

Simulation Facility:	<u>Kewaunee</u>	Scenario No.:	<u>1</u>
Examiners:	_____	Applicant:	_____ <u>SRO</u>
	_____		_____ <u>RO</u>
	_____		_____ <u>BOP</u>
Initial Conditions:	IC-14: 83% power, end of cycle (EOC). BOL (AMStone)		
Turnover:	<p>The plant is at 83% power. Backdown is underway with plant going to 40% power to support Reactor Engineering testing. Currently performing steps 4.3.5, 6 and 7 of N-0-03. Directions are to continue the plant backdown at 0.25%/ min. Diesel Generator "A" has been tested 4 hours ago (Following SW Pump B2 failure) All ESF features for Train A have been verified OPERABLE</p> <p>Equipment Out of Service: RHR Pump "B"  Internal Containment Spray Pump "B"  Service Water Pump "B2"</p>		

Event No.	Malf. No.	Event Type*	Event Description
Preload	RD11		Failure of Reactor Trip Breakers to open (can be opened locally)
Preload	CC04B		CC Pump "B" fails to auto start
Preload	RH04A		RHR Pump "A" fails to auto start
1	—	N BOP SRO	Decrease turbine load at 0.25%/min. When < 50% (< 60%) power, Stop FW Pump, Cond Pump & align condensate to condenser for Mode II
		R RO	Decrease reactor power using rods and/or boration
2	SO3-3, 4.47E6 (RX215)	I BOP SRO	FI-464, S/G A controlling steam flow channel fails high
3	S02 - 9, 21% (RX206)	I RO SRO	Controlling Przr level channel (LT-428) fails to No-Load value
4	CC05A, 95% (CC04C)	C RO SRO	Running Component Cooling Water Pump "A" trips & Pump "B" fails to auto start
5	MS02A, 20%	M RO BOP SRO	Main Steamline Break inside containment on the "A" Header (~ 350,000 lbm/hr)
6	(RD11)	M RO BOP SRO	Reactor Trip Breakers Fail to open on trip signal
7	(RH04A)	C RO SRO	RHR Pump "A" fails to auto start
8	RC05, 100%	M BOP RO SRO	Przr steam space LOCA (~500,000 lbm/hr)

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

## SCENARIO 1

### **NOTES TO SIMULATOR OPERATOR:**

1. PULL-OUT Service Water Pump B2 HS, 46527 and TAG
2. PULL-OUT RHR Pump B HS, 46304 and TAG
3. PULL-OUT ICS Pump B HS, 46306 and TAG
4. Event 2, trip bistable when directed with following Remote Functions:
  - RP5 (RP177) 464A Hi S.A.L.
  - RP5 (RP178) 464B Hi/Hi S.A.L.
  - RP6 (RP182) 466C FWF < SF
  - RP6 (RP181) 466B FWF > SF
5. Event 3, trip bistable when directed with following Remote Functions:
  - RP4-9 (RP155) 428A HIGH LEVEL TRIP
2. In Event 4, when asked the AO reports the CC pump tripped on overcurrent and the motor casing is very hot.
3. For Event 6 when directed by the Control Room to manually trip the trip breakers and open the MG Drive breakers, after approximately ONE minute:
  - Remove MALF RD11
  - Toggle REMOTE FUNCTION RD2 - 2 (RD102) MG Set 1A STOP
  - Toggle REMOTE FUNCTION RD2 - 3 (RD103) MG Set 1B STOP
4. Event 8 should occur within two minutes following closure of MSIV MS-1A.
5. In Event 8 (E-1 step 17.c) if contacted as Technical Support Staff concerning implementation of E-MDS-30, report it will not be implemented at this time but evaluation of conditions will continue and you will notify Control Room if situation changes.

## SCENARIO 1 OVERVIEW

Event 1 - The plant is at 83% power, end of cycle. Plant backdown is in progress to support Reactor Engineering testing. Operations Management has directed a backdown rate of 0.25%/min. to 40% power. Currently performing steps 4.3.5, 6 and 7 of N-0-03. When directed, the BOP operator will remove from service a Feedwater Pump (N-FW-05A), a Condensate Pump (N-CD-03), and condensate will be aligned to North end of condenser for Mode II (N-BT-07A). He may also direct placing of the Heating Boiler in operation (N-HS-22).

Event 2 – After the load reduction is started, S/G A steam flow channel (controlling channel for Main Feedwater Control Valve FW-7A), FT-464, will fail high. This results in an indicated steam flow - feedwater flow mismatch, and a demanded opening of FW-7A causing S/G level to increase. The operator responds to annunciator 47061-B SG A SF > FF alarm. The operator is expected to recognize this condition, take manual control of the FW-7A and adjust it to restore S/G A level to normal. The actions of A-MI-87 are implemented for the failed S/G steam flow channel, including selection of the alternate steam flow channel (FT-465) for control. Once S/G levels are stabilized, FW-7A controller may be restored to AUTO per procedure A-FW-05A. The SRO should review Technical Specification 3.5 for actions associated with the failed steam flow channel.

Event 3 – After Steam Generator levels are stabilized and when actions are complete for responding to S/G A steam flow channel failure, the controlling Przr level channel fails to its no-load value of 21. The operators will respond to Computer alarm LO428A for level deviation and determine the failure of LT-428. The operators should also note the increase in Przr level and increase in the controlled Charging Pump speed indication. If Przr level program increases above 31% [~558°F] (as Tavg increase with load), then annunciator 47043-E PRESSURIZER LEVEL DEVIATION will alarm. The operators will select the alternate channel for control (Position 2-1) and recorder (Position 1) and remove LT-428 (Channel 3) from service as directed by procedure A-MI-87. The SRO will address TS 3.5 for actions for the failed Przr level instrument.

