRS	9. Go To OFN NB-030, LOSS OF AC EMERGENCY BUS NB01 (NB01), Step 1.

Op-Test No.: Dec 2019 Scenario No.: 4 Event No.: 3/4 Total No Pages 25

Event Description: **AC EMERGENCY BUS NB02 UV due to XNB02 failure**

Time	Position	Applicant's Actions or Behavior
		OFN NB-030, LOSS OF AC EMERGENCY BUS NB01 (NB02)
	ATC	1. Check AC Emergency Buses – AT LEAST ONE ENERGIZED **– *Yes*** *NB01 Voltage – NORMAL OR *NB02 Voltage – NORMAL
	CRS	2. Determine Emergency Action Level, Using EPP 06-005, EMERGENCY CLASSIFICATION **- *None***
		NOTE "Affected" refers to an emergency bus that has experienced a loss of power or spurious Load Shedder/Sequencer actuation.
	CRS	3. Go To The Appropriate ATTACHMENT For The Affected Bus: * NB02 – ATTACHMENT B
		ATTACHMENT B, LOSS OF NB02
	ATC	B1. Check Reactor Power – LESS THAN OR EQUAL TO 99% - ***Yes***
	ATC	B2. Check Yellow Train AC Emergency Bus – DEENERGIZED **– *No*** RNO Perform the following: a. Ensure ESW Pump A Running o EF HIS-55A b. Ensure ESW Train A to Ultimate Heat Sink Valve OPEN o EF HIS-37 c. Go to Step B27
	ATC	B27. Check Reactor Power – LESS THAN OR EQUAL TO 99% **- *Yes***

Op-Test No.: Dec 2019	Scenario No.: 4	Event No.: 3/4	Total No Pages 25

Event Description: **AC EMERGENCY BUS NB02 UV due to XNB02 failure**

Time	Position	Applicant's Actions or Behavior
	BOP	B28. Ensure Yellow Train ESW Operation/Alignment: a. Ensure ESW PUMP 'B' – RUNNING o EF HIS-56A b. Ensure yellow train ESW valve alignment: 1) Ensure Yellow Train Service Water To ESW Cross-Connect Valves – CLOSED o EF HIS-25 o EF HIS-26 o EF HIS-39 o EF HIS-40 2) Ensure ESW Train B To Ultimate Heat Sink – OPEN o EF HIS-38 **CT1**: Manually start 'B' ESW pump before loaded 'B' EDG trips on High Jacket Water Temperature at 195°F.
	BOP	B29. Ensure CCW Alignment is Correct: a. Check Red Train- ALIGNED to Service Loop **– *No*** **RNO** Go to step B 29b.
	BOP	29.b. Ensure One Yellow Train CCW Pump is Running ○ EG HIS-22 For Pump B – *Yes* ○ EG HIS-24 For Pump D c. Ensure One Yellow Train CCW Pump is in Standby ○ EG HIS-22 For Pump B ○ EG HIS-24 For Pump D – *Yes* d. Check One Pair of CCW service Loop Supply and Return Valves For an Operating CCW Pump – OPEN * EG ZL-15 AND EG ZL-53 – *Yes* <u>OR</u> * EG ZL-16 AND EG ZL-54

<u>NOTE</u>

Local opening of EF HV-44, ESW B TO AIR COMPRESSOR (2000' AB NE) results in ESW Train B being inoperable. Local opening of the valve, on 2000' NORTH END AUX BLDG, will preclude it from automatically isolating on a high flow condition.

Op-Test No.: Dec 2019 Scenario No.: 4 Event No.: 3/4 Total No Pages 25

Event Description: **AC EMERGENCY BUS NB02 UV due to XNB02 failure**

Time	Position	Applicant's Actions or Behavior
	BOP	B30. Ensure Instrument Air Aligned to Yellow Train a. Ensure ESW TRN B TO AIR COMPRESSOR B – OPEN o EF HIS-44 **- Yes** b. Check AIR COMPRESSOR B BKR RESET Switch CLOSED o KA HIS-2C **– No** **RNO,** Reset and close switch c. Check INST AIR PRESS >105 psig o KA PI-40 **- Yes** d. Check ESW TRN B TO AIR COMPRESSOR B – NOT LOCALLY OPENED o EF HV-44 **- Yes**
	ATC	B31. Align Normal Charging and Letdown, using Attachment D, RESTORATION OF NORMAL CHARGINF AND LETDOWN ***– Still Aligned***
	BOP	B32. Verify Yellow Train Containment Fan Coolers – RUNNING IN SLOW SPEED - *Yes* o GN HIS-9 for Cooler B o GN HIS-17 for Cooler D
	BOP	B33. ENSURE Yellow Train A/C Units Running a. GK HIS-103, CLASS 1/E ELECT EQUIP A/C UNIT 5B ***- Yes*** b. GK HIS-40, CTRL ROM A/C UNIT 4B FAN & DAMPR ***- Yes*** c. Check Class 1E Recirculation Cooling NOT in-service due to Class 1/E ELEC EQUIP A/C UNIT 5A Being out of service prior to the NB02 Power Loss ***- Yes***
	BOP	B34. Ensure Yellow Train Hydrogen Mixing Fans Running in Selected Speed: **- Yes** o GN HIS-2 o GN HIS-4
	BOP	B35. Check TDAFW Pump – RUNNING **– Yes**

Op-Test No.: Dec 2019 Scenario No.: 4 Event No.: 3/4 Total No Pages 25

Event Description: **AC EMERGENCY BUS NB02 UV due to XNB02 failure**

Time	Position	Applicant's Actions or Behavior
	BOP	B36. Check if TDAFW Pump should be stopped: a. Check TD AFW Pump – NOT NEEDED FOR SECONDARY HEAT SINK b. Secure TDAFP, using SYS AL-120, MD or TD AFW PUMP OPERATIONS c. Reset ESF Panel SA066Z MODE SEL o SA HS-25

Simulator Operator: WHEN contacted as Building Watch, acknowledge request and report Tappet Nut is in correct position.

Event Termination: After the crew has TDAFWP is secured and/or at the direction of the Lead Examiner

Simulator Operator: **Insert Key 5** at the direction of Lead Examiner

Op-Test No.: Dec 2019	Scenario No.: 3	Event No.: 5/6/7/8	Total No Pages 25

Event Description: **Loss of Off-Site Power**

Time	Position	Applicant's Actions or Behavior
Simulator Operator: **Insert Key 5** at direction of Lead Examiner. Diagnostics: Lights go out, reactor and turbine trip, EDGs begin loading onto vital buses Annunciators: Multiple		
	CRS	Enters and directs EMG E-0, REACTOR TRIP OR SAFETY INJECTION
EMG E-0, REACTOR TRIP OR SAFETY INJECTION		
NOTE ○ Steps 1 through 4 are immediate action step ○ Foldout page shall be monitored throughout this procedure		
	ATC	1. Verify Reactor Trip: a. Check all rod bottom lights – LIT **– *No*** b. Check reactor trip breakers and bypass breakers – OPEN – ***Yes*** ○ SB ZL-1 ○ SB ZL-2 ○ SB ZL-3 ○ SB ZL-4 c. Check intermediate range neutron flux – DECREASING **– *Yes*** ○ SE NI-35B [GAMMA METRICS] ○ SE NI-36B [GAMMA METRICS] **RNO** Perform the following: 1. Manually trip reactor *SB HS-1 *SB HS-42 2. IF reactor power is greater than or equal to 5% OR intermediate range power is increasing, THEN go to EMG FR-S1, RESPONSE TO NUCLEAR POWER GENERATION/ATWS, Step 1
	BOP	2. Verify Turbine Trip: - ***Yes*** a. Check Main Stop Valves – ALL CLOSED
	ATC	3. Check AC Emergency Busses – AT LEAST ONE ENERGIZED **– *Yes*** *NB01 – ENERGIZED *NB02 – ENERGIZED

Op-Test No.: Dec 2019 Scenario No.: 3 Event No.: 5/6/7/8 Total No Pages 25		
Event Description: **Loss of Off-Site Power**		
Time	**Position**	**Applicant's Actions or Behavior**
	ATC	4. Check if Safety Injection is Actuated: a. Check any indication SI is actuated – LIT ***– No*** *Annunciator 00-030A, NF039A LOCA SEQ ACTUATED – LIT *Annunciator 00-031A, NF039B LOCA SEQ ACTUATED – LIT *ESFAS status panel SIS section – ANY WHITE LIGHTS LIT *Partial Trip Status Permissive/Block status panel – SI RED LIGHT LIT **RNO** a. Perform the following: 1) Check SI Required: *Containment pressure – GREATER THAN OR EQUAL TO 3.5 PSIG – No OR *RCS Pressure – LESS THAN OR EQUAL TO 1830 PSIG – No OR *RCS Subcooling – LESS THAN 30°F [45°F] – No OR *Any S/G pressure – LESS THAN OR EQUAL TO 615 PSIG – No OR *PZR level – LESS THAN 6% [32%] 2) IF SI is required, THEN manually actuate SI and go to Step 6 3) IF SI is NOT required, THEN perform the following: a) Direct operator to monitor Critical Safety Functions using EMG F-0, CRITICAL SAFETY FUNCTION STATUS TREES (CSFST) b) Go to EMG ES-02, REACTOR TRIP RESPONSE, Step 1
EMG ES-02, REACTOR TRIP RESPONSE		
NOTE Foldout page shall be monitored throughout this procedure		

Op-Test No.: Dec 2019	Scenario No.: 3	Event No.: 5/6/7/8	Total No Pages 25

Event Description: Loss of Off-Site Power

Time	Position	Applicant's Actions or Behavior
	BOP	1. Check RCS Temperature Control: a. Check Off-Site Power – AVAILABLE – No **RNO** a. Perform the following: 1) Isolate main steamlines by depressing MS ISO VLV ALL CLOSE pushbutton *AB HS-79 *AB HS-80 2) Go to step 1.c c. Check RCS Cold Leg Temperatures – STABLE AT OR TRENDING TO 557oF **– *Yes***
	BOP	2. Check RCS Cold Leg Temperatures: a. Check RCS Cold Leg Temperatures – THREE OUT OF FOUR GREATER THAN OR EQUAL TO 530°F **– *Yes*** b. Check RCS Cold Leg Temperatures – THREE OUT OF FOUR GREATER THAN OR EQUAL TO 550°F **– *Yes***
	BOP	3. Check Main Generator Breakers and Exciter Breaker – OPEN **– *Yes*** o MA ZL-3A o MA ZL-4A o MA ZL-2
	BOP	4. Check Feedwater Status: a. Check RCS Average Temperature – LESS THAN 564°F **– *Yes*** b. Check Main Feedwater Pumps – TRIPPED **– *Yes*** o Annunciator 00-120A, MFP A TRIP – LIT o Annunciator 00-123A, MFP B TRIP – LIT c. Check Main Feedwater Isolation Valves – CLOSED **– *Yes*** o AE HIS-39 For S/G A o AE HIS-40 For S/G B o AE HIS-41 For S/G C o AE HIS-42 For S/G D d. Check Total Feed Flow To S/Gs – GREATER THAN 270,000 LBM/HR **– *Yes***
	ATC	5. Evaluate SW/ESW Status: o Check Service Water Header Pressure – GREATER THAN 85 PSIG **– *Yes***

Op-Test No.: Dec 2019 Scenario No.: 3 Event No.: 5/6/7/8 Total No Pages 25

<u>Event Description:</u> Loss of Off-Site Power

Time	Position	Applicant's Actions or Behavior
		<u>NOTE</u> Locally opening EF-HV-43, ESW A TO AIR COMPRESSOR or EG HV-44, ESW B TO AIR COMPRESSOR requires the associated ESW train to be declared inoperable. Local opening of the valve, on 2000' NORTH END AUX BLDG, will preclude it from automatically isolating on a high flow condition
	BOP	6. Verify Instrument Air Compressor is Running: a. Ensure at least one ESW TRN TO AIR COMPRESSOR Valve – OPEN **– *Yes*** *EF HIS-43 *EF HIS-44 b. Check AIR COMPRESSOR BRKR RESET switch associated with open ESW Valve(s) – CLOSED **– *No*** *KA HIS-3C *KA HIS-2C RNO b. Reset and close AIR COMPRESSIR BRKR RESET Switch *KA HIS-3C *KA HIS-2C c. Check INST AIR PRESS – GREATER THAN 105 PSIG **– *Yes*** o KA PI-40 d. Check neither ESW TO AIR COMPRESSOR Valve – Locally Opened **– *No*** o EF HV-43 o EF HV-44 e. Check both ESW TRN TO AIR COMPRESSOR Valves – OPEN **– *Yes*** o EF HIS-43 o EF HIS-44 f. Check both AIR COMPRESSOR BRKR RESET switches – CLOSED **– *Yes*** o KA HIS-3C o KA HIS-2C
	BOP	7. Verify Instrument Air to Containment: a. Check INST AIR SPLY CTMT ISO VLV – CLOSED **– *Yes*** o KA HIS-29 b. Check PZR PRESS MASTER CTRL Output – LESS THAN 55% **- *Yes*** o BB PK-455A c. Open INST AIR SPLY CTMT ISO VLV o KA HIS-29

Op-Test No.: Dec 2019 Scenario No.: 3 Event No.: 5/6/7/8 Total No Pages 25
Event Description: **Loss of Off-Site Power**