Event 4 - When actions are complete for responding to the Przr level channel failure, the running CCW Pump (“A”) trips. CCW Pump “B” should auto start on low CCW header pressure but will fail to do so, requiring the operator to manually start the pump. (NOTE: The operator may manually start the pump prior to the automatic start by standard practice.) Normal CCW cooling should be verified once the pump is started. The SRO should review Technical Specification 3.3.d for applicability to the tripped CCW Pump and order a plant shutdown. If failure of the auto start of CCW Pump B is noted, I&C should be notified to investigate cause.

Events 5, 6, 7 & 8 – After the plant shutdown is started, a main steamline break of ~ 350,000 lbm/hr occurs on the S/G A steam header inside containment. Containment humidity, temperature and pressure will rise. An automatic actuation of Safety Injection will occur due to Low Steam Line Pressure. The operators will recognize the failure of the reactor to trip, enter E-0 and transfer to FR-S.1 from E-0 step 1 contingency. The operators will perform the immediate actions of FR-S.1. The operators will open the feeder breakers to the buses supplying the Rod Drive MG Sets (Bus 33 & 43) and direct the local operators to open the Rod Drive MG Sets Breakers and the reactor trip breakers. Transition to E-0 will occur at step 5.d. Steam flow will remain higher than expected for S/G A, resulting in closure of MSIV MS-1A. The RO will determine RHR Pump “A” failed to auto start and will manually start the pump when directed (and allowed by SI sequencing). One minute following MSIV closure, a Przr steam space break occurs, which will further reduce RCS pressure resulting in adverse containment conditions and reduction in RCS subcooling requiring the RXCPs to be stopped. Transition from E-0 is made to E-2 at step 21. Upon entry into E-2, the operators will isolate steam flow from S/G A by closing the supply to the TD AFW Pump (MS-100A) and isolate AFW flow to the S/G by closing AFW-2A and AFW-10A. Transition from E-2 is made at step 8 to procedure E-1. The operators will reset SI and evaluate SI termination. The running RHR Pump will be stopped as directed and when S/G A has completed its blowdown, the evaluation for RCS cooldown and depressurization will be made. The scenario ends upon the transition to ES-1.2.

## SCENARIO 1 OVERVIEW (CONT.)

### **Critical Tasks**

1. E-CC A: Manually start at least one CCW Pump required to provide adequate component cooling flow for the operating safeguards train prior to Rx Trip.
2. PRZR B: Prevent a Rx Trip by shifting PRZR level controlling channel or by taking manual control of charging pumps.
3. FR-S.1 —C: Insert negative reactivity into the core by at least one of the following methods before completing immediate action steps of FR-S.1: • Open the Bus 33 and Bus 43 supply breakers to de-energize the rod drive MG sets; • Manually insert control rods.

Scenario No: 1		Event No. 1
Event Description: Ramp DOWN power to 40% at 0.25% per minute.		
Time	Position	Applicant's Actions or Behavior
	CUE:	Turnover direction to continue power decrease to 40% at 0.25% per minute rate.
	CRS	Implement actions of N-0-03.
	CRS	Direct decrease to 40% power at 0.5 %/min.
	CREW	Review applicable Precautions, and Limitations and Actions
	RO	Perform reactivity estimate based on planned load decrease (if required)
	BOP	Decrease load per N-TB-54: <ul style="list-style-type: none"> <li>• Review applicable Precautions &amp; Limitations</li> <li>• Determine maximum unloading rate per Figures 2 &amp; 3</li> <li>• Set setter to desired load ( 40%)</li> <li>• Verify/set loading rate to ½%/min.</li> <li>• Inform GenCo of rate and amount of load reduction</li> <li>• Depress GO</li> <li>• Verify load decreases</li> <li>• Maintain Reactive load within limits of Figure 5</li> </ul>

Comments:

Time	Position	Applicant's Actions or Behavior
	RO	<p>Perform reactivity adjustments:</p> <p>Rod Control (inward motion at 1.5° F difference Tave-Tref)</p> <p>AND/OR</p> <p>Boron Concentration Control (initiate boration) per N-CV-35A</p> <ul style="list-style-type: none"> <li>• Review applicable Precautions &amp; Limitations</li> <li>• Verify at least one RXCP in operation.</li> <li>• Determine rate and magnitude of boration.</li> <li>• Position Reactor Makeup Mode Selector to BORATE</li> <li>• Adjust CVC-403/CV-31092, Blender Control BA Flow, to required flow rate.</li> <li>• Set Boric Acid Totalizer to required quantity.</li> <li>• Position Reactor Makeup Control switch to START.</li> <li>• Verify required change has been achieved by monitoring: <ul style="list-style-type: none"> <li>• Rod Position</li> <li>• Boron Concentration</li> <li>• Tave</li> </ul> </li> <li>• When boration is complete:</li> </ul>
	RO (cont.)	<ul style="list-style-type: none"> <li>• Close CVC-406/CV-31904 BA Blender to VCT.</li> <li>• Perform 20 gallon Alternate Dilute</li> <li>• Position CVC-406 to AUTO</li> </ul> <p><i>Alternate Dilution actions (to flush lines):</i></p> <ul style="list-style-type: none"> <li>• <i>Position Reactor Makeup Mode Selector to ALT DIL.</i></li> <li>• <i>Adjust MU-1022/CV-31095, Blender Control Rx Mu Flow, to desired flow rate.</i></li> <li>• <i>Set Rx Make-up Totalizer to 20 gal.</i></li> <li>• <i>Position Reactor Makeup Control switch to START.</i></li> <li>• <i>When dilution is complete:</i> <ul style="list-style-type: none"> <li>• <i>Position Reactor Makeup Mode Selector to AUTO.</i></li> <li>• <i>Position Reactor Makeup Control switch to START.</i></li> <li>• <i>Adjust CVC-403/CV-31092, Blender Control BA Flow, to current RCS boron concentration.</i></li> </ul> </li> <li>• If RCS boron concentration has been changed by &gt;50 ppm, operate Przr heaters as necessary to equalize RCS and Przr boron.</li> </ul>

Comments:

Time	Position BOP	Applicant's Actions or Behavior Adjust Heater Drain Pump speed as required to maintain equal loading on pumps  When Turbine Power is < 50% (275 Mwe) : <ul style="list-style-type: none"> <li>• Stop one Feedwater Pump per N-FW-05A: <ul style="list-style-type: none"> <li>• Verify turbine power &lt; 60%</li> <li>• Position FW-2A/MV-32025 (FW-2B/MV-32026) Feedwater Pump A(B) and Discharge Valve C/S to STOP/PULLOUT</li> <li>• Verify FW-101A/CV-31028 (FW-101B/CV-31029) Feedwater Pump A(B) Recirc CV closed</li> <li>• Direct operator to locally perform actions for Feedwater Pump shutdown</li> </ul> </li> <li>• Stop one Condensate Pump per N-CD-03: <ul style="list-style-type: none"> <li>• Verify Feedwater Pump A or B off</li> <li>• Stop Condensate Pump B(A)</li> <li>• Direct operator to locally open C-50A(B) AND close SW-3001A(B) for the stopped Condensate Pump</li> </ul> </li> </ul>
	BOP (cont.)	<ul style="list-style-type: none"> <li>• Align condensate to North end of condenser for Mode II per N-BT-07A <ul style="list-style-type: none"> <li>• Direct the local operator to shutdown the filter system per N-BT-07C</li> <li>• Direct the local operator to slowly close BT-1003A and BT-1003B</li> <li>• When these actions are completed, close BT-2A/MV-32077, BT-3A/MV-32078, BT-2B/MV-32079 and BT-3B/MV-32080 (S/G Blowdown Isol)</li> <li>• Direct the local operator to continue actions of N-BT-07A, 4.3.2</li> </ul> </li> <li>• When Moisture Separators are 58-62 psig, direct local operator to place Heating Boiler in operation per N-HS-22</li> </ul>
		<b>NOTE: Event 2 may be initiated during load backdown.</b>

Comments:

Scenario No: 1		Event No. 2
Event Description: S/G A controlling steam flow channel, FI-464, fails high. Feedwater flow and S/G level will initially increase in response to sensed steam demand. FW-7A will throttle open. The operator is required to take manual control of FW-7A and restore level to reference value.		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciator alarms: 47061-B S/G A SF > FF 47061-C S/G A FEED FLOW EXCESSIVE (due to non-failed channels) 47062-B S/G/ A BYPASS CV LEVEL DEVIATION  Steam flow FI-464 reading at top of scale (while FT-465 reads approx. same as S/G B steam flow channels FI-474 and FI-475) Unexpected rise in S/G A level (LI-461/462) Stable turbine load
	BOP/CRS	Identify/report unusual response of FW-7A/failure of steam flow channel FT-464
	BOP	Take MAN control of FW-7A Restore S/G A level to program
	CRS	Implement Alarm Response Sheet, A-MI-87 "Bistable Tripping for Failed Reactor Protection or Safeguards Inst.", Attachment I "FT-464 STEAM GENERATOR STEAM FLOW RR-109" – "REMOVAL FROM SERVICE", and direct operator action.
	BOP	Perform prerequisite alignments: <ul style="list-style-type: none"> <li>Place Steam Flow Channel Selector switch for S/G A 46547/HFC-465 to 465/WHITE (Ch II)</li> </ul>
	BOP/CRS	Direct actions to remove FT-464 (Red Channel) from service: <ul style="list-style-type: none"> <li>Perform partial SP 47-316A to check redundant channel bistable contacts for FT-464 removal from service.</li> <li>Direct I&amp;C to enter Relay Rack RR-109 to trip associated bistables for FT464.</li> </ul>

Comments:



Time	Position	Applicant's Actions or Behavior
	BOP	<p>When conditions permit, position balance S/G A level, steam flow and feed flow and restore FW-7A to AUTO</p> <ul style="list-style-type: none"> <li>• Verify the following: <ul style="list-style-type: none"> <li>• Annunciator 47063-I MAIN STEAM HEADER A FLOW HI-HI in alarm</li> <li>• Annunciator 47062-I STEAM HEADER A ISOLATION ALERT in alarm</li> <li>• Annunciator 47061-C S/G A FEED FLOW EXCESSIVE in alarm</li> <li>• Annunciator 47061-B S/G A SF &gt; FF in alarm</li> </ul> </li> </ul>
	BOP (cont)	<ul style="list-style-type: none"> <li>• 44908-0501 MS Hdr A Hi Flow Status Light lit</li> <li>• 44908-0601 MS Hdr A Hi-Hi Flow Status Light lit</li> <li>• 44907-0901 S/G A SF &gt; FF Status Light lit</li> </ul>
	CRS	<p>Review Technical Specification 3.5.b &amp; c:</p> <ul style="list-style-type: none"> <li>• Table 3.5-2: <ul style="list-style-type: none"> <li>• No. 16 Steam Flow/Feedwater Flow Mismatch</li> </ul> Determine continued operation acceptable (1 channel required OPERABLE) </li> <li>• Table TS 3.5-4: <ul style="list-style-type: none"> <li>• No. 2.a. Hi-Hi Steam Flow with Safety Injection Steamline Isolation</li> <li>• No. 2.b. Hi Steam Flow and 2 of 4 Lo-Lo T<sub>avg</sub> with Safety Injection Steamline Isolation</li> </ul> Determine continued operation acceptable (One channel required OPERABLE) </li> </ul>
	CRS	Inform I&C/Maintenance of S/G A steam flow channel FT-464 failure/status

Comments:

Scenario No: 1      Event No. 3		
Event Description: Controlling Pressurizer level channel III (LT-428) fails to its no-load value (21%).		
Time	Position	Applicant's Actions or Behavior
	CUE:	<p>Przr level Channel:  47043-F ,PRZR Level Deviation  Computer alarm L0428A  Charging Pump "A" (AUTO) speed increase to maximum  Przr level increase on LI-426 and LI-427</p> <p>After Przr level channel swap:  47014-I &amp; L, RXCP A(B) LABRYNTH SEAL DP LOW  47014-I &amp; L, RXCP A(B) LABRYNTH SEAL DP LOW  47041-K REGEN HX LETDOWN TEMP HIGH  47043-J CHARGING PUMP IN AUTO HIGH/LOW SPEED</p>
	RO/CRS	Identify/report failed Przr level channel - LT-428.
	CRS	Implement Alarm Response Sheet and A-MI-87 "Bistable Tripping for Failed Reactor Protection or Safeguards Inst.", Attachment I "LT-428 PRESSURIZER LEVEL RR-112" – "REMOVAL FROM SERVICE" and direct operator action.
	RO  [CT] PRZR B	<p>Check Przr level:</p> <ul style="list-style-type: none"> <li>• Verify level normal (27-29% based on RCS Tave).</li> </ul> <p>Determine level is increasing above normal for given RCS Tave</p> <ul style="list-style-type: none"> <li>• Position Przr Level Control Channel Selector switch to <b>2-1</b>.</li> <li>• Position Przr Level Recorder Input Selector switch to <b>1</b>.</li> <li>• Verify Przr level restores to reference level</li> </ul>

Comments:

	RO/CRS	<p>Direct actions to remove LT-428 from service:</p> <ul style="list-style-type: none"> <li>• Perform partial SP 47-316C to check redundant channel bistable contacts for LT-428 removal from service.</li> <li>• Direct I&amp;C to enter Relay Rack RR-112 to trip associated bistable 428A.</li> <li>• Verify the following:</li> <li>• Annunciator 47041-E PRESSURIZER LEVEL HI in alarm</li> <li>• 44907-0407 Pressurizer Hi Level Status Light lit</li> </ul>
	CRS	<p>Review Technical Specification 3.5.b &amp; c:</p> <ul style="list-style-type: none"> <li>• Table TS3.5-2, No. 9 Pressurizer High Water Level</li> </ul> <p>Determine continued operation acceptable (2 channels required OPERABLE).</p>

Comments:

Scenario No: 1-2		Event No. 4
Event Description: Component Cooling Water Pump "A" trips due to overcurrent condition. Component Cooling Water Pump "B" fails to auto start (on low CCW header pressure), but may be started manually.		
Time	Position	Applicant's Actions or Behavior
	CUE	<p>Annunciators:</p> <p>40103-F BUS 51 FEEDER BKR TRIP (SER point 746)</p> <p>47021-I RXCP CC FLOW LOW</p> <p>47023-I RHR PUMPS CC FLOW LOW</p> <p>47024-I ICS PUMPS CC FLOW LOW</p> <p>47021-H CC PUMPS DISCH PRESSURE LOW(if Pump is not manually started shortly following CCW Pump "A" trip)</p> <p>CC Pump "A" C/S WHITE light lit</p> <p>CC return flow indication FI-619 decreasing</p> <p>CC discharge header pressure 4130202(26081) decreasing</p> <p>CCW Pump "B" C/S GREEN light lit with CC discharge pressure &lt; 35 psig</p>
	RO/CRS	Identify/report trip of CC Pump "A"
	CRS	Implement Alarm Response Sheet and A-CC-31A "Abnormal Conditions in the Component Cooling System" and direct operator action.
	RO  [CT] E-CC A	<p>(Immediate Action)Verify standby Pump operating (AUTO start at low pressure ≤35 psig)</p> <p>Manually start CC Pump "B"</p> <p>Verify pump discharge pressure ≥ 95 psig [PI-628]</p> <p>Monitor temperature and flow to components in operation [RXCP Thermal Barrier Return temps TI-614/610, Letdown Hx outlet TI-130, CC Return flow FI-619]</p>
	CRS	<p>Review Technical Specification 3.3.d and determine 3.3.d.2 is applicable</p> <p>Determine Neither Component Cooling Pump is OPERABLE and apply the Standard Shutdown Sequence</p> <p>Contact Maintenance/Electrical to initiate repairs and investigate auto start failure</p>