Time	Position	Applicant's Actions or Behavior
	ATC	8. Check RCP Seal Cooling – ALWAYS IN-SERVICE DURING EVENT *CCW to ALL Thermal Barriers – IN SERVICE **– *Yes*** OR * Charging to RCP Seals – IN SERVICE **– *Yes***
	ATC	9. Check Charging Pumps – AT LEAST ONE RUNNING – Yes *CCP A OR *CCP B OR *NCP
	ATC	10. Verify Charging System Aligned For Normal Injection: a. Check CCPs – ANY RUNNING **– *Yes*** b. Check CCP Discharge to Charging Header Isolation Valve for Running CCP – OPEN **– *Yes*** *BG-8483A (1974' AUX BLDG, CCP A ROOM) *BG-8483C (1974' AUX BLDG, CCP B ROOM) c. Check CCP Recirc Valves – OPEN **– *Yes*** o BG HIS-8110 o BG HIS-8111 d. Check Charging Pumps to Regenerative Heat Exchanger Containment Isolation Valves – OPEN **– *Yes*** o BG HIS-8105 o BG HIS-8106 e. Check Regenerative Heat Exchanger to Loop Cold Leg Valves – ONLY ONE OPEN **– *Yes*** *BG HIS-8146 For Loop 1 OR *BG HIS-8147 For Loop 4
	ATC	11. Check Charging Flow – ESTABLISHED o BG FI-121A – GREATER THAN 60 GPM **– *Yes***
	ATC	12. Check All Control Rods – FULLY INSERTED – No **RNO** IF two or more control rods NOT fully inserted, THEN perform the following: a. Emergency borate, using OFN BG-009, EMERGENCY BORATION b. Continue with step 13

Op-Test No.: Dec 2019 Scenario No.: 3 Event No.: 5/6/7/8 Total No Pages 25

Event Description: **Loss of Off-Site Power**

Time	Position	Applicant's Actions or Behavior
		OFN BG-009, EMERGENCY BORATION
		NOTE Prolonged Emergency Boration with the Plant at power may require the Plant to be tripped due to rapid RCS Temperature, Pressure and PZR Level decreases
	ATC	1. Check Charging System Aligned as the operable Boron Injection Flowpath **– *Yes***
	ATC	2. Align Charging Pumps for Emergency Boration: a. Ensure one Charging Pump is running *CCP A *CCP B *NCP b. (ρ) Align Boration Flow Path: 1) Ensure Boric Acid Transfer Pumps – AT LEAST ONE RUNNING 2) Open Emergency Borate to Charging Pump Suction Valve o BG HIS-8104 c. Check both BATs used to satisfy TRM volume requirements d. WHEN BAT aligned to Boric Acid Transfer Pump level is less than or equal to 10%, THEN open Boric Acid Batching Tank Outlet to Boric Acid Transfer Pumps Isolation Valves o BG-8465A o BG-8465B
	ATC	3. Verify Charging Flow Path: a. Ensure Charging Pump to Regenerative Heat Exchanger Isolation Valves – OPEN – Yes o BG HIS-8105 o BG HIS-8106 b. Ensure One Regenerative Heat Exchanger to RCS Loop Cold Leg Valve – OPEN – Yes *BG HIS-8146 For Loop 1 OR *BG HIS-8147 For Loop 4 c. Adjust Charging Pump Flow to maintain Pressurizer level *BG FK-121 for CCP d. Adjust Charging Header Backpressure Control Valve, as necessary, to establish 8 gpm to 13 gpm seal injection flow o BG HC-182

Op-Test No.: Dec 2019	Scenario No.: 3	Event No.: 5/6/7/8	Total No Pages 25

Event Description: Loss of Off-Site Power

Time	Position	Applicant's Actions or Behavior
	ATC	4. Check Emergency Boration from RWST – NOT REQUIRED – Yes ○ Emergency Borate Flow – GREATER THAN 30 GPM AND ○ Boron Dilution Event – NOT IN PROGRESS **CT 2:** Commence Emergency Boration due to more than one control rod stuck out before Positive IR SUR develops causing the crew to transition to EMG FR-S1 on an ORANGE path challenge to subcriticality CSF

Event termination: After the crew has established Emergency Boration flow and/or at the discretion of the Lead Examiner.

Simulator operator: **Insert Key 9** at the lead examiners direction.

Op-Test No.: Dec 2019	Scenario No.: 3	Event No.: 9	Total No Pages 25

Event Description: **'A' MDAFW Pump trips on overcurrent loss of Secondary Heat Sink**

Time	Position	Applicant's Actions or Behavior
Simulator Operator: **Insert Key 9** at direction of Lead Examiner. Diagnostics: Amber light lit on 'A' MDAFW pump, Auxiliary feed flow goes to zero, and RED PATH exists for heat sink		
	CREW	Recognizes indications of a loss of heat sink
	CRS	Enters and directs EMG FR-H1
EMG FR-H1, RESPONSE TO LOSS OF SECONDARY HEAT SINK		
CAUTION ○ If total feed flow is <270,000 lbm/hr due to Operator action, this procedure shall NOT be performed ○ If a non-faulted S/G is available, feed flow shall NOT be reestablished to any faulted S/G.		
NOTE Foldout Page shall be monitored throughout this procedure.		
	CRS	1. Check if Secondary Heat Sink is Required: a. RCS Pressure greater than any non-faulted S/G Pressure **– *Yes*** b. RCS Hot Leg Temperature >350°F. **– *Yes***
	BOP	2. Check if RCS Bleed and Feed – NOT Required a. Check WR Level in at least Two S/Gs ≥12% [28%] **– *Yes*** ○ AE LI-501, SG A WR LEV ○ AE LI-502, SG B WR LEV ○ AE LI-503, SG C WR LEV ○ AE LI-504, SG D WR LEV

Op-Test No.: Dec 2019	Scenario No.: 3	Event No.: 9	Total No Pages 25

Event Description: **'A' MDAFW Pump trips on overcurrent loss of Secondary Heat Sink**

Time	Position	Applicant's Actions or Behavior
	BOP	3. Try to Establish AFW flow to at least one S/G: a. Check ESFAS Status Panel SGBSIS Section – ALL WHITE LIGHTS LIT – ***Yes*** ○ Red Train ○ Yellow Train b. Check Control Room indications for cause of AFW failure ○ CST Level ○ Motor Driven AFW Pump Power Supply ○ Turbine Driven AFW Pump Steam Supply ○ AFW Valve Alignment c. Try to Restore AFW flow
	ATC/BOP	4. Try To Identify Leaking S/G: *Unexpected rise in any S/G narrow range level – ***Yes*** OR *Radiation from any S/G steamline radiation monitor *ABS 114 For S/G A *ABS 113 For S/G B *ABS 112 For S/G C – ***Yes*** *ABS 111 For S/G D OR *Radiation from any S/G steamline survey OR *Radiation from and S/G sample OR *Radiation from any S/G blowdown cation column at RM172 (Micro-R meter or equivalent)

Simulator Operator:
- IF contacted as TB Watch to investigate loss of AFW pumps, acknowledge requests.
- **Wait 3 minutes** then report the TDAFW pump overspeed trip will NOT reset.
- **Wait 3 minutes** then report Overcurrent dropped flag on B MDAFW Pump power supply breaker.
- IF contacted as WWM, acknowledge requests and specify a response team will be formed.

Op-Test No.: Dec 2019 Scenario No.: 3 Event No.: 9 Total No Pages 25

Event Description: 'A' MDAFW Pump trips on overcurrent loss of Secondary Heat Sink

Time	Position	Applicant's Actions or Behavior
	BOP	4. Check Total Flow to S/Gs >270,000 lbm/hr – **No** RNO Perform the following: a. IF feed flow to at least one S/G can be verified: – **No** b. IF feed flow can NOT be verified to at least one S/G, THEN perform the following: 1) Dispatch Operator to locally restore AFW Flow. 2) IF all AFW flow has been lost, THEN close AFW throttle valves to prevent inadvertent feedwater addition to a hot/dry S/G. o AL HK-8A and -7A for A S/G o AL HK-10A and -9A for B S/G o AL HK-12A and 11A for C S/G o AL HK-6A and 5A for D S/G 3) Go to Step 6
	BOP	6. Reduce Heat Input to RCS: a. Stop all RCPs: ***- Already Off*** o BB HIS-37 for RCP A o BB HIS-38 for RCP B o BB HIS-39 for RCP C o BB HIS-40 for RCP D b. Turn off all PZR heaters: ***- Already Off*** o BB HIS-50 o BB HIS-51A o BB HIS-52A
	CREW	7. Establish S/G Pressure Control: a. Check Condenser – Available: ***- No*** o C9 LIT o MSIVs OPEN o CW Pumps – RUNNING **RNO** Perform the following: 1) Use S/G ARVs 2) Go to Step 8

Op-Test No.: Dec 2019	Scenario No.: 3	Event No.: 9	Total No Pages 25

Event Description: **'A' MDAFW Pump trips on overcurrent loss of Secondary Heat Sink**

Time	Position	Applicant's Actions or Behavior
	BOP	8. Establish Flow from Non-Safety Related AFW Pump: a. Start non-safety related AFW Pump per SYS AP-122, NON-SAFETY AUX FEED PUMP OPERATION **Control Room Action per Step 6.1.2** 1. Place AD LIC-79B, COND HOTWELL M/U LEV CTRL in manual and close. ○ AD LIC-79B – MANUAL/CLOSED 2. ENSURE AL HV-8 is closed, using AL HK-8A, SGA TDAFP AFW REG VLV CTRL. ○ AL HK-8A – CLOSED 3. ENSURE AL HV-10 is closed, using AL HK-10A, SG B TD AFP AFW REF VLV CTRL ○ AL HK-10A – CLOSED 4. ENSURE AL HV-12 is closed, using AL HK-12A, SG C TD AFP AFW REG VLV CTRL ○ AL HK-12A – CLOSED 5. ENSURE AL HV-6 is closed, using AL HK-6A, SG D TD AFP AFW REG VLV CTRL. ○ AL HK-6A – CLOSED. b. Open TD AFWP Flow Control Valves to establish AFW flow to S/Gs. ○ AL HK-8A for S/G A ○ AL HK-10A for S/G B ○ AL HK-12A for S/G C ○ AL HK-6A for S/G D **CT3**: Restore AFW Flow >270,000 lbm/hr using NSAFW Pump per EMG FR-H1 before 3 of 4 S/G levels degrade to <12% [28%] WR level. c. Go to step 17.

Simulator Operator:

- **WHEN** contacted to Start NSAFP, acknowledge requests.
- **Wait 5 minutes**, CONTACT the Control Room to direct performance of Step 6.1.2.
- **WHEN** SYS AP-122, Step 6.1.2 Control Room Actions are complete and or at the direction of the Lead Examiner **INSERT Key 10**
- **WHEN** scenario file has completed (5 min 30 seconds), inform the control room that the NSAFP is running.

Op-Test No.: Dec 2019 Scenario No.: 3 Event No.: 9 Total No Pages 25		
Event Description: **'A' MDAFW Pump trips on overcurrent loss of Secondary Heat Sink**		
Time	**Position**	**Applicant's Actions or Behavior**
	BOP	17. Check S/G Levels: a. Check RCS Bleed and Feed – NOT ESTABLISHED – *Yes* b. Check NR Level in at least one S/G >6% [29%] - *No* RNO Perform the following: 1) Verify flow to S/G(s): a) Core Exit Temperatures Stable or lowering OR b) Level in at least one S/G rising (WR or NR) **– Yes** 2) IF Feedwater flow to at least one S/G can NOT be verified **– N/A** 3) IF Feedwater flow to at least one S/G verified THEN maintain flow to restore NR level to >6% [29%] while returning to procedure and step in effect. **(EMG ES-02)**
Event Termination: After the crew has verified AFW flow and/or at the direction of the Lead Examiner **Simulator Operator:** FREEZE		

Facility: Wolf Creek Scenario No.: 5(Spare) Op-Test No.: December 2019

Examiners: ______________________ Operators: ______________________

Initial Conditions: 100% Power, MOL, Yellow Train in Service, Letdown is at 120 gpm, 'B' Safety Injection Pump has been tagged out for emergent maintenance.

Turnover: The unit is operating at 100% power, MOL Yellow Train is in Service, Letdown is at 75 gpm. 'B' SI Pump OOS for emergent maintenance, LCO 3.5.2, COND A is entered

Critical Tasks: **CT1** Establish High Head Injection by opening BIT Inlet valve(s) before RVLIS Level drops to 66% **CT2** Trip RCPs within 5 minutes of RCS pressure going below 1400 psig **CT3** Establish Alternate High Head Injection prior to CET temperatures exceeding 712ºF.