Comments:

Scenario No: 1		Event No. 5, 6, 7, and 8
Event Description:		
(5) Steamline break on S/G A downstream of the flow restriction nozzle with approximately 350,000 lbm/hr flow (@ 1000 psig). (6) Reactor Trip Breakers Fail to open on trip signal requiring manual action. (7) RHR Pump A fails to auto start, leaving NO RHR Pump running and requiring manual start of the pump. (8) Przr steam space LOCA occurs at approximately 500,000 lbm/hr flow.		
Time	Position	Applicant's Actions or Behavior
	CUE	Steamline Break: Annunciators: 47061-B S/G A SF > FF 47062-I STEAM HEADER A ISOLATION ALERT  Steam flow indication on S/Gs (and just on S/G A after MSIV MS-1A closes) S/G A pressure continually decreasing RCS temperature falling Przr level lowering Przr pressure lowering Containment pressure (4151202), temperature (41507-41511) and humidity (41517) rising (or high)  RHR Pump With SI actuated and sequencer loading complete, GREEN (NO RED light) light still lit for RHR Pump A C/S. SI Active Status Panel light 23 RHR PUMP A ON dark  Przr steam space leak Increase rate of RCS pressure drop Higher than expected Przr level Containment radiation level increasing
	CREW	Identify/report conditions indicating a steamline break inside containment
	CRS	Direct reactor trip due to steamline break
	RO	Manually trip reactor by depressing reactor trip pushbutton [46285 ]  Report failure of reactor to trip

Comments:

Time	Position	Applicant's Actions or Behavior
	CRS	Direct actions of FR-S.1 "Response to Nuclear Power Generation/ATWS"  <b>(NOTE: E-0 immediate action for verification of reactor trip is not listed here since it is inherent in the actions performed by the crew.)</b>
	RO  RO (cont.)  [CT] FR-S.1 — C	Perform immediate operator actions of FR-S.1  Verify reactor trip: <ul style="list-style-type: none"> <li>• Reactor trip &amp; bypass breakers open</li> <li>• Rod Position Indicators read ZERO</li> <li>• Rod bottom lights LIT</li> <li>• Neutron flux decreasing</li> </ul> Attempt to manually trip reactor by depressing reactor trip pushbutton Report failure of reactor to trip <ul style="list-style-type: none"> <li>• Manually insert Control Rods</li> </ul>
	BOP [CT] FR-S.1 — C	Perform immediate operator actions of FR-S.1 <ul style="list-style-type: none"> <li>• Open Bus 33 and Bus 43 supply breakers [13301, 14301]</li> </ul>
	CREW	Perform immediate operator actions of FR-S.1 <ul style="list-style-type: none"> <li>• Dispatch operator to locally <ul style="list-style-type: none"> <li>- Open Reactor Trip Breakers</li> <li>- Position Rod Drive MG Set motor and generator Circuit Breaker C/Ss to TRIP</li> </ul> </li> <li>• When Reactor trip breakers and MG set breakers have been opened, re-energize buses 33 and 43</li> </ul>
	BOP	Perform immediate operator actions of FR-S.1  Verify Turbine Trip: <ul style="list-style-type: none"> <li>• HP turbine impulse pressure PI-486 trending toward ZERO</li> <li>• All turbine STOP VALVES closed</li> </ul> Verify Feedwater Isolation: <ul style="list-style-type: none"> <li>• FW-7A and FW-7B Main FW Flow Control Valves closed</li> <li>• FW-10A and FW-10B Main FW Bypass Flow Control Valves closed</li> </ul> <b>(NOTE: Immediate Actions of FR-S.1 complete)</b>

Comments:

Time	Position	Applicant's Actions or Behavior
	BOP	Check AFW Pumps running <ul style="list-style-type: none"> <li>• Both MD AFW Pumps running</li> <li>• T/D AFW Pump running (if necessary)</li> </ul>
	CREW	Check ATWS Actions completed: <ul style="list-style-type: none"> <li>• ATWS actions in progress</li> <li>• Reactor tripped (Control Rods inserted)</li> <li>• Turbine tripped</li> </ul> <p><b>(NOTE: The local operator will trip the Reactor Trip Breakers and MG Set breakers and contact Control Room about actions.)</b></p>
	BOP	Perform immediate operator actions of E-0  Verify power to Emergency AC Busses Bus 5 energized Bus 6 energized
	CREW	Perform immediate operator actions of E-0 Determine SI needed/actuated needed If actuated: <ul style="list-style-type: none"> <li>47021-A SI TRAIN A ACTUATED lit</li> <li>47021-B SI TRAIN B ACTUATED lit</li> </ul>
	CREW (cont)	If NOT actuated Check <ul style="list-style-type: none"> <li><b>Przr pressure &lt;1815 psig</b></li> <li><b>Przr level CANNOT be maintained &gt; 5%</b></li> <li>RCS Subcooling (CETs) &lt; 30° F</li> <li><b>S/G pressures &lt; 500 psig</b></li> <li><b>CNMT pressure &gt; 4 psig</b></li> </ul> Determine that SI is required (or soon will be required) on either Przr level, S/G pressure and/or Przr pressure  If required, Manually actuate SI [Safety Injection Train A(B) – START pushbuttons 4647201, 4647501]  Make plant announcement for Safety Injection

Comments:

Time	Position	Applicant's Actions or Behavior
	BOP	<p>Check Main Steamline Isolation</p> <ul style="list-style-type: none"> <li>• Check high-high steam flow (&gt; 4.45x10<sup>6</sup> lb/hr) for S/G A(B)</li> <li>• Check high steam flow (&gt; 0.7x10<sup>6</sup> lb/hr) AND Tavg &lt; 540° F for S/G A(B)</li> <li>• Check Containment pressure &gt; 17 psig</li> </ul> <p>Identify/report steam flow indicated for S/G A (but not at high steam flow value) (if not reported before) and Containment pressure increasing</p> <p><b>(NOTE: With identified higher than expected steam flow and rising containment pressure, the crew may perform actions at this time to isolate the steam lines)</b></p>
	RO/BOP	<p>Verified Containment Spray NOT required:</p> <ul style="list-style-type: none"> <li>• CNMT pressure remained below 23 psig</li> </ul> <p>Determine/report CNMT Spray NOT required</p>
	BOP	<p>Verify Containment Cooling</p> <ul style="list-style-type: none"> <li>• Fan Coil Units running</li> <li>• Verify SW-903A-D CFCU SW Return Isolation valves open</li> <li>• Check Containment pressure remained below 4 psig</li> </ul> <p>Determine Containment pressure &gt; 4psig</p> <ul style="list-style-type: none"> <li>• Check RBV-150A-D CFCU Emergency Dampers open</li> </ul> <p>Verify Aux Bldg Special Vent running:</p> <ul style="list-style-type: none"> <li>• Annunciator 47052-G ZONE SV BNDRY DAMPER NOT CLOSED not lit</li> <li>• Verify Zone SV fans [ASV-91A(B)/CD-34014(34015) ASV Exhaust Fan A(B) and Damper] running</li> </ul> <p>Verify Service Water Pumps (A1, A2, B1) running</p> <p>Report SW Pump B2 not running due to OOS condition</p> <p>Verify Feedwater Isolation:</p> <ul style="list-style-type: none"> <li>• FW-7A and FW-7B Main FW Flow Control Valves closed</li> <li>• FW-10A and FW-10B Main FW Bypass Flow Control Valves closed</li> <li>• BOTH Feedwater Pumps off</li> </ul> <p>Verify AFW Pumps running:</p> <ul style="list-style-type: none"> <li>• Check both MD AFW Pumps running</li> <li>• Stop T/D AFW Pump and place C/S [MS-102/MV-32040] in PULLOUT</li> </ul>

Comments:



Time	Position	Applicant's Actions or Behavior
	CREW	Identify/report indications of changes in Containment conditions: <ul style="list-style-type: none"> <li>• Increase in pressurization</li> <li>• Increase in radiation levels indicated on R-2, R-7 and recorders RE-29064, 29065.</li> </ul> <p><b>(NOTE: This will occur sometime after entry of the Przr steam space leak and may be noted later.)</b></p>
	CREW	Identify/report need to use ADVERSE CONTAINMENT values when Containment pressure exceeds 4 psig
	RO	Verify the CI Active Status Panel [11] lights lit  Verify ECCS pumps running: <ul style="list-style-type: none"> <li>• SI pumps</li> <li>• RHR pumps</li> <li>• CC Pumps</li> </ul> Report RHR Pump A failed to start/NO RHR Pumps running Manually start RHR Pump A (if not already performed)
	RO (cont)	Verify SI flow: <ul style="list-style-type: none"> <li>• With RCS pressure &lt; 2100 psig [1900 psig ADVERSE]:</li> <li>• SI flow indicated on FI-925</li> <li>• Check RCS pressure &lt; 150 psig and determine it is not</li> </ul>
	BOP	Verify total AFW flow > 200 gpm [4104102, 4104202]
	RO	Check RXCP Seal Cooling: <ul style="list-style-type: none"> <li>• CC Supply for Thermal Barrier Isolation Valves CC-600, CC-601A(B), CC-610A(B) and CC-612A(B) open</li> <li>• Thermal Barrier temperatures TI-610 and TI-614 normal</li> <li>• RXCP Bearing Temperatures TI-125 and TI-132 normal</li> </ul>

Comments:

Time	Position	Applicant's Actions or Behavior
	RO/BOP	Check RCS temperatures: <ul style="list-style-type: none"> <li>• RCS Average Temperature [TI-401-404, recorder 42554, computer trend] stable at or trending to 547° F (or RCS Cold Leg Temps [Recorder 42555 or computer trend] at or trending to 547° F if NO RXCP running)</li> <li>• With temperature &lt; 547° F:               <ul style="list-style-type: none"> <li>• Stop dumping steam</li> <li>• Verify T/D AFW is in PULLOUT</li> <li>• Control feed flow to &gt; 200 gpm until one S/G NR level &gt; 4% [15% ADVERSE]</li> <li>• Verify MS-1A &amp; 1B and MS-2A &amp; 2B, MSIV and MSIV Bypass valves are closed</li> </ul> </li> </ul>
	RO	Check Przr PORVs and Spray Valves closed: <ul style="list-style-type: none"> <li>• PORVs closed</li> <li>• Normal Spray valves closed [PS-1A(B) indicating lights]</li> <li>• CVC-15 Aux Spray Valve closed</li> </ul> Check if RXCPs should be tripped: <ul style="list-style-type: none"> <li>• SI flow indicated on FI-925</li> <li>• RCS subcooling based on CETs &lt; 15° F [45° F ADVERSE]</li> <li>• If both conditions exist stop both RXCPs and place in PULLOUT</li> </ul> <p><b>(NOTE: Above action to trip RXCPs may have occurred earlier or may occur later, as directed by E-0 QRF, depending on conditions.)</b></p>
	BOP	Check if S/G are faulted. <ul style="list-style-type: none"> <li>• Check S/G pressures decreasing in uncontrolled manner</li> </ul> Identify/report S/G A pressure decreasing
	CREW	Diagnose faulted S/G A
	CRS	Transition to E-2 "Faulted Steam Generator Isolation" Evaluate Critical Safety Function Status Trees Direct operator actions of E-2.