Event No.	Malf. No.	Event Type*	Event Description
1		C (BOP/CRS)	TB Closed Cooling Water Pump 'B' Trips ALR 00-105A
2		C (ATC/CRS)	BG PK-131, LTDN HX OUTLET PRESS CTRL Fails HIGH in AUTO, Manual Available ALR 00-039E
3		C (ALL) Tech Spec	AC Emergency Bus NB01 Bus Lockout ALR 00-18A, OFN NB-030 LCO 3.8.9, COND C
4		I (ATC/CRS) Tech Spec	PR NI 42 fails LOW OFN SB-008, ATT R LCO 3.3.1, Functions 2,3,5,6,18.b, 18.c, 18.d and 18.e COND A,
5		C (ALL)	AD HIS-8, Condensate Pump 'A' Discharge valve fails closed. OFN AF-025, OFN MA-038
6		M (ALL)	Small Break LOCA in CTMT on 'C' Cold Leg EMG E-0, EMG E-1, EMG ES-11
7		C (BOP/CRS)	BIT Inlet valves, EM HIS-8803A/B, fail to AUTO OPEN on SI EMG E-0
8		C (ALL)	'B' CCP trips and BG FK-121 fails closed (Scenario) EMG FR-C2

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

Target Quantitative Attributes per Scenario (See Section D.5.d)	Actual Attributes	ES-301-5	CRS	ATC	BOP
1. Malfunctions after EOP entry (1–2)	2	Rx	0	0	0
2. Abnormal events (2–4)	5	Nor	0	0	0
3. Major transients (1–2)	1	I/C	7	5	5
4. EOPs entered/requiring substantive actions (1–2)	3	Maj	1	1	1
5. Entry into a contingency EOP with substantive actions (≥ 1 per scenario set)	1	TS	2	0	0
6. Preidentified critical tasks (≥ 2)	3				

Critical Task	Safety Significance	Cueing	Measurable Performance Indicators	Performance Feedback
CT1: Given a failure of the BIT inlet valves to open and no available Safety Injection Pumps, establish high head injection flow to the RCS before RVLIS Forced Flow Range drops to 66% w/ 4 RCPs running AND prior to tripping RCPs	With RCPs running and RVLIS <66%, the core is significantly uncovered and a degraded core cooling exists, challenging the fuel cladding fission product barrier only due failure of the crew to take the proper action.	Green light lit on * EM HIS-8803B No indication for * EM HIS-8803A, fails as is (CLOSED) No indicated High Head ECCS Flow: * EM FI-922 * EM FI-918 * EM FI-917A * EM FI-917B	On Panel RL-018, Open *EM HIS-8803B	Red Lights lit on the manipulated hand switch, Green light out. Charging flow through Bit: * EM FI-917A * EM FI-917B
CT2 Trip all RCPs within 5 minutes of RCS pressure going below 1400 psig per EMG E-0 foldout page step 1 AND after having established High Head Injection	During the initial stages of a SBLOCA, if selected parameter setpoints are reached, the RCPs should be tripped to avoid more serious impacts later due to core uncovery and loss of inventory caused by continued RCP Operation.	* RCS Pressure <1400 psig. (BB PI-455A/456/457/458) <u>AND</u> * CCP Flow or SI Pumps running with Indicated flow: (EM FI-917A/B) (EM FI-918/922) <u>AND</u> Operator Controlled Cooldown <u>NOT</u> in progress.	On Panel RL-021, take handswitches to the STOP position: *BB HIS-37 *BB HIS-38 *BB HIS-39 *BB HIS-40	Green Lights Lit on the manipulated handswitches. Indicated RCP Amps all drop to 0 on: *BB 11-1 *BB 11-2 *BB 11-3 *BB 11-4
CT3: Establish Alternate High Head Injection per EMG FR-C2 prior to CETC temperatures rising to 712°F.	The most effective method to restore adequate core cooling is to raise RCS inventory via safety injection. The NCP is the only pump remaining that can accomplish this function.	Red Train CCP and SI Pumps without power due to NB01 Lockout. B SI Pumps out of service for maintenance at beginning of scenario. B CCP trips. No indicated flow on: EM FI-917A/B EM FI-922/918	On Panel RL001, Manipulates controls as necessary to Open *BG HC-182, *BG HIS-8105 *BG HIS-8147 *BG FK-462	100% open indication on BG HC-182 and BG FK-462. Red Lights Lit and green lights out on BG HIS-8105 and BG HIS-8146. On Panel RL002, Flow indicated on BG FI-121 CHG HDR FLOW

Note: Causing an unnecessary plant trip or ESF actuation may constitute a Critical Task failure. Actions taken by the applicant(s) will be validated using the methodology for critical tasks in Appendix D to NUREG-1021.

SCENARIO 5 (SPARE) NARRATIVE

Turnover: The Unit is operating at 100% power. Yellow Train is in service with letdown flow at 120 gpm, 'B' Safety Injection Pump has been tagged out for emergent maintenance. LCO 3.5.2, COND A is entered.

Event 1: Trip of 'B' TB CLCW Pump. Main Control Board Annunciators ALR 105A and 133A will both actuate. The crew should perform ALR 00-105A to restore cooling by starting 'A' CLCW pump using EB HIS-1. Once cooling is restored, the Turbine Building Watch will be dispatched to locally clear the 133A Isophase Bus Trouble Alarm. Once cooling is restored and at the direction of the Lead Examiner the next event will start.

Event 2: Letdown Outlet Pressure Controller BG PK-131 Fails HIGH in Auto. The output on Controller BG PK-131 will fail to 100% in auto, causing letdown HX high flow and Annunciator 039E to actuate. Once the ATC has taken action to manually restore proper letdown flow, the next event will start at the direction of the Lead Examiner.

Event 3: NB01 Bus Lockout: The crew will respond to a bus lockout condition per ALR 00-018A, which requires prompt action to lower turbine loading to maintain power <100% due to AFAS-T Actuation and to Start 'B' ESW pump. After plant conditions stabilize, the crew will perform OFN NB-030, ATTACHMENT A to address other equipment affected by loss of power to bus NB01. Once actions are complete and the CRS has determined technical specification implications and or at the discretion of the Lead Examiner, the next event will start.

Event 4: PRNI 42 Fails LOW. MCB Annunciators 78A and 83C will actuate. The crew will address the instrument failure using OFN SB-008, ATT R. After evaluating Technical Specifications and at the direction of the Lead Examiner, the Major event will start.

Event 5: Condensate Pump 'A' Discharge Valve (AD HIS-8) fails closed. The crew will respond using OFN AF-025 to determine maximum power with only two condensate pumps is 90% (1102 MWE) and commence rapid downpower per OFN MA-038 IAW pre-shift reactivity brief. Once plant conditions have stabilized, and at the direction of the Lead Examiner, the next event will start.

Event 6: Small Break LOCA inside CTMT. RCS leak develops on Loop 3 Cold Leg that grows to ~2.0" break over 30 seconds, crew will diagnose, Manually Trip the Reactor and Actuate Safety Injection

Event 7: BIT Inlet valves, EM HIS-8803A/B, fail to AUTO OPEN on SI. This malfunction, combined with 'B' SI pump being out of service and a bus lockout on NB01, supports the critical task to establish high head injection prior to Core Cooling conditions degrading to Orange Path CSF and before tripping RCPs. The BOP operator may identify the valve failure while monitoring foldout page actions for the RCPs. The ATC performing EMG E-0, ATTACHMENT F will also be procedurally directed to establish the correct lineup at step F13.
CT1: Given a failure of the BIT inlet valves to open establish high head injection flow to the RCS before RVLIS Forced Flow Range drops to 66% w/ 4 RCPs running AND prior to Tripping RCPs.

CT2: Trip all RCPs within 5 minutes of RCS pressure going below 1400 psig per EMG E-0 foldout page step 1 AND after having established High Head Injection.

Event 8: 'B' CCP Trips and BG FK-121 fails closed on SI. These failures, combined with initial conditions and NB01 bus lockout will cause crew to transition to EMG FR-C2 on an ORANGE PATH core cooling CSF where they will establish alternate high head injection using the NCP per ATTACHMENT A.
CT3: Establish Alternate High Head Injection per EMG FR-C2 prior to CET temperatures rising to 712°F.

The scenario is complete when the crew has transitioned to EMG FR-C2 and completed alignment of Alternate High Head Injection and/or at the discretion of the lead examiner

SIMULATOR SCENARIO FILES

;2019 ILO NRC Exam, Spare Scenario (IC 305)

;Initial Conditions – IC31, 100% Yellow Train in Service, Letdown flow at 75 gpm, ‘B’ SI pump OOS
scn SimGroup\Tag B SI PMP

;Event 1 - [Key 1] TB Closed Cooling Water Pump Trips
ICM bkrDPEB01B.cmf t:1 k:1

;Event 2 - [Key 2] BG PK-131 fails to 100% in Auto
ICM cdBGPC-131.cmf t:5 k:2 f:100
{Key[2]} ICM vmodBGPCV0131 t:1 d:0
{bgp0131a<200} DCM vmodBGPCV0131

;Event 3 - [Key 3] NB01 Bus Lockout
IMF mNB03 k:3

;Event 4 - [Key 4] PRNI 42 fails LOW
IMF mSE03B k:5 r:30 i:100.042 f:0

;Event 5 - [Key 5] AD HIS-8, ‘A’ Cond Pump Discharge Valve Fails Closed
ICM movADHV0008.cmf

;Events 6, 7 – [Key 6] SBLOCA on Loop 3 Cold leg in CTMT.
IMF mBB06C f:2.0 r:30 k:6
IMF mSA27EM03
IMF mSA27EM04

;**Event 8 – [Key 8]** ‘B’ CCP Trips and BG FK-121 fails closed on SI
ICM bkrNB00201 t:1 k:8
ICM vlBGFCV0121 t:1 k:8 f:0

;Local Action – **[Key 9]** Locally reset ISOPHASE trouble alarm
IRF rMA04 k:9 f:ACK

;Local Action – **[Key 10]** Locally secure ‘A’ EDG.
{Key[10]} scn SimGroup\SHTDNDGA

‘Local Action – **[Key 11]** Locally Close CCW Red Train Supply/Return Valves
ICM movEGHV0015.cmf t:4 k:11 f:0
ICM movEGHV0053.cmf t:4 k:11 d:30 f:0

;Local Action – **[Key 12]** Locally secure ‘B’ EDG
{Key[12]} scn SimGroup\SHTDNDGB

;Local Action – **[Key 13] -** Turbine Building Watch Locally closes breakers for BAT pumps.
IRF rBG40A f:1 k:13
IRF rBG40B f:1 d:30 k:13

;Local Action - **[Key 14]-** Aux Building Watch locally closes breaker for BG HV-8104
IRF rBG41 f:1 k:14

;End

Booth Instructions

Ensure NRC Exam Security Established per AIF 30B-015-09, and AIF 30B-015-18

Ensure the following procedures are available, free of markings and are the most recent revision in Curator (9/25/19):

- **ALR 00-018A, NB01 BUS LOCKOUT (Rev 21)**
- **ALR 00-039E, LTDN HX DISCH FLOW HI (Rev 9)**
- **ALR 00-105A, CLCL PMP FLOW LO (Rev 6)**
- **OFN SB-008, INSTRUMENT MALFUNCTIONS (Rev 48)**
- **OFN SB-008, ATTACHMENT R, PR NEUTRON FLUX CHANNEL MALFUNCTION**
- **OFN AF-025, UNIT LIMITATIONS (Rev 56)**
- **OFN NB-030, LOSS OF AC EMERGENCY BUS NB01 (NB02) (Rev 38)**
- **OFN MA-038, RAPID PLANT SHUTDOWN (Rev 30)**
- **EMG E-0, REACTOR TRIP OR SAFETY INJECTION (Rev 40)**
- **EMG E-1, LOSS OF REACTOR OR SECONDARY COOLANT (Rev 29)**
- **EMG ES-11, POST LOCA COOLDOWN AND DEPRESSURIZATION (Rev 26)**
- **EMG FR-C2, RESPONSE TO DEGRADED CORE COOLING (Rev 17)**

NOTE: All events are loaded into snap **IC305**

Ensure malfunctions, including severity levels match scenario.

Ensure all meters, lamps, bistables and annunciators are correct for the initial setup. **Blue Placard is on the 'A' CCP. Caution Tag on 'B' SI Pump hand switch, EM HIS-5.**

Ensure soft panel display in back is set to RP312 RCP Vibration on left screen and AMSAC on right screen.

Ensure no discernable history from RM11, Ovation screens, paper trend recorders, etc.
Ensure all laminated brief sheets, foldout pages, E plan boards are wiped clean.

Ensure all follow-up buttons are removed from the boards and trash cans and recycle bins are free of any potential exam material.

Ensure communications are established with the lead examiner, fresh batteries, radio check sat.

Critical Parameter Data to be collected:

- BIT flow established prior to securing RCPs
- BIT flow established prior to Forced Flow RVLIS going below 66%
- RCPs must be tripped within 5 minutes of RCS pressure dropping <1400 psig
- CETCs must remain <712ºF.

Ensure Horns are ON and machine is in RUN

- **Insert Key 1** for Event 1 (TB CLCW Pump Trips).
- **Insert Key 2** for Event 2 (BG PK-131 fails HIGH in Auto).
- **Insert Key 3** for Event 3 (NB01 Bus Lockout)
- **Insert Key 4** for Event 4 (PRNI 42 fails LOW)
- **Insert Key 5** for Event 5 (AD HIS-8, Cond Pump A Discharge Valve fails Closed)
- **Insert Key 6** for Major Event. (SBLOCA in CTMT, BIT Valves fail to open)
- **Insert Key 8** for Event 8 ('B' CCP trips and FK-121 fails closed)
- When directed to reset ISO PHASE trouble alarm, Insert Key 9
- When directed to align EDGs for AUTO, **Insert Key 10 & 12**
- When directed to Locally close CCW Red Train Supply/Return Valves, **Insert 11**
- When directed to reset and close breakers for BAT pumps, **Insert Key 12**
- When directed to reset and close breaker for BG HV-8104, **Insert Key 13**

Op-Test No.: Dec 2019	Scenario No.: 5 (Spare)	Event No.: 1	Total No Pages 47

Event Description: **Turbine Building Closed Cooling Water Pump 'B' Trips**

Time	Position	Applicant's Actions or Behavior
Simulator Operator: **Insert Key 1** at direction of Lead Examiner. Diagnostics: MCB Alarms, Condensate Pump bearing temperatures rise, IF no actions are taken by the crew Condensate Bearing Pump temperatures will exceed alarm setpoints in less than 10 minutes. Annunciators: 105A & 133A		
Examiner Note: Crew may take actions to start a CLCW pump prior to ALR entry		
	CRS	Both annunciators are top tier 'A'; however the crew should recognize that CLCW is the cooling medium for Isophase Bus Duct cooling and perform ALR 00-105A first.
ALR 00-105A, CLCW PMP FLOW LOW		
	ATC	1. Check Closed Cooling Water Surge Tank Level Using NPIS Computer – LOW ***- NO*** o EBD0018 RNO Go To Step 8.
	BOP	8. Start Standby Closed Cooling Water Pump: *EB HIS-1 For Pump A
	CRS	9. Check Annunciator 00-105A, CLCW PMP FLOW LO – CLEAR ***- YES***
	CRS	10. Return to Procedure and Step in Effect.
Simulator Operator: o IF contacted as WWM, acknowledge requests. o IF contacted as Call Supt., acknowledge status. o IF contacted as TBW to investigate 'B' CLCW pump **wait five minutes** and report the breaker for 'B' pump is open with dropped overcurrent flag. o IF contacted as Building Watch to investigate ISOPHASE trouble alarm, **Insert Key 9**, and report it was a low flow alarm that cleared after acknowledging.		
Event termination: After the crew has restored CLCW flow, alarms are clear, and/or at the direction of the Lead Examiner **Simulator Operator:** **Insert Key 2** at the direction of the Lead Examiner.		

Op Test No.: Dec 2019 Scenario No.: 5 (Spare) Event No.: 2 Total No Pages 47

Event Description: **BG PK-131, Letdown Outlet Pressure Controller fails HIGH in AUTO. Manual Available.**

Time	Position	Applicant's Actions or Behavior
Simulator Operator: **Insert Key 2** at the lead examiners direction Diagnostics: BG PCV-131 output indicates 100%, BG PI-131 LTDN HX OUTLET PRESS lowers Annunciators: 039E		
	CREW	Recognizes higher than normal letdown flowrate, 039E may not be in alarm yet
	CRS	Enters and directs ALR 00-039E, LTDN HX DISCH FLOW HI
00-039E, LTDN HX DISCH FLOW HI		
NOTE: Per USAR 15.6.2, letdown flow is limited to a nominal desired flow of about 120 gpm, during all modes of plant operations, but must be less than 130 gpm to ensure a letdown line break outside of Containment does not exceed offsite dose limits		
	ATC	1. Check Letdown Heat Exchanger Outlet Flow – GREATER THAN 130 GPM **– *Yes* (May be <130 gpm, so procedure directs RTPSE, but the mitigating actions are in this procedure and should still be performed)** o BG FI-132
NOTE: If letdown flow is being intentionally maintained greater than a nominal 120 gpm but less than 130 gpm, the demin dP must be less than 25 psid, with more frequent monitoring of dP across demineralizers when the demins are inservice, per engineering calculation.		
	ATC	2. Check Letdown from RHR: a. Check Letdown from RHR System – IN PROGRESS **– *No*** **RNO** Go to Step 3
	ATC	3. Check Letdown Flow Using Orifice Bypass Line: a. Check Letdown Flow Using Orifice Bypass Line – IN PROGRESS ***- No*** RNO Go To Step 4
	ATC	4. Check 75 GPM Letdown Orifice Isolation Valves – ONLY ONE OPEN **– *Yes*** *BG HIS-8149BA OR *BG HIS-8149CA

Op Test No.: Dec 2019	Scenario No.: 5 (Spare)	Event No.: 2	Total No Pages 47

Event Description: **BG PK-131, Letdown Outlet Pressure Controller fails HIGH in AUTO. Manual Available.**

Time	Position	Applicant's Actions or Behavior
	ATC	5. Check Letdown Heat Exchanger Outlet Pressure Controller – OPERATING PROPERLY ○ BG PK-131 **– *No*** ○ RNO Perform the following: a. Place Controller in manual b. Adjust pressure controller, as necessary to establish between 300 psig and 350 psig
NOTE: During the swapping from BG PCV-131 to the bypass valve it may be necessary to throttle BG-V8408A and BG-V007 concurrently		
	ATC	6. Check Letdown Heat Exchanger Outlet Pressure – BETWEEN 300 PSIG AND 350 PSIG **– Yes** ○ BG PI-131
	ATC	7. Check Letdown Heat Exchanger Outlet Flow – LESS THAN 130 GPM ***– Yes*** ○ BG FI-132
	CRS	8. Return to Procedure and Step in Effect

Simulator Operator: IF contacted as WWM, acknowledge requests. IF contacted as Call Supt., acknowledge status.

Event Termination: After the crew has restored all PZR backup heaters to AUTO, raised letdown flow to 120 gpm, and/or at the direction of the Lead Examiner

Simulator Operator: **Insert Key 3** at direction of the Lead Examiner

Op-Test No.: Dec 2019 Scenario No.: 5 (Spare) Event No.: 3 Total No Pages 47

Event Description: **AC Emergency Bus NB01 Bus Lockout**

Time	Position	Applicant's Actions or Behavior
Simulator Operator: **Insert Key 3** at direction of Lead Examiner. Diagnostics: Multiple annunciators. Loss of power to red train components, TDAFW pump starts. EDG 'A' starts Annunciators: 018A, 018B, 018D		
	CREW	Recognizes loss of power to RED train components and multiple alarms. Diagnoses a loss of NB01
	CRS	Enters and directs ALR 00-018A
ALR 00-018A, NB01 BUS LOCKOUT		
CAUTION Prior to resetting any lockout, all faults should be verified to be clear.		
	BOP	1. Check CCW Service Loop Aligned to Train B. **– Yes**
	BOP	2. Check Reactor Power – LESS THAN OR EQUAL TO 99% **-No** RNO Perform the following: a. (p) Reduce Turbine load as necessary b. ENSURE reactor power is ≤99% **Examiner NOTE:** Per beginning of shift reactivity brief, the BOP should "FAST LOAD DECREASE" turbine load by 30 MW.
	ATC	3. Ensure NB01 Supply Breaker Open o NB01 Normal Supply Breaker NB0112 – OPEN o NB HIS-2 o NB01 Alternate Supply Breaker NB0109 – OPEN o NB HIS-3 o NB01 Emergency Supply Breaker NB0111 – OPEN o NB HIS-25 o NB01 SBO DG Supply Breaker NB0114 OPEN o NB0114

Op-Test No.: Dec 2019 Scenario No.: 5 (Spare) Event No.: 3 Total No Pages 47

Event Description: AC Emergency Bus NB01 Bus Lockout

Time	Position	Applicant's Actions or Behavior
	ATC	4. Shutdown Diesel Generator A. a. Locally place Master Transfer Switch in Local/Manual position and stop EDG B. ○ KJ HS-9
Simulator Operator: ○ When contacted as TBW to locally secure A EDG, **Insert Key 10** ○ IF contacted as the Site Watch or Turbine Watch to investigate XNB01, wait 5 minutes and REPORT – "No abnormal conditions at XNB01 transformer." ○ IF contacted as the TBW to check breaker position, acknowledge request and report SBO DGs are NOT running and breaker NB0114 is OPEN.		
	CRS	5. Refer to Technical Specifications ○ LCO 3.8.9 ○ LCO 3.8.1 **Enters LCO 3.8.9 COND C – 2 hours** **Examiner Note: Since 'B' SI Pump was out of service at the beginning of the scenario and 'A' SI pump is now without power, crew may discuss LCO 3.5.2, COND C and entry to LCO 3.0.3.**
	CREW	6. Go To OFN NB-030, LOSS OF AC EMERGENCY BUS NB01 (NB02), Step 1
OFN NB-030, LOSS OF AC EMERGENCY BUS NB01 (NB02)		
	ATC	1. Check AC Emergency Buses – AT LEAST ONE ENERGIZED **- Yes**
	CRS	2. Determine Emergency Action Level, Using EPP 06-005, EMERGENCY CLASSIFICATION **Examiner Note: No classification at this time since offsite power is still available to ESF XFMR XNB02.**

Op-Test No.: Dec 2019 Scenario No.: 5 (Spare) Event No.: 3 Total No Pages 47		
Event Description: AC Emergency Bus NB01 Bus Lockout		
Time	**Position**	**Applicant's Actions or Behavior**
NOTE "Affected" refers to an emergency bus that has experienced a loss of power or spurious Load Shedder/Sequencer actuation.		
	CRS	3. Go To The Appropriate ATTACHMENT For The Affected Bus: AFFECTED BUS NB01 — ATTACHMENT A
ATTACHMENT A, LOSS OF AC EMEREGENCY BUS NB01		
	ATC	A1. Check Reactor Power – LESS THAN OR EQUAL TO 99% **- Yes**
	ATC	A2. Check Red Train AC Emergency Bus – DEENERGIZED **- Yes**
	ATC	A3. Ensure CCW Service Loop Aligned to Yellow Train **– Yes**
Simulator Operator: ○ IF contacted as WWM, acknowledge requests. IF contacted as Call Supt., acknowledge status. ○ WHEN contacted as Aux Building Watch to locally close EG HV-15 and 53, Red Train CCW Supply and Return Valves, acknowledge requests. **Insert Key 11.** ○ **Wait 5 minutes** and report valves are closed.		
	BOP	A4. Perform the Following: a. Locally close CCW Red Train Supply / Return Valves ○ EG HV-15 (2026' Aux BLDG, About 30' south of CCW HX 'A', by West Wall) ○ EG HV-53 (2026' Aux BLDG, North of CCW Train 'B' Room) b. Open CCW Surge Tank 1 Vent Valve ○ EG HIS-9

Op-Test No.: Dec 2019 Scenario No.: 5 (Spare) Event No.: 3 Total No Pages 47

Event Description: **AC Emergency Bus NB01 Bus Lockout**

Time	Position	Applicant's Actions or Behavior
	BOP	A5. Ensure RCP Thermal Barrier L/U – NORMAL a. Ensure RCP Thermal Barrier Return Valves – OPEN o BB HIS-13 for RCP A o BB HIS-14 For RCP B o BB HIS-15 For RCP C o BB HIS-16 For RCP D b. Ensure CCW Return From RCS Isolation Valves – OPEN o EG HIS-61 o EG HIS-62
	ATC	A6. Check Reactor Power <99% - *Yes*
CAUTION Upon restoration from a total loss of Instrument Air, rapid opening of all steam dumps may occur if in the Steam Pressure Mode. This can cause a Safety Injection. Steam Dumps should be monitored as air is restored and isolated or controlled in manual, as necessary		
NOTE Local opening of EF HV-43, ESW A TO AIR COMPRESSOR (2000' AB NE) results in ESW Train A being inoperable. Local opening of the valve, on 2000' NORTH END AUX BLDG, will preclude it from automatically isolating on a high flow condition.		
	ATC	A7. Ensure Instrument Air Aligned to Red Train **- Yes**
	ATC	A8. Check RCP Cooling – Normal a. CCW Flow to RCS >1.25×10^6 LBM/HR b. RCP Seal Injection flow to each RCP Between 8 gpm and 13 gpm.
	ATC	A9. (p) Restore Power to PZR Backup Heaters a. Check NB02 Energized by offsite power b. Ensure supply breaker for PG22 closed. o PG HIS-21 c. Place B Train PZR backup heaters in AUTO or CLOSE, as desired, to maintain PZR pressure. o BB HIS-52A.

Op-Test No.: Dec 2019 Scenario No.: 5 (Spare) Event No.: 3 Total No Pages 47

Event Description: **AC Emergency Bus NB01 Bus Lockout**

Time	Position	Applicant's Actions or Behavior
		NOTE Yellow train ESW must be started and isolated from Service Water to ensure yellow train components remain OPERABLE.
	ATC	A10. Establish ESW to Yellow Train: a. Check ESW Pump B – Running – ***No*** RNO Perform the following: 1) Start ESW Pump B o EF HIS-56A b. Open ESW Train B to Ultimate Heat Sink. o EF HIS-38 c. Close Yellow train ESW valves o EF HIS-26 o EF HIS-40
	BOP	A11. Check if TDAFW Flow should be reduced. a. Check Reactor Power <10% ***- No*** RNO Go to Step A12
	BOP	A12. Check Yellow Train Spent Fuel Pool Cooling Pump RUNNING **–** ***Yes***
	BOP	A13. Check Yellow Train A/C Units – Running - **Yes**
		CAUTION Prior to using any normal operating procedure to restore equipment and/or resetting any lockout relays, all faults should be verified to be clear.
		NOTE o Annunciator 00-018A, NB01 BUS LOCKOUT being lit is indicative of a bus lockout. This will prevent energization of the NB bus from any source until the bus fault is cleared. o Annunciator 00-018A, NB01 BUS LOCKOUT will not alarm if a bus fault occurs with breakers NB0112 and NB0109 open and EDG A carrying the bus.

Op-Test No.: Dec 2019 Scenario No.: 5 (Spare) Event No.: 3 Total No Pages 47		
Event Description: **AC Emergency Bus NB01 Bus Lockout**		
Time	**Position**	**Applicant's Actions or Behavior**
	ATC	A14. Check NB01 Bus Status: ○ Annunciator 00-018A, NB01 BUS LOCKOUT – CLEAR – ***No*** RNO Perform the following: a. IF diesel is running AND cooling will NOT be restored within 30 minutes, THEN locally stop the diesel, as follows: 1) Place Master Transfer Switch to LOC/MAN ○ KJ HS-9 2) Stop the diesel ○ KJ HS-8B b. Dispatch Electrical Maintenance to clear bus fault. c. WHEN bus fault is clear, THEN continue with step B15.
Simulator Operator: IF contacted as TB Watch and NOT already dispatched to secure A EDG, **Insert Key 10**		
Event Termination: After the crew has stabilized the plant and/or at the direction of the Lead Examiner **Simulator Operator:** **Insert Key 4** at the direction of Lead Examiner		

Op-Test No.: Dec 2019 Scenario No.: 5(Spare) Event No.: 4 Total No Pages 47 **Event Description:** **PRNI 42 fails LOW**		
Time	**Position**	**Applicant's Actions or Behavior**
Simulator Operator: **Insert Key 4** at direction of Lead Examiner. Diagnostics: Annunciator Alarms, Indication on SE NI-42B low scale, Light indications change on Partial Trip status panel, SB-069 Annunciators: 078 & 083C		
	CREW	Recognizes indications and diagnoses a failure of a Power Range Nuclear instrument
	CRS	Enters and directs ALR 00-078A, PR CHANNEL DEV. May enter OFN SB-008 directly.
ALR 00-078A, PR CHANNEL DEV		
	ATC	1.Check For Dropped Or Misaligned Rod: ***-No*** RNO Go to Step 3.
	ATC	3. Check Power Range Channels Operable: a. Check NI Power Range Channels - WITHIN 7% OF EACH OTHER o SE NI-41B o SE NI-42B **- No** o SE NI-43B o SE NI-44B **RNO:** IF alarm is caused by failed NI power range channel, THEN perform the following: 1. Declare QPTR alarm INOPERABLE. 2. Refer to Technical Specification 3.3.1 Table 3.3.1-1 AND TR 3.3.17 3. Go to OFN SB-008, INSTRUMENT MALFUNCTIONS, Step 1.
	CRS	Enters and directs OFN SB-008, INSTRUMENT MALFUNCTIONS.

Op-Test No.: Dec 2019 Scenario No.: 5(Spare) Event No.: 4 Total No Pages 47

Event Description: **PRNI 42 fails LOW**

Time	Position	Applicant's Actions or Behavior
OFN SB-008, INSTRUMENT MALFUNCTIONS		
	CRS	1. Check For Malfunction: * Check If Nuclear Instrumentation System Channel Is Malfunctioning: ***- Yes*** a. Perform appropriate attachment for malfunctioning channel from table below: VARIABLE / CHANNELS / ATTACHMENT Power Range (SE) / N-41, N-42, N-43, N-44 / ATTACHMENT R
	CRS	Enters and directs ATTACHMENT R, POWER RANGE NEUTRON FLUX CHANNEL MALFUNCTION.
OFN SB-008, ATTACHMENT R		
NOTES ○ Steps R1 through R3 are Memory Action steps ○ Refer to FIGURE 4, NI OVERLAP, as needed, to determine if power range instruments are functioning correctly.		
	ATC	R1. Identify Failed Instrument Channel: * One power range flux or delta flux meter indicates abnormally higher or lower than other power range meters***–Yes (SE NI 42B)***
	BOP	R2. Check Load Rejection – NOT IN PROGRESS ○ Generator Load MW – STABLE ***– Yes***
	ATC	R3. Switch ROD BANK AUTO/MAN SEL Switch To Manual. ○ SE HS-9

Op-Test No.: Dec 2019 Scenario No.: 5(Spare) Event No.: 4 Total No Pages 47

Event Description: PRNI 42 fails LOW

Time	Position	Applicant's Actions or Behavior
	RO	R4. Bypass Failed Power Range Flux Channel: a. At the Detector Current Comparator Drawer (N50), perform the following 1) Turn the Upper Section switch to the failed power range flux channel. **PRN42** 2) Turn the Lower Section switch to the failed power range flux channel. **PRN42** 3) Turn the Power Mismatch Bypass switch to the failed power range flux channel. **BYPASS PRN42** 4) Turn the Rod Stop Bypass switch to the failed power range flux channel. **BYPASS PRN42** b. At the Comparator and Rate Drawer (N37/46), perform the following: 1) Turn the Comparator Channel Defeat switch to the failed power range channel. **PRN42**
NOTE It may take several minutes for power and temperature rate circuitry outputs to return to normal before switching back to automatic rod control.		
	ATC	R5. Check ROD BANK AUTO/MAN SEL Switch In Auto. o SE HS-9 **RNO** (ρ) WHEN Tavg is within 1°F of Tref, THEN place ROD BANK AUTO/MAN SEL switch in auto. o SE HS-9
	ATC	R6. Monitor Rod Control System Response To Ensure Proper Control
	BOP	R7. Check Failed Power Range Flux Channel Not Used For Recording On OPΔT/OTΔT Recorder: o OPΔT/OTΔT Recorder ***– No, selected to Loop 1***
	CRS	R8. Verify Operability Of Annunciator 00-079C, RPI DEV OR PR TILT, Using STN RJ-001, VERIFICATION OF OPERABILITY OF COMPUTER PROCESSES
Simulator Operator: IF contacted as WWM, acknowledge requests. IF contacted as Call Supt., acknowledge status.		

Op-Test No.: Dec 2019 Scenario No.: 5(Spare) Event No.: 4 Total No Pages 47

Event Description: **PRNI 42 fails LOW**

Time	Position	Applicant's Actions or Behavior
		NOTE SR 3.2.4.1 allows QPTR to be monitored by three channels if less than or equal to 75% RTP. SR 3.2.4.2 may be performed in lieu of SR 3.2.4.1 to perform a flux map when greater than 75% RTP.
	CRS	R9. Verify QPTR Operability: a. Check Reactor Power Greater Than 50%. ***Yes*** b. Check Reactor Power Greater Than 75%. ***Yes*** c. Perform STS RE-012, QPTR DETERMINATION for one PR Channel being INOPERABLE AND above 75% RTP every 12 hours to verify QPTR is within limits.
	CRS	R10. Monitor The Following Technical Specification LCOs And Comply With Action Statements, As Appropriate: o 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION, Table 3.3.1-1, Functions 2, 3, 6, 18.b, 18.c, 18.d, And 18.e ***– Yes*** o 3.2.4, QUADRANT POWER TILT RATIO, SR 3.2.4.1 And SR 3.2.4.2 ***– Not yet determined per STS RE-012*** o TR 3.3.17, REACTIVITY CONTROL AND POWER DISTRIBUTION ALARMS ***- Yes*** **Enters LCO 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION, Table 3.3.1-1, Functions 2, 3, 6, 18.b, 18.c, 18.d, And 18.e, Condition A – Immediately, Condition D – 12 hrs., Condition E – 72 hrs., Condition S – 1 hr., and Condition T – 1 hr.** **Enters T.R.M 3.3.17, REACTIVITY CONTROL AND POWER DISTRIBUTION ALARMS, Condition D – 12 hrs.**

Examiner Note: The rest of attachment R will NOT be performed. The crew should wait on troubleshooting activities. Monitor the crews' response to maintain Tavg/Tref within band

Event Termination: After the crew has identified Tech Specs and/or at the direction of the Lead Examiner

Simulator Operator: **Insert Key 5** at the lead examiners direction.

Op-Test No.: Dec 2019	Scenario No.: 5 (Spare) Event No.: 5	Total No Pages 47

Event Description: **AD HIS-8 'A' Condensate Pump Discharge Valve fails CLOSED**

Time	Position	Applicant's Actions or Behavior
Simulator Operator: **Insert Key 5** at direction of Lead Examiner. Diagnostics: All four S/G levels lowering Annunciators: 120B and 123B		
	CREW	Diagnoses failure and either performs ALR 00-120B (123B), or enters OFN AF-025 and OFN MA-038 directly.
	CRS	Reviews ALR 00-120B and/or enters OFN AF-025 directly
ALR 00-120B, MFP A SUCT PRESS LO		
	BOP	1. Verify PAE01A, STEAM GENERATOR FEEDWATER PUMP Suction Pressure - LOW **- Yes**
	BOP	2. Check Condensate Header Pressure: ○ NPIS Point ADP0025 <290 psig **– Yes** ○ AD PI-24 <290 psig **- Yes**
	BOP	3. Check Condensate Pumps - THREE RUNNING **- Yes**
Simulator Operator: IF contacted as Turbine Watch to investigate/manually open AD HIS-8, acknowledge request, wait 3 MINUTES, report valve is closed and cannot be opened		
	BOP	4. Check Running Condensate Pumps Discharge Valve(s) – OPEN ***– No*** **RNO** Manually - OPEN VALVE, AD HIS-8 For Pump A
Simulator Operator: IF contacted as Turbine Watch to OPEN AD HIS-8, wait 5 minutes and report that the valve will NOT open		
	BOP	5. Check Running Condensate Pump Recirculation Control Valves – CLOSED **- Yes**
	BOP	6. Check Heater Drain Pumps – Two Running ***- Yes***
	BOP	7. Check Running Heater Drain Pump Recirc Control Valves – CLOSED - ***Yes***

Op-Test No.: Dec 2019 Scenario No.: 5 (Spare) Event No.: 5 Total No Pages 47

Event Description: **AD HIS-8 'A' Condensate Pump Discharge Valve fails CLOSED**

Time	Position	Applicant's Actions or Behavior
	BOP	8. Open Condensate Demineralizer Bypass Valve AD HIS-28
NOTE There is a popup window 7993 for each recirc valve.		
	RO	9. Check Running MFP Recirc Valves – CLOSED ***- Yes***
	RO	10. Check Feedwater Recirculation Control Valve – CLOSED ***– Yes*** ○ AD HK-35
NOTE Head loss through the LP heaters cause a pressure drop from Condensate to the Main Feed Pumps that varies with flow rate (power level).		
	RO	11. Check MFP A suction Pressure >340 psig ***– No*** RNO Perform the following: a. Reduce Turbine load as necessary to restore MFP suction pressure to >340 psig per GEN 00-004, or OFN MA-038
OFN AF-025, UNIT LIMITATIONS		
NOTE Steps 1 through 12 may be done in any order.		
NOTE Reactor power reductions using this OFN are limited to 6MWe (0.5%) per minute. Reactor power reductions at >12 MWe (1.0%) per minute must be done using OFN MA-038, RAPID PLANT SHUTDOWN.		
	CRS	12. Check For Conditions Requiring Unit Load Reduction: a. Determine maximum unit load, using ATTACHMENT A, UNIT LOAD LIMITS.

Op-Test No.: Dec 2019 Scenario No.: 5 (Spare) Event No.: 5 Total No Pages 47

Event Description: **AD HIS-8 'A' Condensate Pump Discharge Valve fails CLOSED**

Time	Position	Applicant's Actions or Behavior
	CRS	FEED AND CONDENSATE CONDITION REQUIRING LOAD REDUCTION: One condensate pump out of service — MAXIMUM UNIT LOAD: 1102 MWE 90% (1) (2) (1) If one condensate pump is lost, reduce power as necessary to maintain MFP suction pressure greater than 340 psig as indicated on Graphic 6101. (2) Maintain Motor Current for the operating Condensate Pumps to less than or equal to 440 amps as indicated on NPIS Computer points, ADI0010, ADI0011 or ADI0012 as applicable. Per E-012.3-00005 the rating of the Condensate Motors is 442 amps.
	CREW	CRS should announce to the crew to perform a 10% power reduction per the beginning of shift brief using guidance OFN MA-038

FEED AND CONDENSATE	
CONDITION REQUIRING LOAD REDUCTION	MAXIMUM UNIT LOAD
One condensate pump out of service	1102 MWE 90% (1) (2)

Simulator Operator: IF contacted as WWM, acknowledge requests. IF contacted as Call Supt., acknowledge status.

OFN MA-038, RAPID PLANT SHUTDOWN

CAUTION

Fast unloading rates may result in increased turbine vibration.

NOTES

- Foldout page shall be monitored throughout this procedure
- Load reduction at greater than 65 MW (5%)/minute will arm condenser steam dumps
- Steps 1, 2 and 3 are memory action steps.

Time	Position	Applicant's Actions or Behavior
	RO	1. Determine Turbine Unloading Method To Be Used: a. Check Desired Unloading Rate – LESS THAN OR EQUAL TO 65 MW/MINUTE (5%) b. Check Automatic Turbine Unloading Desired

Op-Test No.: Dec 2019 Scenario No.: 5 (Spare) Event No.: 5 Total No Pages 47

Event Description: AD HIS-8 'A' Condensate Pump Discharge Valve fails CLOSED

Time	Position	Applicant's Actions or Behavior
		NOTES o If the High Limiter Active on Graphic 5551 is in alarm, load can only be decreased with the Load Control selected to Open Loop. When High Limiter Active is cleared as indicated by the alarm changing to Limiter Activated, the Load Control Mode may be changed. o The following is the preferred Mode of Load Control, unless otherwise directed by another procedure: Open Loop – When Turbine Load is not being changed or the first 10% load decrease from 100%. MW – If making Turbine Load changes where there is no ongoing secondary side transient. FSP – If a secondary side transient requires changing Turbine Load or there is a need to keep primary side more stable.
	BOP	2. (p) Reduce Turbine Load In Automatic: a. From Graphic 5551, TURBINE CONTROL SYSTEM – OPERATION PANEL, LOAD CONTROL section – Select method of Load Control, as directed by CRS/SM. * Open Loop **(Only for first 10% load decrease from 100%)** b. Perform the following steps to reduce turbine load: 1) From Graphic 5551, SETPOINTS section, select CHANGE. 2) At popup 7055, enter the desired MW (greater than or equal to 90% if in Open Loop) and select ENTER. 3) At popup 7055, in the RATE - DEC field enter the desired rate of decrease and select ENTER. 4) From Graphic 5551, SETPOINTS section, select GO to commence load reduction. c. (p) Energize PZR Backup Heaters. o BB HIS-51A o BB HIS-52A d. (p) Borate RCS And Adjust Control Rods, As Necessary, To Maintain The Following: o Target Tavg/Tref Temperature Error Between 0°F And +5°F o Control Rods Above The Rod Insertion Limits e. Maintain desired turbine unloading rate. f. Go to step 4.

Op-Test No.: Dec 2019 Scenario No.: 5 (Spare) Event No.: 5 Total No Pages 47

Event Description: **AD HIS-8 'A' Condensate Pump Discharge Valve fails CLOSED**

Time	Position	Applicant's Actions or Behavior
	ATC	4. Check PZR PORVs: a. RCS Pressure – LESS THAN 2335 PSIG ***- Yes*** b. PZR PORVs – CLOSED ***- Yes*** o BB HIS-455A o BB HIS-456A c. RCS Pressure – GREATER THAN 2185 PSIG ***- Yes*** d. PORV Block Valves – OPEN ***- Yes*** o BB HIS-8000A o BB HIS-8000B
	ATC	5. Check PZR Pressure – Stable at or trending to 2235 psig***- Yes***
	ATC	6. Check PZR Level – Stable at or Trending to program level***- Yes***
	ATC	7. Check S/G Levels controlling between 45% and 55%**- Yes**
Simulator Operator: IF contacted as RP or Chemistry, acknowledge requests		
	RO	8. Notify RP to perform the following: o Monitor RCS and other connecting systems for rising radiation levels due to unplanned crud burst. o Notify all personnel in the affected areas.
	RO	9. Check if sampling is required: ***- Not yet***
	RO	10. Check Reactor Power <65%

Event termination: After the crew has placed rods in manual and/or at the discretion of the Lead Examiner.

Simulator operator: **Insert Key 6** at the lead examiners direction.

Op-Test No.: Dec 2019 Scenario No.: 5 (Spare) Event No.: 6/7 Total No Pages 47 **<u>Event Description:</u> SBLOCA inside Containment. BIT inlet valves fail to open on SI**		
Time	**Position**	**Applicant's Actions or Behavior**
<u>Simulator Operator:</u> Insert Key 6 at direction of Lead Examiner. Diagnostics: RCS pressure and PZR level lowering rapidly		
	CREW	Recognizes lowering RCS pressure and PZR level diagnoses RCS leakage
	CRS	Directs manual Reactor Trip and Safety Injection, enters EMG E-0, REACTOR TRIP OR SAFETY INJECTION
EMG E-0, REACTOR TRIP OR SAFETY INJECTION		
<u>NOTES</u> ○ Steps 1 through 4 are immediate action steps ○ Foldout page shall be monitored throughout this procedure.		
	ATC	1. Verify Reactor Trip: - ***Yes*** a. Check all rod bottom lights – LIT b. Check reactor trip breakers and bypass breakers – OPEN ○ SB ZL-1 ○ SB ZL-2 ○ SB ZL-3 ○ SB ZL-4 c. Check intermediate range neutron flux – DECREASING ○ SE NI-35B [GAMMA METRICS] ○ SE NI-36B [GAMMA METRICS]
	BOP	2. Verify Turbine Trip: - ***Yes*** a. Check Main Stop Valves – ALL CLOSED **–** ***Yes***
	ATC	<u>3.</u> Check AC Emergency Busses – AT LEAST ONE ENERGIZED **–** ***Yes*** *NB01 – ENERGIZED *NB02 – ENERGIZED

Op-Test No.: Dec 2019 Scenario No.: 5 (Spare) Event No.: 6/7 Total No Pages 47

Event Description: **SBLOCA inside Containment. BIT inlet valves fail to open on SI**

Time	Position	Applicant's Actions or Behavior
	ATC	4. Check if Safety Injection is Actuated: a. Check any indication SI is actuated – LIT **– *Yes*** *Annunciator 00-030A, NF039A LOCA SEQ ACTUATED – LIT *Annunciator 00-031A, NF039B LOCA SEQ ACTUATED – LIT *ESFAS status panel SIS section – ANY WHITE LIGHTS LIT *Partial Trip Status Permissive/Block status panel – SI RED LIGHT LIT b. Check both trains of SI actuated **– *Yes*** ○ Ann 00-030A, NF039A LOCA SEQ ACTUATED – LIT ○ Ann 00-031A, NF039B LOCA SEQ ACTUATED – LIT
CAUTION If offsite power is lost after SI reset, manual action may be required to restore safeguards equipment to the required configuration.		
	ATC	5. (t) Check if SI required: * SI was manually actuated AND was required **– *Yes*** * Containment pressure is currently or has been – GREATER THAN OR EQUAL TO 3.5 PSIG **– *Yes*** * RCS pressure is currently or has been – LESS THAN OR EQUAL TO 1830 PSIG **– *Yes*** * Any S/G pressure is currently or has been – LESS THAN OR EQUAL TO 615 PSIG **– *No***
	BOP	FOLDOUT PAGE Step 1. RCP TRIP CRITERIA IF all conditions listed below occur, THEN trip all RCPs: ○ RCS pressure – LESS THAN 1400 PSIG ○ CCPs or SI pumps – AT LEAST ONE RUNNING **- NO** ○ Operator controlled cooldown – NOT IN PROGRESS ○ **CT2:** Trip all RCPs within 5 minutes of RCS pressure going below 1400 psig per EMG E-0 foldout page step 1 AND after having established High Head Injection.

Op-Test No.: Dec 2019 Scenario No.: 5 (Spare) Event No.: 6/7 Total No Pages 47

Event Description: **SBLOCA inside Containment. BIT inlet valves fail to open on SI**

Time	Position	Applicant's Actions or Behavior
	BOP	FOLDOUT PAGE Step 7. RCS TEMPERATURE CONTROL ○ IF a Loss-Of-Offsite Power has occurred, THEN close MSIVs *AB HS-79 *AB HS-80 ○ IF no RCPS are running AND off-site power is available, THEN select STM PRESS mode on the steam dumps ○ AB US-500Z ○ IF RCS C/L temperature is less than 557°F AND decreasing, THEN control total feed flow to limit RCS cooldown ○ Maintain total feed flow greater than 270,000 lbm/hr until narrow range is greater than 6% [29%] in at least one S/G
	ATC	6. Verify Automatic Actions using Attachment F **Examiner Note:** See Attachment 1 for complete list of actions F5. Verify ECCS Pumps Running: b. Check SI pumps – BOTH RUNNING **– *No*** RNO Manually start pumps. ○ EM HIS-4 - **Unavailable** ○ **EM HIS-5** **CT1**: Given a failure of the BIT inlet valves to open and B Safety Injection pump to auto start, establish high head injection flow to the RCS before RVLIS Forced Flow Range drops to 66% w/ 4 RCPs running AND prior to Tripping RCPs. F13. Verify ECCS Flow: a. Check Centrifugal Charging Pumps To Boron Injection Tank Flow meters – FLOW INDICATED – ***No*** ○ EM FI-917A ○ EM FI-917B **RNO** Perform the following: 1) IF BIT valves have NOT been closed by operator action, THEN manually start pumps and align valves. ○ **Open EM HIS-8803A** ○ **Open EM HIS-8803B** **CT1:** Given a failure of the BIT inlet valves to open and B Safety Injection pump to auto start, establish high head injection flow to the RCS before RVLIS Forced Flow Range drops to 66% w/ 4 RCPs running AND prior to Tripping RCPs.

Op-Test No.: Dec 2019 Scenario No.: 5 (Spare) Event No.: 6/7 Total No Pages 47

Event Description: **SBLOCA inside Containment. BIT inlet valves fail to open on SI**

Time	Position	Applicant's Actions or Behavior
	BOP	7. Check Main Generator Breakers and Exciter Breaker – OPEN **– *Yes*** o MA ZL-3A o MA ZL-4A o MA ZL-2
	BOP	8. Check Total AFW Flow – GREATER THAN 270,000 LBM/HR **– *Yes***
	BOP	9. Check RCS Cold Leg Temperatures: *Stable at or trending to 557°F for condenser steam dumps or S/G ARVs *Stable at or trending to a range of 553°F to 557°F for S/G ARVs if recovering from an inadvertent SI
	BOP	10. Establish S/G Pressure Control: a. Check condenser – AVAILABLE **– *Yes*** o C-9 LIT o MSIV – OPEN o Circulating water pumps - RUNNING b. Place Steam Header Pressure Control in Manual o AB PK-507 c. Manually set Steam Header Pressure Control output to zero o AB PK-507 d. Place Steam Dump Select Switch in STEAM PRESS position o AB US-500Z e. Place Steam Header Pressure Control in Automatic o AB PK-507
	ATC	11. Check PZR PORVs a. Check PZR PORVs – CLOSED **– *Yes*** o BB HIS-455A o BB HIS-456A b. Power to block valves – AVAILABLE **– *Yes*** o BB HIS-8000A o BB HIS-8000B c. RCS pressure – LESS THAN 2185 PSIG
	ATC	12. Check Normal PZR Spray Valves – CLOSED **– *Yes*** o BB ZL-455B o BB ZL-455C
	ATC	13. Check PZR Safety Valves – CLOSED **– *Yes*** o BB ZL-8010A o BB ZL-8010B BB ZL-8010C

Op-Test No.: Dec 2019 Scenario No.: 5 (Spare) Event No.: 6/7 Total No Pages 47		
Event Description: **SBLOCA inside Containment. BIT inlet valves fail to open on SI**		
Time	**Position**	**Applicant's Actions or Behavior**
NOTE Seal injection flow shall be maintained to all RCPs		
	ATC/BOP	14. Check if RCPs should be stopped: a. Check RCPs – ANY RUNNING ***– No*** RNO a. Go to Step 15
	CRS	15. Direct operator to Monitor Critical Safety Functions Using EMG F-0, CRITICAL SAFETY FUNCTION STATUS TREES (CSFST)
	BOP	16. Check if S/Gs are not Faulted: ***- Yes*** a. Check pressures in all S/Gs – o NO S/G PRESSURE DECREASING IN AN UNCONTROLLED MANNER o NO S/G COMPLETELY DEPRESSURIZED
	BOP	17. (t) Check if S/G tubes are intact: o Check S/G Levels – NOT INCREASING IN AN UNCONTROLLED MANNER ***– Yes*** o Narrow range o Wide range o Condenser air discharge radiation – NORMAL BEFORE ISOLATION ***– Yes*** o GEG 925 o S/G blowdown and sample radiation – NORMAL BEFORE ISOLATION ***– Yes*** o BML 256 o SJL 026 o Turbine driven auxiliary feedwater pump exhaust radiation – NORMAL ***– Yes*** o FCT 381 o S/G steamline radiation – NORMAL ***– Yes*** o ABS 114 for S/G A o ABS 113 for S/G B o ABS 112 for S/G C o ABS 111 for S/G D

Op-Test No.: Dec 2019 Scenario No.: 5 (Spare) Event No.: 6/7 Total No Pages 47

Event Description: **SBLOCA inside Containment. BIT inlet valves fail to open on SI**

Time	Position	Applicant's Actions or Behavior
	ATC	18. Check if RCS is intact in Containment: ***- NO*** o Containment radiation – NORMAL BEFORE ISOLATION o GTP 311 o GTI 312 o GTG 313 o GTP 321 o GTI 322 o GTG 323 o GTA 591 o GTA 601 o Containment pressure – NORMAL o GN PI-934 o GN PI-935 o GN PI-936 o GN PI-937 o GT PDI-40 o GN PR-934 o Containment sump level – NORMAL o EJ LI-7 o EJ LI-8 o EJ LR-6 o LF LI-9 o LF LI-10 RNO Perform the following: a. Ensure BIT Inlet AND Outlet Valves are open ***– Yes*** o EM HIS-8803A o EM HIS-8803B o EM HIS-8801A o EM HIS-8801B b. Go to EMG E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1
	CRS	Conducts brief and transitions to EMG E-1, LOSS OF REACTOR OR SECONDARY COOLANT

Event termination: After the crew has begun transition to EMG E-1 and/or at the discretion of the Lead Examiner.

Simulator operator: **Insert Key 8** at the lead examiners direction.

Op-Test No.: Dec 2019 Scenario No.: 5 (Spare) Event No.: 6/7 Total No Pages 47		
Event Description: **SBLOCA inside Containment. BIT inlet valves fail to open on SI**		
Time	**Position**	**Applicant's Actions or Behavior**
EMG E-1, LOSS OF REACTOR OR SECONDARY COOLANT		
NOTES o Foldout page shall be monitored throughout this procedure o Seal injection flow shall be maintained to all RCPs		
	ATC/BOP	1. 14. Check if RCPs should be stopped: a. Check RCPs – ANY RUNNING **– *No*** RNO a. Go to Step 2
	BOP	2. Check if S/Gs are not Faulted: ***- Yes*** a. Check pressures in all S/Gs – o NO S/G PRESSURE DECREASING IN AN UNCONTROLLED MANNER o NO S/G COMPLETELY DEPRESSURIZED
	BOP	3. Check intact S/G Levels: a. Check Narrow Range Level in at Least One S/G – GREATER THAN 6% [29%] b. Control feed flow to maintain narrow range level in all S/Gs between 6% [29%] and 50%
CAUTION If offsite power is lost after SI reset, manual action may be required to restore safeguards equipment to the required configuration		
	ATC	4. Reset SI o SB HS-42A o SB HS-43A
	ATC	5. Reset Containment Isolation Phase A and Phase B o SB HS-56 For Phase A o SB HS-53 For Phase A o SB HS-55 For Phase B o SB HS-52 For Phase B
CAUTION If steamlines in Area 5 of Auxiliary Building are not intact extreme caution will be necessary when performing local surveys		

Op-Test No.: Dec 2019 Scenario No.: 5 (Spare) Event No.: 6/7 Total No Pages 47

Event Description: **SBLOCA inside Containment. BIT inlet valves fail to open on SI**

Time	Position	Applicant's Actions or Behavior
	BOP	6. Determine Secondary Radiation Levels: a. Direct Health Physics to survey steamlines in Area 5 of the Aux Bldg b. Check S/G Sampling ISOLATED ***– Yes*** c. Check Instrument Air Pressure – GREATER THAN 105 PSIG ***– Yes*** ○ KA PI-40 d. Open CCW to Radwaste System Isolation Valves ○ EG HS-69 ○ EG HS-70 e. Open all S/G sample isolation valves ○ BM HIS-65 for S/G A ○ BM HIS-35 for S/G A ○ BM HIS-66 for S/G B ○ BM HIS-36 for S/G B ○ BM HIS-67 for S/G C ○ BM HIS-37 for S/G C ○ BM HIS-68 for S/G D ○ BM HIS-38 for S/G D f. Direct Chemistry to sample all S/Gs for activity
	BOP	7. Check Secondary Radiation – NORMAL a. Condenser Air Discharge Radiation – NORMAL BEFORE ISOLATION ***– Yes*** ○ GEG 925 b. S/G Blowdown Radiation – NORMAL BEFORE ISOLATION ***– Yes*** ○ BML 256 c. S/G Sample Radiation – NORMAL ***– Yes*** ○ SJL 026 ○ Sample results d. Turbine Driven Auxiliary Feedwater Pump Exhaust Radiation – NORMAL ***– Yes*** ○ FCT 381 e. S/G Steamline Radiation – NORMAL ***– Yes*** ○ ABS 114 For S/G A ○ ABS 113 For S/G B ○ ABS 112 For S/G C ○ ABS 111 For S/G D ○ Local Surveys

Simulator Operator: WHEN contacted as HP and Chemistry, acknowledge requests

CAUTION

If any PZR PORV opens because of high PZR pressure, the PORV shall be monitored to ensure it recloses after pressure decreases to less than 2335 psig

Op-Test No.: Dec 2019 Scenario No.: 5 (Spare) Event No.: 6/7 Total No Pages 47

Event Description: **SBLOCA inside Containment. BIT inlet valves fail to open on SI**

Time	Position	Applicant's Actions or Behavior
	BOP	8. Check PORVs and Block Valves a. Power to block valves – AVAILABLE ***– Yes*** o BB HIS-8000A o BB HIS-8000B b. Check PZR PORVs – CLOSED ***– Yes*** o BB HIS-455A o BB HIS-456A c. RCS pressure – LESS THAN 2185 PSIG
NOTE Locally opening EF-HV-43, ESW A TO AIR COMPRESSOR or EG HV-44, ESW B TO AIR COMPRESSOR requires the associated ESW train to be declared inoperable. Local opening of the valve, on 2000' NORTH END AUX BLDG, will preclude it from automatically isolating on a high flow condition		
	BOP	9. Verify Instrument Air Compressor is Running: a. Ensure at least one ESW TRN TO AIR COMPRESSOR Valve – OPEN ***– Yes*** *EF HIS-43 *EF HIS-44 b. Check AIR COMPRESSOR BRKR RESET switch associated with open ESW Valve(s) – CLOSED ***– No*** *KA HIS-3C *KA HIS-2C RNO b. Reset and close AIR COMPRESSIR BRKR RESET Switch *KA HIS-3C *KA HIS-2C c. Check INST AIR PRESS – GREATER THAN 105 PSIG ***– Yes*** o KA PI-40 d. Check neither ESW TO AIR COMPRESSOR Valve – Locally Opened ***– No*** o EF HV-43 o EF HV-44 e. Check both ESW TRN TO AIR COMPRESSOR Valves – OPEN ***– Yes*** o EF HIS-43 o EF HIS-44 f. Check both AIR COMPRESSOR BRKR RESET switches – CLOSED ***– Yes*** o KA HIS-3C o KA HIS-2C

Op-Test No.: Dec 2019 Scenario No.: 5 (Spare) Event No.: 6/7 Total No Pages 47

Event Description: SBLOCA inside Containment. BIT inlet valves fail to open on SI

Time	Position	Applicant's Actions or Behavior
	BOP	10. Verify Instrument Air to Containment: a. Check PZR PRESS MASTER CTRL Output – LESS THAN 55% ***- Yes*** o BB PK-455A b. Open INST AIR SPLY CTMT ISO VLV o KA HIS-29
	ATC	11. Check if ECCS Flow should be reduced: ***- No*** a. RCS Subcooling – GREATER THAN 30°F [45°F] b. Secondary heat sink: *Total Feed Flow to Intact S/Gs – GREATER THAN 270,000 LBM/HR OR *Narrow Range Level in at least one intact S/G – GREATER THAN 6% [29%] c. RCS Pressure – STABLE OR INCREASING d. PZR Level – GREATER THAN 6% [32%] RNO Go to Step 12
	ATC	12. Check if Containment Spray should be stopped: a. Check Spray Pumps – ANY RUNNING ***– No*** RNO a. Perform the following: 1) IF at least one spray pump has been stopped by operator action THEN got to step 12.b ***– No*** 2) IF no spray pumps are running, THEN OBSERVE CAUTION PRIOR TO STEP 13 and go to step 13 ***– Yes***
CAUTION After RHR pumps have been stopped, RCS pressure shall be monitored for RHR pump restart criteria		
	ATC	13. Check if RHR Pumps Should be stopped: a. Check RHR Pumps – ANY RUNNING ***– No*** RNO Go to step 14
	ATC	14. Check RCS and S/G Pressures: a. Check RCS Pressure STABLE OR DECREASING ***– Yes*** b. Check Pressure in All S/Gs – STABLE OR INCREASING ***– Yes***

Op-Test No.: Dec 2019 Scenario No.: 5 (Spare) Event No.: 6/7 Total No Pages 47 **Event Description:** **SBLOCA inside Containment. BIT inlet valves fail to open on SI**		
Time	**Position**	**Applicant's Actions or Behavior**
	ATC	15. Check if Diesel Generators should be stopped: a. Check NB01 – ENERGIZED BY OFFSITE POWER **– *No*** e. Check NB02 – ENERGIZED BY OFFSITE POWER **– *Yes*** f. Depress START/RESET pushbutton for Diesel Generator NE02 ○ KJ HS-108A g. Depress STOP pushbutton for Diesel Generator NE01 ○ KJ HS-108A h. Place EDG NE02 in standby using KJ-121, DIESEL GENERATOR NE01 AND NE02 LINEUP FOR AUTOMATIC OPERATION, while continuing with this procedure
Simulator Operator: WHEN contacted as the Building Watch, acknowledge request: ○ Wait 5 min and **Insert Key 12**, contact control room and report EDG B is lined up for automatic operation		
	ATC	16. Load Equipment on Energized AC Emergency Busses: a. Locally reset and close Boric Acid Transfer Pump beakers ○ NG01AHF4 For Pump A ○ NG02AAF4 For Pump B b. Locally reset and close emergency borate valve breaker ○ NG04CPF2 For BG HV-8104
Simulator Operator: WHEN contacted as the Turbine/Auxiliary Building Watch, acknowledge request: ○ Wait 5 min and **Insert Key 13**, contact control room and report breakers are reset and closed for Boric Acid Transfer pumps ○ Wait 10 min and **Insert Key 14**, contact control room and report breaker is reset and closed for Emergency Borate valve		
	ATC	17. Close Non-Class 1E Battery Charger Breakers ○ PK HIS-2 For PK-21 ○ PK HIS-3 For PK-22 ○ PK HIS-4 For PK-23 ○ PK HIS-5 For PK-24
	ATC	18. Check ALL non-class 1E AC Busses and Load Centers – ENERGIZED BY OFFSITE POWER ○ PA ○ PB ○ PG ○ SL

Op-Test No.: Dec 2019 Scenario No.: 5 (Spare) Event No.: 6/7 Total No Pages 47		
Event Description: **SBLOCA inside Containment. BIT inlet valves fail to open on SI**		
Time	**Position**	**Applicant's Actions or Behavior**
	BOP	19. Place Hydrogen Analyzers Inservice a. On RL011, place power lockout switches for containment sample valves in NON-ISO position ○ GS HIS-40 ○ GS HIS-41 ○ GS HIS-42 ○ GS HIS-43 b. On RL011, open one Hydrogen Analyzer Supply Inner Containment Isolation Valve per train ○ GS HIS-13 OR GS HIS-14 For Red Train ○ GS HIS-4 OR GS HIS-5 For Yellow Train c. On RL011, open remaining hydrogen analyzer containment isolation valves ○ GS HIS-12 ○ GS HIS-17 ○ GS HIS-18 ○ GS HIS-3 ○ GS HIS-8 ○ GS HIS-9 d. On RL020, place containment hydrogen analyzer control switches in ANALYZE position ○ GS HIS-16A ○ GS HIS-11A e. On RL020, monitor containment hydrogen concentration ○ GS AI-19 ○ GS AI-10
	BOP	20. Verify Cold Leg Recirculation Capability: a. Check ESFAS Status Panel SIS Section – NO AMBER LIGHT LIT ○ Red Train ***– No*** ○ Yellow Train ***– No*** RNO Perform the following: 1. Ensure Power to Components Listed in Attachment A – Available ***– Yes*** 2. IF cold leg recirculation capability can NOT be verified for at least one RHR train, THEN go to EMG C-11, LOSS OF EMERGENCY COOLANT RECIRCULATION, Step 1

Op-Test No.: Dec 2019 Scenario No.: 5 (Spare) Event No.: 8 Total No Pages 47

Event Description: **'B' CCP trips and BG FK-121 fails closed on SI**

Time	Position	Applicant's Actions or Behavior
Simulator Operator: **Insert Key 6** at direction of Lead Examiner. Diagnostics: ORANGE PATH conditions for CORE COOLING		
	CRS	Enters and directs actions for EMG FR-C2, RESPONSE TO DEGRADED CORE COOLING
EMG FR-C2, RESPONSE TO DEGRADED CORE COOLING		
NOTES ○ Foldout page shall be monitored throughout this procedure ○ Normal conditions for running RCPs are desired. If normal conditions can not be established or maintained, RCPs should not be tripped		
	BOP	1. Verify SI Valves – PROPERLY ALIGNED a. Check ESFAS status panel SIS section – ALL WHITE LIGHTS LIT FOR CURRENT ECCS LINEUP ***- No*** *Injection OR *Cold leg recirculation OR *Hot leg recirculation RNO IF any SIS section component NOT properly aligned, THEN manually align associated component to establish proper SIS lineup

Op-Test No.: Dec 2019 Scenario No.: 5 (Spare) Event No.: 8 Total No Pages 47

Event Description: 'B' CCP trips and BG FK-121 fails closed on SI

Time	Position	Applicant's Actions or Behavior
	ATC	2. Verify Charging and SI flow in all trains: a. Check Centrifugal Charging pumps to Boron Injection Tank Flow Meters – FLOW INDICATED **– *No*** ○ EM FI-917A ○ EM FI-917B RNO a. Perform the following: 1) Start pumps and align valves as necessary to establish normal BIT injection 2) Ensure CCP discharge to Charging Header isolation valves – AT LEAST ONE OPEN *BG-8483A (1974' AUX BLDG., CCP A ROOM) *BG-8483C (1974' AUX BLDG., CCP B ROOM) 3) If normal ECCS injection can NOT be established, THEN try to establish alternate high head injection using ATTACHMENT A, ESTABLISHING ALTERNATE HIGH HEAD INJECTION
ATTACHMENT A, ESTABLISHING ALTERNATE HIGH HEAD INJECTION		
	ATC	A1. Ensure Charging Pump Suction: *Charging Pump Suction from RWST valves – AT LEAST ONE OPEN *BN HIS-112D *BN HIS-112E <u>OR</u> *VCT Outlet Valves – BOTH OPEN ○ BG HIS-112B ○ BG HIS-112C
	ATC	A2. Check CCPs – ANY RUNNING – *No* RNO Perform the following: a. Manually start CCPS ○ BG HIS-1A for CCP A ○ BG HIS-2A for CCP B b. IF neither CCP can be started, THEN start NCP on recric: 1) Start NCP ○ BG HIS-3 c. IF no charging pump can be started, THEN return to procedure and step in effect

Op-Test No.: Dec 2019 Scenario No.: 5 (Spare) Event No.: 8 Total No Pages 47

<u>Event Description:</u> 'B' CCP trips and BG FK-121 fails closed on SI

Time	Position	Applicant's Actions or Behavior
CAUTION If offsite power is lost after SI reset, manual action may be required to restore safeguards equipment to the required configuration		
	BOP	A3. Reset SI: o SB HS-42A o SB HS-43A
	BOP	A4. Reset Containment Isolation Phase A and Phase B: o SB HS-56 For Phase A o SB HS-53 For Phase A o SB HS-55 For Phase B o SB HS-52 For Phase B
NOTE Locally opening EF HV-43, ESW A TO AIR COMPRESSOR or EF HV-44, ESW B TO AIR COMPRESSOR requires the associated ESW Train to be declared inoperable. Local opening of the valve, on 2000' NORTH END AUX BLDG, will preclude it from automatically isolating on a high flow condition		

Op-Test No.: Dec 2019 Scenario No.: 5 (Spare) Event No.: 8 Total No Pages 47

Event Description: 'B' CCP trips and BG FK-121 fails closed on SI

Time	Position	Applicant's Actions or Behavior
	BOP	A5. Verify Instrument Air Compressor Running: a. Ensure At Least One ESW TRN TO AIR COMPRESSOR Valve – OPEN **– *Yes*** *EF HIS-43 *EF HIS-44 b. Check AIR COMPRESOSR BRKR RESET Switch Associated With Open ESW Valve(s) ***- No*** *KA HIS-3C *KA HIS-2C **RNO:** Reset and Close AIR COMPRESSOR BRKR RESET Switch *KA HIS-3C *KA HIS-2C c. Check INST AIR PRESS – GREATER THAN 105 PSIG o KA PI-40 ***– Yes*** d. Check Neither ESW TO AIR COMPRESSOR Valve – Locally Opened ***- No*** o EF HV-43 o EF HV-44 e. Check Both ESW TRN TO AIR COMPRESSOR Valves – OPEN ***– Yes*** o EF HIS-43 o EF HIS-44 f. Check Both AIR COMPRESSOR BRKR RESET Switches – CLOSED ***– Yes*** o KA HIS-3C o KA HIS-2C
	BOP	A6. Verify Instrument Air to Containment: a. Check PZR PRESS MASTER CTRL Output – LESS THAN 55% ***- Yes*** o BB PK-455A b. Open INST AIR SPLY CTMT ISO VLV o KA HIS-29

Op-Test No.: Dec 2019 Scenario No.: 5 (Spare) Event No.: 8 Total No Pages 47		
Event Description: **'B' CCP trips and BG FK-121 fails closed on SI**		
Time	**Position**	**Applicant's Actions or Behavior**
	ATC	7. Establish Normal Charging Header Flowpath: a. Open Charging Header Back Pressure Control valve ○ BG HC-182 b. Open Charging Pumps to Regenerative Heat Exchanger Containment Isolation Valves ○ BG HIS-8105 ○ BG HIS-8106 c. Align Regenerative Heat Exchanger to Loop Cold Leg valves to establish only one open *BG HIS-8146 for loop 1 *BG HIS-8147 for loop 4
	ATC	A8. Check CCPs – ANY RUNNING **– *No*** **RNO** Perform the following: a. Open NCP Discharge Flow Control Valve ○ BG FK-462 b. Go to step A10 **CT1**: Establish Alternate High Head Injection per EMG FR-C2 prior to CET temperatures rising to 712°F
Event termination: After the crew has established Alternate High Head Injection and/or at the discretion of the Lead Examiner. **Simulator operator:** FREEZE		

Attachment 1 EMG E-0 Attachment F

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 79 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 1 of 13)
AUTOMATIC SIGNAL VERIFICATION

F1.	**Check AC Emergency Busses - ENERGIZED:**	
	o NB01 - ENERGIZED	o Depress START/RESET pushbutton for EDG A. o KJ HS-8A
	o NB02 - ENERGIZED	o Depress START/RESET pushbutton for EDG B. o KJ HS-108A

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 81 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 2 of 13)
AUTOMATIC SIGNAL VERIFICATION

F2. Verify Feedwater Isolation:

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
a. Main feedwater pumps - TRIPPED o Annunciator 00-120A, MFP A TRIP - LIT o Annunciator 00-123A, MFP B TRIP - LIT	a. Manually trip Main Feedwater Pumps. o IF MFWP A is NOT tripped, THEN depress the following: o FC HS-18A For MFWP A o FC HS-18B For MFWP A o IF MFWP B is NOT tripped, THEN depress the following: o FC HS-118A For MFWP B o FC HS-118B For MFWP B
b. Main feedwater reg valves - CLOSED o AE ZL-510 for S/G A o AE ZL-520 for S/G B o AE ZL-530 for S/G C o AE ZL-540 for S/G D	b. Manually close valves. * AE FK-510 for S/G A * AE FK-520 for S/G B * AE FK-530 for S/G C * AE FK-540 for S/G D
c. Main feedwater reg bypass valves - CLOSED o AE ZL-550 for S/G A o AE ZL-560 for S/G B o AE ZL-570 for S/G C o AE ZL-580 for S/G D	c. Manually close valves. * AE LK-550 for S/G A * AE LK-560 for S/G B * AE LK-570 for S/G C * AE LK-580 for S/G D
d. Main feedwater isolation valves - CLOSED o AE HIS-39 for S/G A o AE HIS-40 for S/G B o AE HIS-41 for S/G C o AE HIS-42 for S/G D	d. Perform the following: 1) Manually close valves. 2) IF valves can NOT be closed, THEN at SA075A OR SA075B, disconnect the following cards (2 cards total) in the MFIV sub-racks: o ALS-411-1 o ALS-411-2

(Step F2. continued on next page)

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 83 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 3 of 13)
AUTOMATIC SIGNAL VERIFICATION

Step F2. (continued from previous page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
e. Main feedwater chemical injection valves - CLOSED o AE HIS-43 for S/G A o AE HIS-44 for S/G B o AE HIS-45 for S/G C o AE HIS-46 for S/G D	e. Perform the following: 1) Manually close valve. 2) IF valve can NOT be closed, THEN locally isolate affected feedline. * AE-V129 for S/G A (STEAM ENCLOSURE ROOM SOUTH OF MFIV) * AE-V128 for S/G B (STEAM ENCLOSURE ROOM SOUTH OF MFIV) * AE-V131 for S/G C (STEAM ENCLOSURE ROOM SOUTH OF MFIV) * AE-V130 for S/G D (STEAM ENCLOSURE ROOM SOUTH OF MFIV)
f. Check ESFAS status panel SGBSIS section - ALL WHITE LIGHTS LIT o Red train o Yellow train	f. IF any SGBSIS valve NOT closed, THEN manually close valve. IF valve(s) can NOT be closed, THEN manually or locally isolate affected blowdown or sample line. Refer to ATTACHMENT A, VALVES CLOSED BY S/G BLOWDOWN AND SAMPLE ISOLATION SIGNAL.

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 85 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 4 of 13)
AUTOMATIC SIGNAL VERIFICATION

F3. Verify Containment Isolation Phase A:

a. Check ESFAS status panel CISA section - ALL WHITE LIGHTS LIT

- o Red train
- o Yellow train

RESPONSE NOT OBTAINED:

a. Perform the following:

1) <u>IF</u> containment isolation phase A has <u>NOT</u> actuated, <u>THEN</u> manually actuate containment isolation phase A.

- o SB HS-47
- o SB HS-48

2) <u>IF</u> any CISA valve <u>NOT</u> closed, <u>THEN</u> manually close valve. <u>IF</u> valve(s) can <u>NOT</u> be closed, <u>THEN</u> manually or locally isolate affected containment penetration. Refer to ATTACHMENT B, VALVES CLOSED BY CONTAINMENT ISOLATION SIGNAL PHASE A.

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 87 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 5 of 13)
AUTOMATIC SIGNAL VERIFICATION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
F4.	**Verify AFW Pumps Running:**	
	a. Check motor driven AFW pumps - BOTH RUNNING	a. Manually start pumps. o AL HIS-22A o AL HIS-23A
	b. Check turbine driven AFW pump - RUNNING	b. Perform the following: 1) Check if turbine driven AFW pump should be running: * At least 2/4 S/G narrow range level channels on 2/4 S/Gs - LESS THAN 23.5% <u>OR</u> * Loss of NB01 voltage has occurred <u>OR</u> * Loss of NB02 voltage has occurred <u>OR</u> * AMSAC actuation 2) <u>IF</u> turbine driven AFW pump should be running, <u>THEN</u> manually open steam supply valves: a) AB HIS-5A b) AB HIS-6A c) FC HIS-312A

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 89 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 6 of 13)
AUTOMATIC SIGNAL VERIFICATION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
F5.	**Verify ECCS Pumps Running:**	
	a. Check CCPs - BOTH RUNNING	a. Manually start pumps. o BG HIS-1A o BG HIS-2A
	b. Check SI pumps - BOTH RUNNING	b. Manually start pumps. o EM HIS-4 o EM HIS-5
	c. Check RHR pumps - BOTH RUNNING	c. Manually start pumps. o EJ HIS-1 o EJ HIS-2
F6.	**Verify CCW Alignment:**	
	a. Check CCW pumps - ONE RUNNING IN EACH TRAIN	a. Manually start CCW pumps as necessary to establish one running in each train. o EG HIS-21 or EG HIS-23 for red train o EG HIS-22 or EG HIS-24 for yellow train
	b. Check one pair of CCW service loop Supply And Return Valves for an operating CCW pump - OPEN * EG ZL-15 AND EG ZL-53 OR * EG ZL-16 AND EG ZL-54	b. Manually align valves as necessary to establish CCW flow to service loop and containment.
F7.	**Check ESW Pumps - BOTH RUNNING**	Manually start pumps. o EF HIS-55A o EF HIS-56A

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 91 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 7 of 13)
AUTOMATIC SIGNAL VERIFICATION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
F8.	**Check Containment Fan Coolers - RUNNING IN SLOW SPEED**	Perform the following for each Containment Cooler Fan that is still running in Fast or is not running: a. Manually stop ANY Containment Cooler Fans running in fast. * GN HIS-5 For Cooler 1A * GN HIS-9 For Cooler 1B * GN HIS-13 For Cooler 1C * GN HIS-17 For Cooler 1D b. Place Containment Cooler Fan Speed Selector switches in Slow. * GN HS-5 for cooler 1A * GN HS-9 for cooler 1B * GN HS-13 for cooler 1C * GN HS-17 for cooler 1D c. Manually start containment cooler fans. * GN HIS-5 for cooler 1A * GN HIS-9 for cooler 1B * GN HIS-13 for cooler 1C * GN HIS-17 for cooler 1D

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 93 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 8 of 13)
AUTOMATIC SIGNAL VERIFICATION

F9. Verify Containment Purge Isolation:

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
a. Check ESFAS status panel CPIS section - ALL WHITE LIGHTS LIT o Red train o Yellow train	a. Perform the following: 1) IF containment purge isolation has NOT actuated, THEN manually actuate containment purge isolation. o SA HS-11 o SA HS-15 2) IF any CPIS component NOT properly aligned, THEN manually align component. 3) IF component(s) can NOT be manually aligned, THEN locally isolate instrument air to affected containment penetration. Refer to ATTACHMENT C, VALVES CLOSED BY CONTAINMENT PURGE ISOLATION SIGNAL.

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 95 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 9 of 13)
AUTOMATIC SIGNAL VERIFICATION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
F10.	**Verify Both Trains Of Control Room Ventilation Isolation:**	
	a. Check ESFAS status panel CRVIS section - ALL WHITE LIGHTS LIT o Red train o Yellow train	a. Perform the following: 1) IF control room ventilation isolation has NOT actuated, THEN manually actuate control room ventilation isolation. o SA HS-9 o SA HS-13 2) IF any CRVIS component NOT properly aligned, THEN manually align associated component. 3) IF neither train of CRVIS is in service, THEN establish one in service train of CRVIS using SYS GK-122, MANUAL CRVIS LINE-UP. 4) IF only one train of CRVIS can be placed in service, THEN within 90 minutes (76.5 minutes control room and 13.5 minutes local operator), isolate out of service train using SYS GK-122, MANUAL CRVIS LINE-UP.
	b. Ensure Control Room outer door - CLOSED	

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 97 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 10 of 13)
AUTOMATIC SIGNAL VERIFICATION

F11. Verify Main Steamline Isolation Not Required:

a. Check containment pressure - HAS REMAINED LESS THAN 17 PSIG

o GN PR-934

b. Check either condition below - SATISFIED:

* Low steamline pressure SI - NOT BLOCKED <u>AND</u> steamline pressure - HAS REMAINED GREATER THAN 615 PSIG

<u>OR</u>

* Low steamline pressure SI - BLOCKED <u>AND</u> steamline pressure rate - HAS REMAINED LESS THAN 100 PSI/50 SEC

RESPONSE NOT OBTAINED:

Verify steamline isolation:

1. If any main steamline isolation valve is <u>NOT</u> closed, <u>THEN</u> perform the following:

   a) Close main steamline isolation valves.

      * AB HS-79
      * AB HS-80

   b) <u>IF</u> any MSIV is still <u>NOT</u> closed, <u>THEN</u> at SA075A <u>OR</u> SA075B, disconnect the following cards (2 cards total) in the MSIV sub-rack:

      o ALS-411-1

      o ALS-411-2

2. Check ESFAS status panel SLIS section - ALL WHITE LIGHTS LIT

   o Red Train
   o Yellow Train

3. <u>IF</u> any SLIS valve <u>NOT</u> closed, <u>THEN</u> manually close valve. <u>IF</u> valve(s) can <u>NOT</u> be closed, <u>THEN</u> manually or locally isolate affected steamline. Refer to ATTACHMENT D, VALVES CLOSED BY STEAMLINE ISOLATION SIGNAL.

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 99 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 11 of 13)
AUTOMATIC SIGNAL VERIFICATION

F12. Verify Containment Spray Not Required:

a. Containment pressure - HAS REMAINED LESS THAN 27 PSIG:

- o Annunciator 00-059A, CSAS - NOT LIT
- o Annunciator 00-059B, CISB - NOT LIT
- o GN PR-934

RESPONSE NOT OBTAINED:

Perform the following:

1. Stop all RCPs.

2. IF containment spray has NOT actuated, THEN manually actuate containment spray.

   - o SB HS-43 AND SB HS-45
   - o SB HS-44 AND SB HS-46

3. Check ESFAS status panel CSAS section - ALL WHITE LIGHTS LIT

   - o Red train
   - o Yellow train

4. IF any CSAS component NOT properly aligned, THEN manually align associated component.

5. Check ESFAS status panel CISB section - ALL WHITE LIGHTS LIT

   - o Red train
   - o Yellow train

6. IF any CISB valve NOT closed, THEN manually close valve. IF valve(s) can NOT be closed, THEN manually or locally isolate affected containment penetration. Refer to ATTACHMENT E, VALVES CLOSED BY CONTAINMENT ISOLATION SIGNAL PHASE B.

Revision: 40	REACTOR TRIP OR SAFETY INJECTION	EMG E-0
Continuous Use		Page 101 of 103

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT F
(Page 12 of 13)
AUTOMATIC SIGNAL VERIFICATION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
F13.	**Verify ECCS Flow:**	
	a. Check Centrifugal Charging Pumps To Boron Injection Tank Flow meters - FLOW INDICATED o EM FI-917A o EM FI-917B	a. Perform the following: 1) IF BIT valves have NOT been closed by operator action, THEN manually start pumps and align valves. 2) IF BIT valves are closed by operator action, THEN go to Step F14.
	b. Check RCS pressure - LESS THAN 1725 PSIG	b. Go to Step F14.
	c. Check SI Pump Discharge Flow meters - FLOW INDICATED o EM FI-918 o EM FI-922	c. Manually start pumps and align valves.
	d. Check RCS pressure - LESS THAN 325 PSIG	d. Go to Step F14.
	e. Check RHR To Accumulator Injection Loop Flow meters - FLOW INDICATED o EJ FI-618 o EJ FI-619	e. Manually start pumps and align valves.
F14.	**Verify AFW Valves - PROPERLY ALIGNED:** a. Check ESFAS status panel AFAS section - ALL WHITE LIGHTS LIT b. Check white train ESFAS status panel AFAS section - ALL WHITE LIGHTS LIT	IF any AFAS section component NOT properly aligned, THEN manually align associated component to establish desired AFAS lineup.