Comments:

Time	Position	Applicant's Actions or Behavior
	BOP	Verify Main Steamline Isolation for S/G A: <ul style="list-style-type: none"> <li>• Verify closed MS-1A MSIV and MS-2A MSIV Bypass Valve for S/G A</li> </ul> Check any S/G not faulted <ul style="list-style-type: none"> <li>• Check pressure in S/G B stable or increasing</li> </ul> Identify faulted SG <ul style="list-style-type: none"> <li>• SG A identified faulted               <ul style="list-style-type: none"> <li>• Lowering pressure</li> </ul> </li> </ul>
	BOP (cont)	Isolate S/G A <ul style="list-style-type: none"> <li>• Verify S/G A blowdown isol valves BT-2A and BT-3A closed</li> <li>• Verify S/G PORV SD-3A closed</li> <li>• Verify/Close AFW Pump 2A flow control valve AFW-2A</li> <li>• Close S/G A Supply to TDAFW Pump MS-100A</li> <li>• Verify S/G A Sample Isolation Valves BT-31A and BT-32A closed</li> <li>• Close S/G A FW Isolation valve FW-12A</li> <li>• Close AFW Train A Crossover Valve AFW-10A</li> </ul> Check CST level > 4% [412901, 4102902]

Comments:

Time	Position	Applicant's Actions or Behavior
	CREW	Check Secondary Radiation: <ul style="list-style-type: none"> <li>• Request period activity samples and radiation surveys of both S/Gs</li> <li>• Check unisolated secondary radiation monitors:               <ul style="list-style-type: none"> <li>• R-31 and R-33 (Main Steamline)</li> <li>• R-15 (CAE)</li> <li>• R-19 (S/G Blowdown)</li> </ul> </li> </ul> Determine Secondary Radiation Trends normal
	BOP	Set Steam Dumps to minimize RCS heatup: <ul style="list-style-type: none"> <li>• Check Condenser available</li> <li>• Determine Both S/G MSIV Closed</li> <li>• Verify intact SG PORV controller in Auto</li> <li>• Set intact SG PORV controller to the maximum SAT PRESS FOR RCLA(B) C/L, P8025G and/or P8024G from PPCS Group Output 8</li> </ul>
	CRS	Transition to E-1 "LOSS OF REACTOR OR SECONDARY COOLANT"  Direct operator actions of E-1

Comments:

Time	Position	Applicant's Actions or Behavior
	RO	<p>If RXCPs not already stopped, check if RXCPs should be tripped:</p> <ul style="list-style-type: none"> <li>• SI flow indicated on FI-925</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• RHR Pump flow &gt; 375 gpm for F928 or F626</li> </ul> <p>AND</p> <ul style="list-style-type: none"> <li>• RCS subcooling based on CETs &lt; 15° F [45° F ADVERSE]</li> </ul> <ul style="list-style-type: none"> <li>• If both conditions exist stop both RXCPs and place in PULLOUT</li> </ul> <p>Check RWST level &gt; 37% [4131101 LI-920, 4131102 LI-921]</p>
	BOP	<p>Check if S/Gs are faulted:</p> <ul style="list-style-type: none"> <li>• Check S/G pressures decreasing in uncontrolled manner</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• Check any S/G completely depressurized</li> </ul> <ul style="list-style-type: none"> <li>• Verify steamlines and feedlines to S/G A isolated</li> </ul>
	BOP (cont)	<p>Check intact S/G levels:</p> <ul style="list-style-type: none"> <li>• S/G B narrow range (NR) level &gt; 4% [15% ADVERSE]</li> <li>• If not, maintain total feed flow to S/G B &gt; 200 gpm until NR level &gt; 4% [15% ADVERSE]</li> <li>• Control feed flow to maintain NR level between 4% [15% ADVERSE] and 50%</li> </ul>
	CREW	Check Main Steamline Radiation Channels R-31 and R-33 on SPDS normal

Comments:

Time	Position	Applicant's Actions or Behavior
	RO	<p>Check Przr PORVs and Block Valves:</p> <ul style="list-style-type: none"> <li>• Power to PR-1A and PR-1B available</li> <li>• PORVs closed <ul style="list-style-type: none"> <li>• PR-2A</li> <li>• PR-2B</li> </ul> </li> <li>• At least ONE PORV Block valve OPEN <ul style="list-style-type: none"> <li>• PR-1A</li> <li>• PR-1B</li> </ul> </li> </ul> <p>Isolate letdown by closing LD-4A, 4B and 4C Letdown Orifice Isol</p> <p>Reset SI by depressing both SI RESET pushbuttons [4647202, 4647502] (If not done previously)</p> <p>Reset Containment Isolation by depressing both CNTMT ISOL RESET pushbuttons [4647302, 4647602]</p>
	BOP	<p>Verify Instrument Air to Containment established</p> <ul style="list-style-type: none"> <li>• At least one Air Compressor running</li> <li>• Air header pressure &gt;60 psig [4150101/4150103]</li> <li>• Instrument Air to Containment Isol IA-101 open</li> </ul>

Comments:

Time	Position	Applicant's Actions or Behavior
	RO	Establish Charging flow: <ul style="list-style-type: none"> <li>• Verify at least one Charging Pump running               <ul style="list-style-type: none"> <li>• If NOT:                   <ul style="list-style-type: none"> <li>• Verify CCW flow to RXCP Thermal Barriers has not been lost</li> <li>• CC Supply for Thermal Barrier Isolation Valves CC-600, CC-601A(B), CC-610A(B) and CC-612A(B) open</li> <li>• Thermal Barrier temperatures TI-610 and TI-614 normal</li> </ul> </li> </ul> </li> </ul>
	RO (cont)	<ul style="list-style-type: none"> <li>• Start Charging Pumps as necessary</li> <li>• Establish charging flow to maintain Przr level &gt; 5% [30% ADVERSE]</li> </ul>
	CREW	Check if SI should be terminated: <ul style="list-style-type: none"> <li>• <b>RCS subcooling based on CETs &gt; 30° F [65° F ADVERSE]</b></li> <li>• <b>RCS pressure &gt; 2100 psig [1900 ADVERSE] AND stable or rising</b></li> <li>• <b>Przr level &gt; 5% [30% ADVERSE]</b></li> <li>• Secondary Heat Sink:               <ul style="list-style-type: none"> <li>• Total feed flow to S/G B &gt; 200 gpm</li> </ul> </li> <li>OR               <ul style="list-style-type: none"> <li>• NR level in S/G B &gt; 4% [15% ADVERSE]</li> </ul> </li> </ul> <p>Determine SI should not be terminated (based on one or more of the above highlighted conditions)</p>

Comments:

Time	Position	Applicant's Actions or Behavior
	RO	<p>Check if Containment Spray should be stopped:</p> <ul style="list-style-type: none"> <li>• Check ICS Pump any running [GREEN light lit]</li> </ul> <p>Determine ICS Pump A not running</p> <p>Check if RHR Pumps should be stopped:</p> <ul style="list-style-type: none"> <li>• RCS pressure &gt;150 psig</li> </ul> <p>AND</p> <ul style="list-style-type: none"> <li>• Stable or increasing</li> <li>• Combined RHR Flow ZERO on FI-626 and FI- 928</li> <li>• Verify RHR Pumps NOT supplying Containment Sump Recirculation flow</li> <li>• Reset SI if necessary [4647202, 4647502 pushbuttons]</li> <li>• If above are satisfied, stop RHR pumps and place in C/Ss in AUTO</li> </ul>
	CREW	<p>Check RCS and S/G pressures:</p> <ul style="list-style-type: none"> <li>• Pressure in both S/Gs stable or increasing</li> <li>• RCS pressure stable or decreasing</li> </ul> <p>If neither condition met, return to step 1 of E-1</p> <p><b>(NOTE: The crew may return to step 1 and reperform actions until S/G A has completed blowing down (S/G A pressure decreasing).)</b></p>
	BOP	<p>Check if Diesel Generators (DGs) should be stopped</p> <ul style="list-style-type: none"> <li>• Verify Bus 5 and Bus 6 energized from offsite power (Breakers 1-501 and 1-601 closed)</li> <li>• Stop DG A and DG B 30 seconds apart (by taking C/S to STOP/PULLOUT position) and place in AUTO</li> </ul>

Comments:



Time	Position	Applicant's Actions or Behavior
	CREW	<p>Evaluate Plant status:</p> <ul style="list-style-type: none"> <li>• Verify recirculation capability <ul style="list-style-type: none"> <li>• Both RHR Pumps operable</li> </ul> </li> </ul> <p>Report RHR Pump B is not operable</p> <ul style="list-style-type: none"> <li>• Determine at least one train recirculation capability</li> <li>• Open CC-400A Component Cooling to RHR HX A</li> <li>• Verify operable CC-400B Component Cooling to RHR HX B [GREEN light lit]</li> <li>• Verify operable SI-300A and B, RWST Supply to RHR Pump A(B) [RED light lit]</li> <li>• Verify operable SI-350A and B, CNTMT Sump B Supply to RHR Pump A(B) [GREEN light lit]</li> <li>• Verify operable SI-351A and B, CNTMT Sump B Supply to RHR Pump A(B) [GREEN light lit]</li> <li>• Direct local operator(s) to unlock and set to on breakers for recirculation MOVs</li> <li>• Check Aux Building radiation monitors R-13, R-14 and R-22 normal</li> <li>• Consult Tech Support Staff to see if E-MDS-30 should be implemented</li> <li>• Notify Chemistry to start Containment Hydrogen Monitoring System</li> <li>• Direct chemistry to obtain primary and secondary samples per EPIPs</li> <li>• Evaluate starting additional plant equipment</li> </ul> <p>Check if RCS cooldown and depressurization is required:</p> <ul style="list-style-type: none"> <li>• Check RCS pressure &gt; 150 psig</li> </ul>

Comments:

Time	Position	Applicant's Actions or Behavior
	CRS	Transition to ES-1.2 "POST LOCA COOLDOWN AND DEPRESSURIZATION "  Direct operator actions of ES-1.2
		<b>NOTE: Scenario can be terminated at this point with transition to ES-1.2.</b>

Comments: