

Facility:	HB ROBINSON	Scenario No.:	1	Op Test No.:	ILC-13
Examiners:	_____	Operators:	CRS -		
	_____		RO -		
	_____		BOP -		
Initial Conditions: <ul style="list-style-type: none"> <li>100% MOL, 9000 MWD/MTU, 848 PPM Boron.</li> <li>CCW Pump "C" is OOS and breaker is racked out</li> <li>HVH-4 is OOS and breaker is racked out</li> </ul>					
Turnover: <ul style="list-style-type: none"> <li>Maintain power at current level.</li> </ul>					
Critical Task: <ul style="list-style-type: none"> <li>Secure All RCPs due to EOP-E-0 Foldout Criteria.</li> <li>Start "A" Safety Injection Pump to provide adequate core cooling.</li> <li>Place CR HVAC in Emergency Pressurization Mode due to LB LOCA.</li> <li>Start "A" CV Spray Pump due to abnormal CV Conditions with reduced CV Spray and Cooling capability.</li> </ul>					
Event No.	Malf. No.	Event Type*	Event Description		
1		(C) BOP	"A" Circulating Water Pump Trips and Discharge Valve (V6-50A) fails to Auto-Close.		
2		(C) RO, CRS (TS) CRS	PCV-455B fails OPEN while in AUTO		
3		(C) BOP, CRS (TS) CRS	"A" SWBP Trips		
4		(R) RO (N) BOP, CRS (TS) CRS	Dropped Control Rod resulting in Load Reduction		
5		(I) RO, CRS (TS) CRS	LT-460 Reference Leg / PT-456 Sensing Line Failure		
6		(C) RO, CRS	Seismic Event and RCS Leak (250 gpm ramped in over 5 ½ minutes)		
7		(M) ALL	Large Break LOCA on Reactor Trip		
8		BOP	CR HVAC fails to Auto Actuate on SI		
9		RO	"A" SI Pump and "A" RHR Pump fail to Auto-Start on SI		
10		RO	"A" CV Spray Pump fails to Auto-Start and "B" CV Spray Pump Trips		
11		RO	"B" RHR Pump Trips 10 sec. after starting "A" RHR Pump		
12		RO	"A" RHR Pump Trips after entering EOP-E-1		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

**ILC-13 NRC SCENARIO 1 SUMMARY DESCRIPTION**

The crew will assume the watch with the plant at 100% RTP. Maintenance is currently in progress on Component Cooling Water Pump C for pump mechanical seal replacement. HVH-4 is Out of Service due to Excessive Motor Vibrations. Repairs on HVH-4 are on hold awaiting parts. The crew has been directed to maintain current plant conditions.

On cue from the Chief Examiner, "A" CW pump will trip on overcurrent and discharge valve V6-50A will fail to close automatically. The crew will take immediate actions IAW AOP-012, Partial Loss of Condenser Vacuum or Circulating Water Pump Trip. The operator will take manual action to close V6-50A from the RTGB. Condenser Vacuum will be minimally affected by the loss of "A" CW Pump. Once the Chief Examiner is satisfied with the crew's actions, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, PZR Spray valve PCV-455B will fail open due to a failure of the controller AUTO function and result in an entry into AOP-019, Malfunction of RCS Pressure Control. Immediate actions will be taken to stabilize RCS pressure. Actions in AOP-019 will direct the crew to take manual control of the PZR Spray Valve and close the valve. The Operator will be able to close the valve; however, PC-455B will remain in MANUAL for the remainder of the scenario. Depending on the timeliness of operator actions, ITS 3.4.1, Condition A, One or more RCS DNB parameters not within limits – Restore RCS DNB parameters to within limit within 2 hours, will be entered due to PZR Pressure being reduced to less than 2205 psig. Once the Chief Examiner is satisfied with the crew's actions, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, Service Water Booster Pump A will trip on overcurrent. APP-002-A8, B8, C8 and D8 will be received when the pump trips and will direct the crew to start the standby SWBP from the RTGB and restore normal flow to the CV HVH units. ITS 3.7.7, Condition A, one Service Water System (SWS) train inoperable – Restore SWS train to operable status within 72 hours, will be entered for the SWBP failure and ITS 3.6.6, Condition D, Two Containment Cooling Trains inoperable – Restore one containment cooling train to operable status within 72 hours, will be entered due to the failure to meet SR 3.6.6.3 (Verify cooling water flow rate to each cooling unit is  $\geq 750$  gpm) for the CV HVH units. Once the Chief Examiner is satisfied with the Tech Spec compliance, he can cue the next event.

On cue from the Chief Examiner, Control Rod H-10 will drop into the core. The crew will take immediate actions IAW AOP-001, Malfunction of Reactor Control System. Additionally AOP-001 will have the crew verify that only one control rod dropped and transition to Section A of AOP-001. The crew will then take action to reduce reactor and turbine power to less than or equal to 70% within 2 hours using rods and boration to maintain Tavg with  $\pm 1.5^{\circ}\text{F}$  of Tref. SRO will determine that ITS 3.1.4 Condition B must be entered. ITS 3.1.4 Condition B requires that the rod be restored to within alignment limits within 1 hour OR verify SDM is within limits provided in the COLR within 1 hour AND reduce thermal power to less than  $\leq 70\%$  RTP AND verify SDM is within the limits provided in the COLR once per 12 hours AND perform SR 3.2.1.1 AND SR 3.2.2.1 within 72 hours AND re-evaluate safety analyses and confirm results remain valid for duration of operation under these conditions within 5 days. If above requirements cannot be achieved then ITS 3.1.4 Condition C will require that the plant be placed in Mode 3 in 6 hours. Due to the rapid reduction of Tave, ITS 3.4.1, Condition A, One or more RCS DNB parameters not within limits – Restore RCS DNB parameters to within limit within 2 hours, will be entered due to PZR Pressure being reduced to less than 2205 psig. Once the Chief

Examiner is satisfied with the crew's actions to perform a controlled reduction in power and demonstrate Tech Spec compliance, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, a leak will develop on PZR instrument tubing inside containment that will result in LT-460 Reference Leg Failure. PT-456 will also be impacted and will actuate OTΔT Bistables and alarms due to a reduction in pressure to approximately 2080 psig as sensed by PT-456. The crew may take actions IAW AOP-025, RTGB Instrument Failure, to address LT-460 failed high; however, this is not necessary since LT-460 is not the controlling channel. OWP-030, PLT-2 and/or AOP-025 will direct the crew to replace LT-460 with LT-461 as a controlling channel and remove LT-460 from service. The crew should determine that the failures are related to a common sensing line on the Pressurizer and determine that a leak has developed. Due to the failure of LT-460, ITS Table 3.3.1 Table 3.3.1-1 Item 8 which requires 3 Pressurizer Water Level – High Channel to be operable will not be met and require entry into ITS 3.3.1 Condition M, which requires the channel to be placed in trip within 6 hours OR reduce thermal power to less than P-7 within 12 hours. Due to the failure of PT-456, ITS Table 3.3.1-1, Items 5 and 7 which requires 3 OTΔT Channels and 3 Pressurizer Pressure Channels to be operable will not be met and require entry into ITS 3.3.1 Conditions E and M. Condition E requires that the channel be placed in trip within 6 hours OR be in Mode 3 in 12 hours. Condition M requires that the channel be placed in trip in 6 hours or reduce thermal power to less than P-7 within 13 hours. Also due to the failure of PT-456, ITS Table 3.3.2-1, Items 1.d and 6.a which requires 3 Pressurizer Pressure – Low Safety Injection Channels and 3 Pressurizer Pressure Low ESFAS Interlock Channels to be operable will not be met and require entry into ITS 3.3.2 Conditions D and H. Condition D requires that the channel be placed in trip within 6 hours OR be in Mode 3 in 12 hours and Mode 4 in 18 hours. Condition H requires that the interlock be verified in the required state for existing unit condition within 1 hour OR be in Mode 3 in 7 hours and Mode 4 in 13 hours. Once the Chief Examiner is satisfied with the crew's actions and Tech Spec compliance, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, a seismic event will occur. APP-036-I5, Seismic Monitor, alarm will be received along with a call from the Load Dispatcher reporting seismic events have been noted in the area from the US Geological Department. The crew will take actions IAW AOP-021, Seismic Disturbances. If dispatched, operator(s) will report that the DBE/SSE ALARM on Seismic Monitor "A" and the OBE ALARM on Seismic Monitor "B" are both EXTINGUISHED. TRM 3.17, Seismic Shutdown, requirements are not met and thus entry in TRM 3.17 is not required. The seismic event will cause a RCS leak to develop and degrade to approximately 250 gpm over a 5 ½ minute time period. The crew will enter AOP-016, Excessive Primary Plant Leakage, and take prescribed actions to mitigate the RCS leakage. ITS 3.4.13 RCS Operational Leakage, Condition B, will be entered due to having pressure boundary leakage and require that the plant be placed in Mode 3 in 6 hours and Mode 5 in 36 hours. The crew will ultimately determine that the leak rate is greater than the available charging pump capacity and initiate a reactor trip and safety injection and transition to EOP-E-0, Reactor Trip or Safety Injection.

Immediately upon the initiation of the reactor trip the RCS leak will degrade to a Large Break LOCA. During the performance of EOP-E-0 the crew will determine that both "A" SI Pump and "A" RHR Pump failed to auto-start. The crew will manually start both "A" SI Pump and "A" RHR Pump. Ten seconds after starting "A" RHR Pump the "B" RHR Pump will trip. Additionally, the crew will identify that CR HVAC failed to properly align to Emergency Pressurization Mode and must be manually realigned from the RTGB. When Containment Pressure exceeds 10 psig the "A" CV Spray Pump will fail to Auto-start and the "B" CV Spray Pump will trip 10 seconds after starting. This will ultimately be identified and "A" CV Spray Pump will be manually started from the RTGB.

After completing the required actions of EOP-E-0 the crew will transition to FRP-P.1, Response to Imminent Pressurized Thermal Shock, due to the rapid RCS depressurization and cooldown but exited due to the presence of a Large Break LOCA. The crew will then transition to EOP-E-1, Loss of Reactor or Secondary Coolant, and performs required actions. While performing steps in EOP-E-1 the "A" RHR Pump will trip on over-current. This will cause the crew to ultimately transition to EPP-15, Loss of Emergency Coolant Recirculation, due to not having at least one train of cold leg recirculation capability. EPP-15 will have the crew minimize CV Spray and ECCS flow. After verifying required CV Spray pump operating the crew will be notified that the problem with "B" RHR Pump has been corrected and can be started as needed.

The Chief Examiner may terminate the scenario at any time after "B" RHR Pump has been started and crew transitions back to EOP-E-1 from EPP-15.



Facility:	HB ROBINSON	Scenario No.:	2	Op Test No.:	<b>ILC-13</b>
Examiners:	_____	Operators:	CRS -		
	_____		RO -		
	_____		BOP -		
Initial Conditions: <ul style="list-style-type: none"> <li>68% EOL, 15,697 MWD/MTU, 139 PPM Boron.</li> <li>CCW Pump "C" is OOS and breaker is racked out</li> <li>HVH-4 is OOS and breaker is racked out</li> </ul>					
Turnover: <ul style="list-style-type: none"> <li>Maintain power at current level while RES is monitoring "A" MFP.</li> </ul>					
Critical Task: <ul style="list-style-type: none"> <li>Manually start HVH-9B to preclude shutdown within 1.5 hours.</li> <li>Open either SI-870A or SI-870B.</li> <li>Isolate feed to "C" S/G and Manually close "A" and "B" MSIV.</li> <li>Stop one Safety Injection Pump to minimize SI flow.</li> </ul>					
Event No.	Mal. No.	Event Type*	Event Description		
1		(C) BOP	HVH-9A Trips with HVH-9B failure to Auto-Start		
2		(R) RO (N) BOP, CRS	"A" MFP Trips / Load Reduction		
3		(C) RO, CRS (TS) CRS	Clogged RCP Seal Injection Strainer		
4		(I) RO, CRS (N) BOP	PT-145 fails Low / Place Excess Letdown in Service		
5		(I) BOP, CRS (TS) CRS	PT-495 fails Low		
6		(M) ALL	72 inch Main Steam Header Fault		
7		ALL	"C" S/G Tube Rupture once S/G has dried out		
8		BOP	Main Turbine fails to Auto-Trip on Reactor Trip		
9		RO	SI-870A/B fail to Auto-Open		
10		BOP	"A" and "B" MSIV fail to Auto-Close and "C" MSIV has failed open		
11		BOP	Feed Header Section Isolation Valves fail to Auto-Close		
12		BOP	"A" MDAFW Pump fails to Auto-Start		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

**ILC-13 NRC SCENARIO 2 SUMMARY DESCRIPTION**

The crew will assume the watch with the plant at 68% RTP. Engineering has requested that power be held at 68% while monitoring the recently replaced motor on "A" MFP. Additionally, Maintenance is currently in progress on Component Cooling Water Pump C for pump mechanical seal replacement. HVH-4 is Out of Service due to Excessive Motor Vibrations. Repairs on HVH-4 are on hold awaiting parts.

On cue from the Chief Examiner, HVH-9A, CV Concrete Shield Cooling Fan, trips and HVH-9B fails to Auto-Start. The operator will verify the standby fan starts by manually starting HVH-9B from the RTGB in accordance with APP-010-A7, HVH-9A/B AIR FLOW LOST/OVLD. Once the Chief Examiner is satisfied with the crew's actions, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, "A" Main Feed Pump will trip. The crew will perform the immediate actions of AOP-010, Main Feedwater / Condensate Malfunction. While performing the remaining actions of AOP-010 the crew will determine that Reactor Power is required to be lowered to less than 60% Reactor Power. The crew will perform the load reduction in accordance with AOP-010 and OP-301, RCS Boration Quick Checklist. Once the Chief Examiner is satisfied with the crew's actions to perform a controlled reduction in power and stabilize the plant, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, the RCP Seal Injection Strainer will become clogged. The crew will determine the strainer is clogged by observing a reduction in RCP seal injection flow to zero flow along with receiving APP-001-A2, Seal Water Injection Filter High  $\Delta P$ , APP-001-B4, RCP Seal Injection HI/LO Flow, and APP-001-B3, RCP A Bearing HI Temperature. APP-001-A2 will direct the crew to dispatch an auxiliary operator to check Seal Water Injection Filter  $\Delta P$  and will ultimately direct the crew to have the auxiliary operator shift seal injection filters using OP-301. The CRS will enter AOP-018, Reactor Coolant Pump Abnormal Conditions, and enter Section C, Loss of Seal Injection. AOP-018 will also diagnose the event as a clogged strainer and direct the crew to shift seal injection filters. Once the seal injection filters are shifted the RCP seal injection flows will return to normal. While seal injection flow is less than 6 gpm to any RCP the CRS will determine that ITS LCO 3.4.17, Condition E, is applicable since seal injection to any RCP is not within limit with at least one charging pump operable. The required action is to initiate action to restore seal injection to affected RCPs immediately and be in Mode 3 in 6 hours and Mode 5 in 36 hours. Once the Chief Examiner is satisfied with the crew's actions to restore seal injection flow and demonstrate Tech Spec compliance, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, Pressure Transmitter PT-145 for Letdown Line Pressure will fail LOW, causing PCV-145 to close and isolate letdown flow. AOP-025, RTGB Instrument Failure, Section A will be implemented to isolate the letdown line, reduce charging flow and place Excess Letdown in service. Once the Chief Examiner is satisfied with the crew's actions, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, PT-495, Main Steam Line "C" Pressure Transmitter, will fail low. The BOP will perform immediate actions of AOP-025, RTGB Instrument Failure, Section G, and take manual control of FCV-498, "C" S/G Feed Regulating Valve, and restore "C" S/G level to the normal band. The crew will then take action to swap to the alternate channel, place the "C" FRV back in Automatic and remove PT-495 from service in accordance with OWP-025, SGP-11. Due to the failure of PT-495, ITS Table 3.3.1 Table 3.3.1-1 Item 14 which requires 2

Steam Flow / Feedwater Flow Mismatch Channels to be operable will not be met and require entry into ITS 3.3.1 Condition E, which requires the channel to be placed in trip with 6 hours OR be in Mode 3 in 12 hours. Due to the failure of PT-495, ITS Table 3.3.2-1, Item 1.e which requires 3 Steam Line High Differential Pressure between Steam header and Steam Lines Channels to be operable will not be met and require entry into ITS 3.3.2 Condition D. Also due to the failure of PT-495, ITS Table 3.3.3-1, Item 20 which requires 2 Steam Generator Pressure Channels per S/G to be operable will be reviewed and determined to be met. ITS Table 3.3.6.1 Item 4 will also be reviewed and determined to be applicable due to affecting Safety Injection ESFAS Instrumentation associated with Containment Ventilation Isolation Instrumentation. Once the Chief Examiner is satisfied with the crew's actions and Tech Spec compliance, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, the plant will experience a fault on the 72 inch Main Steam Header. The crew will determine that a reactor trip is required and transition to EOP-E-0, Reactor Trip or Safety Injection. An automatic safety injection signal will be initiated due to high steam line flow with low Tavg. During the immediate actions of EOP-E-0 it will be determined that the Turbine failed to automatically trip and manual actions will be taken to trip the turbine from the RTGB. During further actions of EOP-E-0 it will be discovered that SI-870A and B, BIT Outlets, fail to automatically open and have to be manually opened from the RTGB in order to provide safety injection flow. All Main Steam Isolation Valves will fail to automatically close and manual actions will be taken to close them from the RTGB. "C" MSIV will remain failed in the open position. V2-6A, B, and C, Feedwater Header Section Valves, will fail to automatically close and will have to be manually closed from the RTGB. "A" Motor Driven Auxiliary Feedwater Pump will fail to automatically start and will be manually started from the RTGB. Once "C" S/G has dried out a 400 gpm tube rupture will ramp in over 60 seconds on "C" S/G. The crew will complete EOP-E-0 and transition to EOP-E-2, Faulted Steam Generator Isolation, and perform the actions to isolate "C" S/G. Once "C" S/G is isolated the crew will then transition to EOP-E-3, Steam Generator Tube Rupture, due to elevated readings on R-31C, Main Steam Line Channel, and continued steam flow from "C" S/G. Since "C" MSIV cannot be closed the crew will direct local isolation of "C" S/G. Ultimately the crew will transition to EPP-17, SGTR with Loss of Reactor Coolant: Subcooled Recovery, and secure all but one RCP and one Safety Injection pump.

The Chief Examiner may terminate the scenario at any time after one safety injection pump has been secured in accordance with EPP-17.

Facility:	HB ROBINSON		Scenario No.:	3	Op Test No.:	ILC-13
Examiners:	_____		Operators:	CRS - _____		
	_____			RO - _____		
	_____			BOP - _____		
Initial Conditions: <ul style="list-style-type: none"> <li>• 100% EOL, 15,697 MWD/MTU, 96 PPM Boron.</li> <li>• CCW Pump "C" is OOS and breaker is racked out</li> <li>• HVH-4 is OOS and breaker is racked out</li> </ul>						
Turnover: <ul style="list-style-type: none"> <li>• Maintain power at current level.</li> </ul>						
Critical Task: <ul style="list-style-type: none"> <li>• Establish Containment Isolation.</li> <li>• Manually start "A" MDAFW pump.</li> <li>• Secure all RCPs due to a loss of subcooling with SI flow.</li> <li>• Manually Start "A" SI Pump</li> <li>• Direct local actions to Swap Charging Pump suction to the RWST to prevent Gas Binding of the Charging Pumps. (Contingency)</li> </ul>						
Event No.	Malf. No.	Event Type*	Event Description			
1		(I) BOP, CRS (TS) CRS	PT-447 fails Low			
2		(C) RO, CRS	TCV-144 Controller fails closed with TCV-143 auto-swap failure			
3		(I) RO (TS) CRS	NI-44 Upper Detector fails High			
4		(R) RO (N) BOP, CRS	HCV-1459 fails Open with "A" MFP Vibrations / Load Reduction			
5		(I) BOP, CRS (TS) CRS	S/G Level Median Selector Module failure			
6		(M) ALL	Three Main Turbine Governor Valves randomly oscillate and ultimately fail close			
7		(M) ALL	Loss of 4KV Bus 3 with "B" EDG failure (Loss of E-2)			
8		(M) ALL	Locked Rotor on "B" RCP results in total seal stack failure and suction line leak.			
9		BOP	SDAFW Pump Trips and "A" and "B" MDAFW pumps fail to Auto-Start.			
10		RO	CVC-200A and CVC-204A/B fail to close on Phase A			
11		RO	"A" SI Pump fails to Auto-Start on SI			
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor						

**ILC-13 NRC SCENARIO 3 SUMMARY DESCRIPTION**

The crew will assume the watch with the plant at 100% RTP. Maintenance is currently in progress on Component Cooling Water Pump C for pump mechanical seal replacement. HVH-4 is Out of Service due to Excessive Motor Vibrations. Repairs on HVH-4 are on hold awaiting parts.

On cue from the Chief Examiner, PT-447, Turbine First Stage Pressure Transmitter, fails low. The crew will perform the immediate actions of AOP-025, RTGB Instrument Failure, Section H, and verify S/Gs trending to 39% and place Rod Control in Manual. S/G levels will be restored to normal, alternate channel selected and feedwater regulating valves returned to automatic. Rod control will be returned to automatic once Tavg verified in the required band. PT-447 will then be removed from service in accordance with OWP-033, FSP-2. Failure of PT-447 will result in ITS Table 3.3.1-1, Item 17e, requirement to have 2 Turbine Impulse Pressure, P-7 inputs available for Reactor Protection System Interlocks to not be met. ITS LCO 3.3.1, Condition T, will be entered which requires that the P-7 interlock be verified in the required state for existing unit conditions within 1 hour OR be in Mode 3 in 7 hours. ITS Table 3.3.2-1, Items 1f, 1g, 4d, and 4e, requirement to have 2 High Steam Flow in Two Steam Lines for Safety Injection and Steam Line Isolation will not be met. ITS LCO 3.3.2, Condition D, will be entered which requires that the channel be placed in trip within 6 hours OR be in Mode 3 in 12 hours AND be in Mode 4 in 18 hours. ITS Table 3.3.6.1 Item 4 will also be reviewed and determined to be applicable due to affecting Safety Injection ESFAS Instrumentation associated with Containment Ventilation Isolation Instrumentation. Once the Chief Examiner is satisfied with the crew's actions and Tech Spec compliance, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, TCV-144, Letdown Temperature Controller, will fail close causing letdown temperature to rise above 135°F. TCV-123, VCT/DEMIN DIV, will fail to divert letdown flow to the VCT and manual action will be taken to divert letdown flow from the RTGB in accordance with APP-001-A6, LTDN FLOW HI TEMP DEMIN BYPD. The operator will then determine that TCV-144 has failed closed and take manual actions at the RTGB to open TCV-144 to re-establish cooling flow to the Non-regenerative Heat Exchanger in accordance with APP-001-A6. Once the Chief Examiner is satisfied with the crew's actions, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, NI-44, Power Range, Upper Detector will fail high. The channel will be removed from service in accordance with OWP-011, NI-4. NI-44 failure will result in ITS Table 3.3.1-1, Items 2, 17.c and 17.d, requirements to have 4 Power Range Neutron Flux Channels to not be met. ITS LCO 3.3.1, Conditions D, S and T will be entered. Condition D requires that the channel be placed in trip within 6 hours and SR 3.2.4.2 be performed once per 12 hours. Conditions S and T requires that the interlock is verified in the required state for existing unit conditions within 1 hour OR be in Mode 3 in 7 hours (Condition S) OR be in Mode 2 in 7 hours (Condition T). Once the Chief Examiner is satisfied with the crew's actions and Tech Spec compliance, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, HCV-1459 will fail open. The crew will perform the immediate actions of AOP-010, Main Feedwater / Condensate Malfunction. While performing the remaining actions of AOP-010 the crew will determine that Reactor Power is required to be controlled less than 100% and take action to lower turbine load. Once Reactor Power is stabilized below 100%, the crew will receive a report from Operations Management that Engineering has noted an unusual noise and vibration on "A" MFP and recommends that

Reactor Power be reduced to 70% power in accordance with AOP-038, Rapid Downpower. Once the Chief Examiner is satisfied with the crew's actions to lower reactor power in a controlled manner, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, the "A" S/G level median selector module will fail resulting in a loss of S/G level input to the "A" Feedwater Regulating Valve. The crew will take immediate actions of AOP-010, Main Feedwater / Condensate Malfunction, with the BOP taking manual control of "A" FRV. Once the Chief Examiner is satisfied with the crew's actions to control and stabilize "A" S/G level, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, three main turbine governor valves will begin to randomly oscillate and ultimately fail closed resulting in a Secondary Load Rejection. The crew may decide to take a conservative action and initiate a reactor trip and transition to EOP-E-0, Reactor Trip or Safety Injection. However, the crew may enter AOP-015, Secondary Load Rejection, and attempt to diagnose the problem. Once in AOP-015 the crew will eventually reach a continuous action step that requires the crew to trip the reactor if greater than two governor valves indicate closed. During the fast-bus transfer following the Reactor Trip, 4KV Bus 3 will lose power from the Start-up Transformer due to breaker 52/17 tripping open. On the loss of 4KV Bus 3 the "B" RCP will experience a locked rotor along with a total seal stack failure and suction line leak. Additionally, "B" EDG will fail resulting in a loss of power to 480V Bus E-2. Due to the seal failure and suction line leak on "B" RCP a safety injection will be required. Only "A" train ECCS components will be available due to the loss of Bus E-2. However, "A" SI Pump does not auto-start and must be manually started from the RTGB. Also during the reactor trip the Steam Driven Auxiliary Feedwater Pump will trip and neither "A" or "B" Motor Driven Auxiliary Feedwater Pump will automatically start. CVC-200A, Letdown Orifice Isolation, and CVC-204A and CVC-240B, Letdown Line Isolation Valves, fail to close as required on the Phase A signal. During the performance of EOP-E-0 the crew should dispatch personnel to investigate and troubleshoot the failure of "B" EDG. If dispatched, maintenance personnel will determine and correct the cause (fuel racks found tripped and reset) and recommend that the "B" EDG be started locally. If personnel are not dispatched then 480V Bus E-2 will remain deenergized. With 480V Bus E-2 deenergized MCC-6 will not have power and thus LCV-115C, VCT Isolation, will remain in the open position preventing Charging Pump suction swapover to the RWST. If not identified this will eventually result in a loss of suction to the Charging Pumps and lead to gas binding if LCV-115C is not closed locally. If gas binding of the Charging Pumps occurs then all Charging Pumps will be secured, LCV-115C will have to be locally closed and Charging Pumps vented prior to restoring charging pump flow.

The crew will progress through EOP-E-0 and address the malfunctions discussed above. Additionally, subcooling will lower to the point at which RCP Trip Criteria is met and all RCPs will be secured. EOP-E-0 will eventually direct the crew to transition to EOP-E-1, Loss of Reactor or Secondary Coolant. At some point during the performance of EOP-E-0 or EOP-E-1 the crew is expected to realize that "B" RCP experienced a seal failure and that AOP-018, Reactor Coolant Pump Abnormal Conditions, is required to be implemented since it is a Concurrent AOP. The crew will perform EOP-E-1 and eventually transition to EPP-8, Post LOCA Cooldown and Depressurization, and initiate RCS Cooldown to Cold Shutdown and Depressurization of the RCS to refill the PZR.

The Chief Examiner may terminate the scenario at any time after RCS Cooldown and/or RCS Depressurization has commenced in accordance with EPP-8.

Facility:	HB ROBINSON		Scenario No.:	4	Op Test No.:	ILC-13
Examiners:	_____		Operators:	CRS - _____		
	_____			RO - _____		
	_____			BOP - _____		
Initial Conditions: <ul style="list-style-type: none"> <li>• 10E-8 amps, EOL, 15,697 MWD/MTU, 513 PPM Boron.</li> <li>• No equipment out of service.</li> </ul>						
Turnover: <ul style="list-style-type: none"> <li>• Startup in progress in accordance with GP-003, Step 8.4.</li> </ul>						
Critical Task: <ul style="list-style-type: none"> <li>• Manually Trip the reactor.</li> <li>• Establish Containment Isolation.</li> <li>• Isolate "A" Steam Generator in accordance with EOP-E-3.</li> <li>• Restart ECCS equipment after loss of off-site power.</li> <li>• Establish Auxiliary Feedwater</li> </ul>						
Event No.	Malf. No.	Event Type*	Event Description			
1		(R) RO, (N) CRS	Withdraw Rods to the Point of Adding Heat			
2		(I) RO, CRS (TS) CRS	PT-445 fails High with PCV-456 failing to fully close			
3		(C) BOP, CRS (TS) CRS	SW Break at Suction of "A" SWBP			
4		(C) RO, CRS	"B" RCP Thermal Barrier leak / FCV-626 failure			
5		(C) RO, CRS	"A" S/G Tube Leak			
6		(M) ALL	"A" S/G Tube Rupture			
7		RO	Failure of Automatic Rx Trip and Right Hand Rx Trip Button			
8		(M) ALL	Loss of Startup Transformer			
9		BOP	MDAFW Pump Motor Operated Discharge Valves fail to Auto-Open (V2-16s)			
10		BOP	Feed Regulating Bypass Valves fail to close on Phase A.			
11		BOP	SDAFW Pump Steam Supply Valves (V1-8s) fail to Auto-Open on Loss of Startup Transformer			
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor						

**ILC-13 NRC SCENARIO 4 SUMMARY DESCRIPTION**

The crew will assume the watch with the plant at 10E-8 amps performing a plant startup in accordance with GP-003, Normal Plant Startup from Hot Shutdown to Critical. The crew will continue with GP-003 at Step 8.4, Post Critical Operations, and withdraw control rods to the Point of Adding Heat and then stabilize Reactor Power between 3% and 5%. Once the Chief Examiner is satisfied with the crew's actions to stabilize reactor power, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, PT-445, Pressurizer Pressure Transmitter, fails High. The crew will perform the immediate actions of AOP-025, RTGB Instrument Failure, Section C, and attempt to close PCV-456, PZR PORV. PCV-456 will fail to fully close and the operator will take manual action to close the PORV Block Valve. Once the PORV Block Valve is closed PZR Pressure will automatically recover to normal band. Due to the failure of PCV-456 to fully close the SRO will determine that ITS LCO Condition B, is applicable due to one PORV inoperable and not capable of being manually cycled. This LCO requires that the block valve be closed within 1 hour and power removed from the associated block valve within 1 hour and restore PORV to operable status within 72 hours. Once the Chief Examiner is satisfied with the crew's actions to control PZR Pressure and Tech Spec compliance, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, a Service Water Break will occur at the Suction of "A" SWBP. The crew will implement AOP-022, Loss of Service Water, Section D, for Leak on South Service Water Header Downstream of Check Valve SW-545. The crew will perform required valve and Service Water Booster Pump manipulations from the RTGB and direct field actions in accordance with AOP-022 attachments to isolate the ruptured section of Service Water piping and restore various components to operable status. The Service Water Break will result in entry into ITS LCO 3.7.5, Condition C, due to Service Water supply to AFW system being inoperable and requires that the plant be in Mode 3 in 6 hours and Mode 4 in 18 hours without reliance on steam generator for heat removal. ITS LCO 3.7.7, Condition A, is also applicable due to one Service Water train inoperable and requires that the train be restored to operable status within 72 hours or be in Mode 3 in 6 hours and Mode 5 in 36 hours. Once the Chief Examiner is satisfied with the crew's actions and Tech Spec compliance, the Chief Examiner will cue the next event.

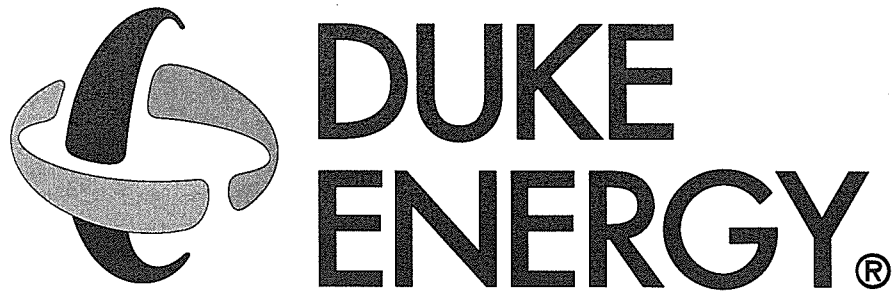
On cue from the Chief Examiner, "B" RCP will experience a 40 gpm thermal barrier leak. This will be identified by a rising trend and alarm on R-17, rising CCW surge tank level, and RCP thermal barrier cooling water high flow alarm. FCV-626, Thermal Barrier Flow Control, will receive the signal to auto-close, however the breaker to the MOV will trip leaving the valve in mid-position. The crew will take action to close CC-735, Thermal Barrier Outlet Isolation, from the RTGB due to the FCV-626 failure. Once the Chief Examiner is satisfied with the crew's actions, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, a 300 gpm tube leak on "A" S/G will be ramped over a six minute time period. The crew will enter AOP-035, S/G Tube Leak, and attempt to control pressurizer level. Ultimately the crew will determine that the leak is greater than the capacity of available charging pumps and initiate a reactor trip and safety injection. The reactor will not trip on an automatic signal or by depressing the right hand reactor trip pushbutton. The RO will identify this failure and trip the reactor by depressing the left hand reactor trip pushbutton. On the initiation of the Reactor Trip the S/G tube leak will degrade to 1000 gpm. On initiation of the



Safety Injection the Feedwater Regulating Bypass Valves will fail to close on the Phase A signal. The BOP will take manual action to adjust the individual valve's potentiometer on the RTGB to close the valves. Additionally, the Motor Driven Feedwater Pumps Discharge Valves will fail to Auto-Open. This failure will be identified, but the crew may determine it not necessary to open the valves until needed due to adequate S/G levels present at the onset of the major event. The crew will carry out the actions of EOP-E-0, Reactor Trip or Safety Injection, identifying the conditions noted above and stabilizing the plant. The crew will transition from EOP-E-0 to EOP-E-3, Steam Generator Tube Rupture. Once "A" S/G has been isolated and an operator dispatched to deenergize the associated AFW valves the plant will experience a loss of off-site power. On the loss of off-site power, the Main Steam Supply valves to the Steam Driven AFW Pump will fail to open. The crew will take required actions to restart safeguards equipment since SI would have been reset at this point in the EOP Network. After safeguards equipment has been restarted the crew will perform an RCS cooldown and depressurization to stop the primary to secondary leakage. The crew will be required to either open the MDAFW Pump Motor Operated Discharge Valves (V2-16s) or manually start the SDAFW pump to provide AFW flow during the RCS cooldown. Once the primary to secondary leakage is stopped, both safety injection pumps will be secured.

The Chief Examiner may terminate the scenario at any time after the safety injection pumps have been secured in accordance with EOP-E-3, or at his discretion.



**H.B. Robinson**

**ILC-13 NRC Licensing Exam  
Simulator Scenarios**

**Final Submittal**



Facility:	HB ROBINSON		Scenario No.:	1	Op Test No.:	ILC-13
Examiners:	_____		Operators:	CRS -		
	_____			RO -		
	_____			BOP -		
Initial Conditions: <ul style="list-style-type: none"> <li>• 100% MOL, 9000 MWD/MTU, 848 PPM Boron.</li> <li>• CCW Pump "C" is OOS and breaker is racked out</li> <li>• HVH-4 is OOS and breaker is racked out</li> </ul>						
Turnover: <ul style="list-style-type: none"> <li>• Maintain power at current level.</li> </ul>						
Critical Task: <ul style="list-style-type: none"> <li>• Secure All RCPs due to EOP-E-0 Foldout Criteria.</li> <li>• Start "A" Safety Injection Pump to provide adequate core cooling.</li> <li>• Place CR HVAC in Emergency Pressurization Mode due to LB LOCA.</li> <li>• Start "A" CV Spray Pump due to abnormal CV Conditions with reduced CV Spray and Cooling capability.</li> </ul>						
Event No.	Malf. No.	Event Type*	Event Description			
1		(C) BOP <i>CRS</i>	"A" Circulating Water Pump Trips and Discharge Valve (V6-50A) fails to Auto-Close.			
2		(C) RO, CRS (TS) CRS	PCV-455B fails OPEN while in AUTO			
3		(C) BOP, CRS (TS) CRS	"A" SWBP Trips			
4		(R) RO (N) BOP, CRS (TS) CRS	Dropped Control Rod resulting in Load Reduction			
5		(I) RO, CRS (TS) CRS	LT-460 Reference Leg / PT-456 Sensing Line Failure			
6		(C) RO, CRS	Seismic Event and RCS Leak (250 gpm ramped in over 5 ½ minutes)			
7		(M) ALL	Large Break LOCA on Reactor Trip			
8		BOP	CR HVAC fails to Auto Actuate on SI			
9		RO	"A" SI Pump and "A" RHR Pump fail to Auto-Start on SI			
10		RO	"A" CV Spray Pump fails to Auto-Start and "B" CV Spray Pump Trips			
11		RO	"B" RHR Pump Trips 10 sec. after starting "A" RHR Pump			
12		RO	"A" RHR Pump Trips after entering EOP-E-1			
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor						

*Sample*

**ILC-13 NRC SCENARIO 1 SUMMARY DESCRIPTION**

The crew will assume the watch with the plant at 100% RTP. Maintenance is currently in progress on Component Cooling Water Pump C for pump mechanical seal replacement. HVH-4 is Out of Service due to Excessive Motor Vibrations. Repairs on HVH-4 are on hold awaiting parts. The crew has been directed to maintain current plant conditions.

On cue from the Chief Examiner, "A" CW pump will trip on overcurrent and discharge valve V6-50A will fail to close automatically. The crew will take immediate actions IAW AOP-012, Partial Loss of Condenser Vacuum or Circulating Water Pump Trip. The operator will take manual action to close V6-50A from the RTGB. Condenser Vacuum will be minimally affected by the loss of "A" CW Pump. Once the Chief Examiner is satisfied with the crew's actions, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, PZR Spray valve PCV-455B will fail open due to a failure of the controller AUTO function and result in an entry into AOP-019, Malfunction of RCS Pressure Control. Immediate actions will be taken to stabilize RCS pressure. Actions in AOP-019 will direct the crew to take manual control of the PZR Spray Valve and close the valve. The Operator will be able to close the valve; however, PC-455B will remain in MANUAL for the remainder of the scenario. Depending on the timeliness of operator actions, ITS 3.4.1, Condition A, One or more RCS DNB parameters not within limits – Restore RCS DNB parameters to within limit within 2 hours, will be entered due to PZR Pressure being reduced to less than 2205 psig. Once the Chief Examiner is satisfied with the crew's actions, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, Service Water Booster Pump A will trip on overcurrent. APP-002-A8, B8, C8 and D8 will be received when the pump trips and will direct the crew to start the standby SWBP from the RTGB and restore normal flow to the CV HVH units. ITS 3.7.7, Condition A, one Service Water System (SWS) train inoperable – Restore SWS train to operable status within 72 hours, will be entered for the SWBP failure and ITS 3.6.6, Condition D, Two Containment Cooling Trains inoperable – Restore one containment cooling train to operable status within 72 hours, will be entered due to the failure to meet SR 3.6.6.3 (Verify cooling water flow rate to each cooling unit is  $\geq 750$  gpm) for the CV HVH units. Once the Chief Examiner is satisfied with the Tech Spec compliance, he can cue the next event.

On cue from the Chief Examiner, Control Rod H-10 will drop into the core. The crew will take immediate actions IAW AOP-001, Malfunction of Reactor Control System. Additionally AOP-001 will have the crew verify that only one control rod dropped and transition to Section A of AOP-001. The crew will then take action to reduce reactor and turbine power to less than or equal to 70% within 2 hours using rods and boration to maintain Tavg with  $\pm 1.5^{\circ}\text{F}$  of Tref. SRO will determine that ITS 3.1.4 Condition B must be entered. ITS 3.1.4 Condition B requires that the rod be restored to within alignment limits within 1 hour OR verify SDM is within limits provided in the COLR within 1 hour AND reduce thermal power to less than  $\leq 70\%$  RTP AND verify SDM is within the limits provided in the COLR once per 12 hours AND perform SR 3.2.1.1 AND SR 3.2.2.1 within 72 hours AND re-evaluate safety analyses and confirm results remain valid for duration of operation under these conditions within 5 days. If above requirements cannot be achieved then ITS 3.1.4 Condition C will require that the plant be placed in Mode 3 in 6 hours. Due to the rapid reduction of Tave, ITS 3.4.1, Condition A, One or more RCS DNB parameters not within limits – Restore RCS DNB parameters to within limit within 2 hours, will be entered due to PZR Pressure being reduced to less than 2205 psig. Once the Chief

Examiner is satisfied with the crew's actions to perform a controlled reduction in power and demonstrate Tech Spec compliance, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, a leak will develop on PZR instrument tubing inside containment that will result in LT-460 Reference Leg Failure. PT-456 will also be impacted and will actuate OTΔT Bistables and alarms due to a reduction in pressure to approximately 2080 psig as sensed by PT-456. The crew may take actions IAW AOP-025, RTGB Instrument Failure, to address LT-460 failed high; however, this is not necessary since LT-460 is not the controlling channel. OWP-030, PLT-2 and/or AOP-025 will direct the crew to replace LT-460 with LT-461 as a controlling channel and remove LT-460 from service. The crew should determine that the failures are related to a common sensing line on the Pressurizer and determine that a leak has developed and perform the actions of AOP-016, Excessive Primary Plant Leakage and AOP-005, Radiation Monitoring System. Due to the failure of LT-460, ITS Table 3.3.1 Table 3.3.1-1 Item 8 which requires 3 Pressurizer Water Level – High Channel to be operable will not be met and require entry into ITS 3.3.1 Condition M, which requires the channel to be placed in trip with 6 hours OR reduce thermal power to less than P-7 within 12 hours. Due to the failure of PT-456, ITS Table 3.3.1-1, Items 5 and 7 which requires 3 OTΔT Channels and 3 Pressurizer Pressure Channels to be operable will not be met and require entry into ITS 3.3.1 Conditions E and M. Condition E requires that the channel be placed in trip within 6 hours OR be in Mode 3 in 12 hours. Condition M requires that the channel be placed in trip in 6 hours or reduce thermal power to less than P-7 within 13 hours. Also due to the failure of PT-456, ITS Table 3.3.2-1, Items 1.d and 6.a which requires 3 Pressurizer Pressure – Low Safety Injection Channels and 3 Pressurizer Pressure Low ESFAS Interlock Channels to be operable will not be met and require entry into ITS 3.3.2 Conditions D and H. Condition D requires that the channel be placed in trip within 6 hours OR be in Mode 3 in 12 hours and Mode 4 in 18 hours. Condition H requires that the interlock be verified in the required state for existing unit condition within 1 hour OR be in Mode 3 in 7 hours and Mode 4 in 13 hours. Once the Chief Examiner is satisfied with the crew's actions and Tech Spec compliance, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, a seismic event will occur. APP-036-I5, Seismic Monitor, alarm will be received along with a call from the Load Dispatcher reporting seismic events have been noted in the area from the US Geological Department. The crew will take actions IAW AOP-021, Seismic Disturbances. If dispatched, operator(s) will report that the DBE/SSE ALARM on Seismic Monitor "A" and the OBE ALARM on Seismic Monitor "B" are both EXTINGUISHED. TRM 3.17, Seismic Shutdown, requirements are not met and thus entry in TRM 3.17 is not required. The seismic event will cause a RCS leak to develop and degrade to approximately 250 gpm over a 5 ½ minute time period. The crew will enter AOP-016, Excessive Primary Plant Leakage, and take prescribed actions to mitigate the RCS leakage. ITS 3.4.13 RCS Operational Leakage, Condition B, will be entered due to having pressure boundary leakage and require that the plant be placed in Mode 3 in 6 hours and Mode 5 in 36 hours. The crew will ultimately determine that the leak rate is greater than the available charging pump capacity and initiate a reactor trip and safety injection and transition to EOP-E-0, Reactor Trip or Safety Injection.

Immediately upon the initiation of the reactor trip the RCS leak will degrade to a Large Break LOCA. During the performance of EOP-E-0 the crew will determine that both "A" SI Pump and "A" RHR Pump failed to auto-start. The crew will manually start both "A" SI Pump and "A" RHR Pump. Ten seconds after starting "A" RHR Pump the "B" RHR Pump will trip. Additionally, the crew will identify that CR HVAC failed to properly align to Emergency Pressurization Mode and must be manually realigned from the RTGB. When Containment Pressure exceeds 10 psig the "A" CV Spray Pump will fail to Auto-start and the "B" CV Spray Pump will trip 10 seconds after starting. This will ultimately be identified and "A" CV Spray Pump will be manually started from the RTGB.

After completing the required actions of EOP-E-0 the crew will transition to FRP-P.1, Response to Imminent Pressurized Thermal Shock, due to the rapid RCS depressurization and cooldown but exited due to the presence of a Large Break LOCA. The crew will then transition to EOP-E-1, Loss of Reactor or Secondary Coolant, and performs required actions. While performing steps in EOP-E-1 the "A" RHR Pump will trip on over-current. This will cause the crew to ultimately transition to EPP-15, Loss of Emergency Coolant Recirculation, due to not having at least one train of cold leg recirculation capability. EPP-15 will have the crew minimize CV Spray and ECCS flow. After verifying required CV Spray pump operating the crew will be notified that the problem with "B" RHR Pump has been corrected and can be started as needed.

The Chief Examiner may terminate the scenario at any time after "B" RHR Pump has been started and crew transitions back to EOP-E-1 from EPP-15.

**ILC-13 NRC SCENARIO 1 SIMULATOR SETUP****IC/SETUP:**

- IC-901, SCN 006\_ILC\_13\_NRC\_1.
- Status board is provided to crew is IC-13.

**PRE-LOADED EVENTS:**

The following events should occur on the reactor trip or triggered events following the reactor trip:

- Event 7: Large Break LOCA on Reactor Trip
- Event 8: CR HVAC fails to Auto Actuate on SI
- Event 9: "A" SI Pump and "A" RHR Pump fail to Auto-Start on SI
- Event 10: "A" CV Spray Pump fails to Auto-Start and "B" CV Spray Pump Trips
- Event 11: "B" RHR Pump Trips 10 seconds after manually starting "A" RHR Pump
- Event 12: "A" RHR Pump Trips after entering EOP-E-1

**EVENTS/TRIGGERS INITIATED DURING THE SCENARIO:**

- Event 1: "A" CWP Trips and V6-50A fails to Auto-Close
- Event 2: PCV-455B fails open while in AUTO
- Event 3: "A" SWBP trips
- Event 4: Dropped Control Rod resulting in Load Reduction
- Event 5: LT-460 Reference Leg / PT-456 Sensing line Failure
- Event 6: Seismic Event and RCS Leak (250 gpm ramped in over 5 ½ minutes)

**EXPECTED PROCEDURE FLOWPATH OR COPIES NEEDED:**

- AOP-012
- AOP-019
- APP-002
- AOP-001
- AOP-025, Section B
- OWP-030, PLT-2
- OWP-029, PLT-2
- AOP-021
- AOP-016
- EOP-E-0
- FRP-P.1
- EOP-E-1
- EPP-15

Op Test No.: ILC-13 NRC Scenario # 1 Event # 1 Page 6 of 6

Event Description: "A" Circulating Water Pump Trips and V6-50A fails to Auto-Close

Time	Position	Applicant's Actions or Behavior
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**BOOTH OPERATOR: When directed, insert Event 1, "A" Circulating Water Pump Trips and V6-50A fails to Auto-Close**

**EVENT INDICATIONS:****APP-008—D4, CW PMP A MOTOR/DISCH VLV TRIP/OLVD, is illuminated****"A" CWP RTGB GREEN OFF light illuminated****V6-50A RTGB RED OPEN light illuminated**

	BOP	<b>Immediate Action Step:</b> Check Circulating Water Pump – ANY TRIPPED (YES)
	BOP	<b>Immediate Action Step:</b> Verify The Tripped Circulating Water Pump Discharge Valve - CLOSED <u>OR</u> CLOSING (BOP takes action to manually close V6-50A from the RTGB.)
	SRO	Enters AOP-012, Partial Loss of Condenser Vacuum or Circulating Water Pump Trip
	SRO	Verifies immediate actions complete.
	BOP	Start any available CWP with its Associated CW PMP SEAL WTR LOST Alarm Extinguished. (All available are running.)
	RO	Make PA Announcement for Procedure Entry.
	BOP	Check Liquid Waste Batch Release – In Progress (NO)
	BOP	Check Condenser Status – VACUUM PREVIOUSLY ESTABLISHED (YES)
	BOP	Check Status of the tripped CWP Discharge Valves – Completed Closing (YES, V6-50A manually closed from RTGB.)
	BOP	Check Plant Conditions – In Modes 1 <u>OR</u> 2 (YES)
	BOP	<b>Continuous Action Step:</b> Check Condenser Back Pressure On PI-1312 AND PI-1313 – APPROACHES RESTRICTED REGION OF ATTACHMENT 3, CONDENSER BACKPRESSURE LIMIT CURVE (NO, Go to Step 13)
	BOP	<b>Continuous Action Step:</b> Check Condenser Vacuum Degrading (NO, Go to Step 15)
	SRO	Implement the EALs



Op Test No.:	<u>ILC-13 NRC</u>	Scenario #	<u>1</u>	Event #	<u>1</u>	Page	<u>7</u>	of	<u>7</u>
Event Description:		"A" Circulating Water Pump Trips and V6-50A fails to Auto-Close							
Time	Position	Applicant's Actions or Behavior							

<b>NOTE:</b>	<b>Crew should notify WCC SRO and/or I&amp;C to write a work request, investigate and initiate repairs, vent the water boxes and notify the Operations Manager.</b>	
<b>BOOTH OPERATOR:</b>	<b>Acknowledge any direction associated with water box venting, inspections, etc. If requested, report that the CWP breaker tripped and the cause is unknown. Traveling Screens appear to be free of debris. 15 minutes after the request to vent the water boxes report that venting has been completed.</b>	
<b>BOOTH OPERATOR:</b>	<b>Insert Event #2 (PCV-455B fails open in AUTO) on cue from the Chief Examiner.</b>	

Op Test No.:	ILC-13 NRC	Scenario #	1	Event #	2	Page	8	of	8
Event Description:		PCV-455B fails open in Auto							
Time	Position	Applicant's Actions or Behavior							

**BOOTH OPERATOR: At the discretion of the Examiner, insert Event 2, PCV-455B fails open in AUTO**

**EVENT INDICATIONS:**

**APP-003-D8, PZR CONTROL HI/LO PRESS**

**PC-455B output failing high.**

**PCV-455B RTGB indication RED open light illuminates.**

**Pressurizer Pressure lowering.**

**Pressurizer Control Bank Heaters energize.**

	RO	<b>Immediate Action Step</b> Determine If PZR PORVs Should Be Closed: <ul style="list-style-type: none"> <li>• Check PZR pressure - LESS THAN 2335 PSIG (YES)</li> <li>• Verify Both PZR PORVs - CLOSED (YES)</li> </ul>
	RO	<b>Immediate Action Step</b> Control The PZR SPRAY VALVES AND PZR Heaters To Restore RCS Pressure To The Desired Control Band <ul style="list-style-type: none"> <li>• Place PCV-455B in Manual and Close</li> </ul>
	SRO	Enters AOP-019, Malfunction of RCS Pressure Control
	SRO	Verifies immediate actions complete.
	CREW	Make PA Announcement for Procedure Entry
	RO	<b>Continuous Action Step</b> Check PZR Pressure - UNDER OPERATOR CONTROL (YES)
	RO	Check Pressurizer Pressure Transmitter PT-444 <u>OR</u> PT-445 – FAILED (NO, Go to Step 7)
	RO	Check PC-444J, PZR PRESS - OPERATING PROPERLY IN AUTO (YES)
	RO	Observe the NOTE prior to Step 11 and Go to Step 11
	RO	Check RCS Pressure - LESS THAN REQUIRED FOR CURRENT PLANT CONDITIONS (YES)
	RO	<b>Continuous Action Step</b> Check PZR Pressure - LESS THAN 2205 PSIG (YES)

Op Test No.:	ILC-13 NRC	Scenario #	1	Event #	2	Page	9	of	9
Event Description:		PCV-455B fails open in Auto							
Time	Position	Applicant's Actions or Behavior							

	RO	Restore Pressure Within 2 HOURS OR Be In Mode 2 Within 6 HOURS
	RO	Check Both PZR SPRAY VALVES – CLOSED (NO, based on initial event conditions. May answer as YES based on current conditions.) Perform the following: a. Place the affected PZR SPRAY VALVE Controller in MAN AND adjust the output to zero. b. IF the affected valve will NOT close, THEN Go To Step 16. (NO) c. IF the affected valve has closed, THEN observe the CAUTION prior to Step 20 and Go to Step 20. (YES)
	RO	Check CVC-311, Aux Pzr Spray Valve – Closed (YES)
	RO	<b>Continuous Action Step</b> Check APP-003-F8, PZR LO LVL HTR OFF & LTDN SECURE – EXTINGUISHED (YES)
	SRO/BOP	Contact Maintenance and Engineering to check PZR Heater capacity
<b>BOOTH OPERATOR: If / When contacted as WCC SRO, Maintenance and/or Engineering, wait 5 minutes and then report that there is no reduced PZR heater capacity.</b>		
	RO	Check PZR Heater capacity – REDUCED (NO, Go to Step 23)
	RO	Check PZR Pressure - STABLE OR TRENDING TO REQUIRED VALUE (YES, Go to Step 29)
	SRO	Implement the EALs
	SRO	Contact I&C to Make Repair to the PZR Pressure Control System
	SRO	Refer to ITS for Applicable LCOs ITS 3.4.1, Condition A, One or more RCS DNB parameters not within limits – Restore RCS DNB parameters to within limit within 2 hours, will be entered if PZR Pressure lowered to less than 2205 psig.
	SRO	Return to Procedure and Step in Effect
<b>BOOTH OPERATOR: Insert Event #3 ("A" SWBP Trips) on cue from the Chief Examiner.</b>		

Op Test No.: ILC-13 NRC Scenario # 1 Event # 3 Page 10 of 10

Event Description: "A" SWBP Trips

Time	Position	Applicant's Actions or Behavior
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**BOOTH OPERATOR: At the discretion of the Examiner, insert Event 3, "A" SWBP Trips****EVENT INDICATIONS:****APP-002-A8, B8, C8, D8, HVH-1(-2, -3, -4) WTR OUTLET LO FLOW****"A" SWBP RTGB Indication RED and GREEN lights illuminated.****"B" SWBP RTGB Indication GREE light illuminated.**

	BOP	Recognizes "A" SWBP tripped and "B" SWBP secured.
	RO	Reviews APP-002-A8, B8, C8, D8 Step 1 "IF the operating SWBP has tripped, THEN START Standby SWBP."
	BOP	Manually starts the "B" SWBP
	CREW	Dispatches AO to observe SWBP operation and verify proper flow to the CV HVH units.

**BOOTH OPERATOR: IF dispatched, report that "A" SWBP breaker indicates tripped on over-current and HVH flows are all within the normal band.**

		Reviews ITS for applicability.
		ITS 3.7.7, Condition A, one Service Water System (SWS) train inoperable – Restore SWS train to operable status within 72 hours, will be entered for the SWBP failure.
	CRS	ITS 3.6.6, Condition D, Two Containment Cooling Trains inoperable – Restore one containment cooling train to operable status within 72 hours, will be entered due to the failure to meet SR 3.6.6.3 (Verify cooling water flow rate to each cooling unit is $\geq 750$ gpm) for the CV HVH units.
	CRS	Notify WCC SRO to initiate Work Request, contact Maintenance and Work Management and notify Operations / Plant Management.

**BOOTH OPERATOR: Insert Event #4 (Dropped Control Rod resulting in Load Reduction) on cue from the Chief Examiner.**

Op Test No.:	<u>ILC-13 NRC</u>	Scenario #	<u>1</u>	Event #	<u>4</u>	Page	<u>11</u>	of	<u>11</u>
Event Description:		Dropped Control Rod resulting in Load Reduction							
Time	Position	Applicant's Actions or Behavior							

**BOOTH OPERATOR: At the discretion of the Examiner, insert Event 4, Dropped Control Rod resulting in Load Reduction**

**EVENT INDICATIONS:**

**APP-005-A3, PR DROP ROD**

**APP-005-C3, PR CHANNEL DEV**

**APP-005-F2, ROD BOTTOM ROD DROP**

**APP-005-F3, PR UPPER CH HI FLUX DEV / AUTO DEFEAT**

**APP-005-F4, PR LOWER CH HI FLUX DEV / AUTO DEFEAT**

**Rod H-10 Rod Bottom Light Illuminated and IRPI lowers to zero**

**APP-003-D8, PZR CONTROL HI/LO PRESS**

**APP-003-D4, TAVG/TREF DEV**

	RO	<b>Immediate Action</b> Check Unexpected Rod Motion – IN PROGRESS (NO) Go to Step 7
	RO	Determine If Multiple Rods Have Dropped As Follows: a. Analyze Indications For Multiple Rod Drop <ul style="list-style-type: none"> <li>Prompt Drop – PRESENT (YES)</li> <li>More than 1 Rod Bottom Light – ILLUMINATED (NO)</li> <li>More Than 1 IRPI - INDICATES ON BOTTOM (NO)</li> </ul> b. Check Multiple Dropped Rods – PRESENT (NO, Go To Step 10.)
	BOP	Make PA Announcement For Procedure Entry
	RO	Check Tavg - TRENDING TO Tref (NO) RNO: Perform Attachment 1, Turbine Load Adjustment, to restore Tavg within +/- 1.5°F
	RO	Determine The Status Of Rods As Follows: a. Analyze the below indications for a dropped rod: <ul style="list-style-type: none"> <li>APP-005-A3, PR DROP ROD – ILLUMINATED (YES)</li> <li>APP-005-F2, ROD BOTTOM ROD DROP – ILLUMINATED (YES)</li> <li>Rod Bottom Light for affected rod – ILLUMINATED (YES)</li> <li>Indication of Prompt Drop – PRESENT (YES)</li> <li>Quadrant Power Tilt indications – PRESENT (YES)</li> </ul> b. Check Dropped Rod – PRESENT (YES)
	SRO	Go To Section A, Dropped Rod
	RO	Check Plant Status – Mode 1 (YES)

Op Test No.:	<u>ILC-13 NRC</u>	Scenario #	<u>1</u>	Event #	<u>4</u>	Page	<u>12</u>	of	<u>12</u>
Event Description:		Dropped Control Rod resulting in Load Reduction							
Time	Position	Applicant's Actions or Behavior							

	RO	Check Dropped Rod Location – In Controlling Bank (NO, Go to Step 4)
	RO	Notify Reactor Engineering AND I&C Personnel to Perform the following: <ol style="list-style-type: none"> <li>Verify the status of the dropped rod</li> <li>Investigate the cause of the dropped rod.</li> <li>Avoid ANY action that could cause inadvertent withdrawal of the affected rod.</li> <li>Determine appropriate recovery actions.</li> </ol>
<b>BOOTH OPERATOR: Acknowledge the request for Reactor Engineering and/or I&amp;C to investigate, determine cause and determine appropriate recovery actions.</b>		
	RO	Check APP-005-B5, ROD BANKS A/B/C/D LO LIMIT – EXTINGUISHED (NO)
	RO	Establish Stable Conditions At OR Below 70% Reactor Power As follows: <ol style="list-style-type: none"> <li>Check Reactor power – Greater Than 70% (YES)</li> <li>Check APP-005-E2, ROD CONT SYSTEM URGENT FAILURE – EXTINGUISHED (YES)</li> <li>Reduce Reactor AND Turbine power to less than or equal to 70% within 2 hours using rods and boration to maintain Tavg within +/- 1.5°F of Tref using OP-301, CVCS, RCS Boration Quick Checklist, AND Attachment 1, Turbine Load Adjustment (OP-301, Section 8.2.8 Quick Boration Checklist, is included at the end of Event #4)</li> </ol>
	BOP	<b>Attachment 1 - Turbine Load Adjustment</b> <ol style="list-style-type: none"> <li>Check Turbine Control Mode – Automatic (YES)</li> <li>Check Turbine Load Adjustment In IMP IN Desired (YES)</li> <li>Depress the IMP IN Pushbutton (IMP IN depressed)</li> <li>Set the Desired Load in the SETTER (REF ▽ to adjust setter)</li> <li>Set the Desired Load Rate (Thumbwheel to set load rate)</li> <li>Depress the GO and HOLD Pushbuttons as necessary (Pushbuttons)</li> </ol> <b>(BOP and RO will coordinate the power reduction with boron additions and rods.)</b> <b>(OP-301, Section 8.2.8 Quick Boration Checklist, is included at the end of Event #4 (shaded area))</b>

Op Test No.:	<u>ILC-13 NRC</u>	Scenario #	<u>1</u>	Event #	<u>4</u>	Page	<u>13</u>	of	<u>13</u>
Event Description:		Dropped Control Rod resulting in Load Reduction							
Time	Position	Applicant's Actions or Behavior							

	CRS	Notify Load Dispatcher of the Unit's Load Capability

Op Test No.:	<u>ILC-13 NRC</u>	Scenario #	<u>1</u>	Event #	<u>4</u>	Page	<u>14</u>	of	<u>14</u>
Event Description: <u>Dropped Control Rod resulting in Load Reduction</u>									
Time	Position	Applicant's Actions or Behavior							

	RO	<b>Continuous Action Step</b> Check Total Reactor Power Change – Greater than 15% in any one hour period. (This will eventually be true.)
	RO	Monitor Quadrant Power Tilt AND Axial Flux Difference to Ensure Compliance with ITS LCO 3.2.3 and ITS LCO 3.2.4
	RO	Determine if Axial Flux Difference (AFD) should be Adjusted As Follows: a. Check APP-005-E2, Rod Cont System Urgent Failure – Extinguished (YES) b. Check AFD – Within Target Band (YES) c. Check AFD – Within Operating Band (YES) d. Go to Step 13
	RO	Confirm Dropped Rod as Follows: a. Determine if a dropped rod exists by at least ONE of the following: <ul style="list-style-type: none"> <li>Quadrant Power Tilt indications – Present <ul style="list-style-type: none"> <li>APP-005-F3 – ILLUMINATED (YES)</li> <li>APP-005-F4 – ILLUMINATED (YES)</li> <li>APP-005-C3 – ILLUMINATED (YES)</li> <li>Power Range Drawer Indications (YES)</li> <li>Axial Flux Difference indications (YES)</li> </ul> </li> <li>Incore flux map</li> <li>Reactor Engineering or I&amp;C determination</li> <li>APP-005-A3 – ILLUMINATED (YES)</li> </ul> b. Check dropped rod determination – Complete (YES)
	RO	Check Dropped Rod – Confirmed (YES)



Op Test No.:	<u>ILC-13 NRC</u>	Scenario #	<u>1</u>	Event #	<u>4</u>	Page	<u>15</u>	of	<u>15</u>
Event Description:		Dropped Control Rod resulting in Load Reduction							
Time	Position	Applicant's Actions or Behavior							

	RO	<b>Continuous Action Step</b> Check Rod Recovery Status – Complete (NO) RNO: IF the rod will NOT be restored to within the alignment limits within 1 hour of discovery, THEN perform the following: <ol style="list-style-type: none"> <li>Verify SDM is within the limits specified in the COLR within 1 hour in accordance with FMP-012, Manual Determination of Shutdown Margin Boron Concentration.</li> <li>Reduce Thermal Power to less than or equal to 70% within 2 hours</li> <li>Verify SDM is within the limits provided in the COLR every 12 hours in accordance with FMP-012, Manual Determination of Shutdown Margin Boron Concentration.</li> <li>Notify Reactor Engineering to perform ITS SR 3.2.1.1 AND SR 3.2.2.1 within 72 hours</li> <li>IF the rod can NOT be realigned, THEN within 5 days, complete a Safety Analysis for continued operation with the misaligned rod.</li> <li>IF the requirements of items a through e can NOT be achieved, THEN be in Mode 3 within 6 hours.</li> </ol>
	CRS	Notify I&C To Make Repairs As Necessary To Restore Proper Operation Of The Rod Control System
	RO	Check IRPI for the dropped rod – Indicates Rod Fully Inserted (YES)
	RO	Contact Reactor Engineering to Obtain the Following: <ol style="list-style-type: none"> <li>Power level at which recovery is to be performed.</li> <li>Rate at which rod should be withdrawn</li> </ol>
<b>BOOTH OPERATOR: When contacted as Reactor Engineering, state power level of 70% RTP and rate of withdrawal should be no greater than 10 steps per minute. When contacted as Manager – Operations acknowledge the report and provide approval for rod recovery.</b>		
	CRS	Notify Manager - Operations OR His Designee Of The Following: <ol style="list-style-type: none"> <li>Current plant conditions</li> <li>Power level required for rod alignment</li> <li>Approval for rod alignment is required prior to continuing</li> <li>Check rod recovery - APPROVED</li> </ol>
	RO	Check Cause of Dropped Rod – FOUND AND CORRECTED

Op Test No.:	<u>ILC-13 NRC</u>	Scenario #	<u>1</u>	Event #	<u>4</u>	Page	<u>16</u>	of	<u>16</u>
Event Description:		Dropped Control Rod resulting in Load Reduction							
Time	Position	Applicant's Actions or Behavior							

		<b>BOOTH OPERATOR: IF / WHEN contacted as I&amp;C report that the cause of the dropped rod was a blown fuse. Replacement fuse is being delivered from the warehouse.</b>
		<b>BOOTH OPERATOR: After adequate power reduction has been observed and on cue from the Chief Examiner Insert Event #5 (LT-460 Reference Leg / PT-456 Sensing Line Failure).</b>
		<b>NOTE: OP-301, Section 8.2.8 Quick Boration Checklist (shaded area) is listed at the end of this section.</b>
		<b>NOTE: The crew should determine that approximately 85 to 95 gallons of boric acid is needed to lower power to 70%. (The value given is based on OST-947 data and does not account for reactivity inserted from the dropped rod.)</b>
		<b>Beginning of OP-301, Section 8.2.8 Quick Boration Checklist</b>
	RO	DETERMINE the amount of Boric Acid to add to the RCS
	RO	OBTAIN an independent check of the volume required.
	RO	<b>OBTAIN</b> permission from the CRS <b>OR</b> the SM to borate.
	RO	<b>PLACE</b> the RCS MAKEUP MODE selector switch to BORATE.
	RO	<b>SET</b> YIC-113, BORIC ACID TOTALIZER to desired quantity.
	RO	<b>IF</b> desired, <b>THEN PLACE</b> FCV-113A, BORIC ACID FLOW, in MAN <b>AND</b> manually <b>ADJUST</b> using the UP and DOWN pushbuttons.
	RO	Momentarily <b>PLACE</b> the RCS MAKEUP SYSTEM switch to START.
	RO	<b>IF</b> any of the below conditions occur, <b>THEN</b> momentarily place the RCS MAKEUP SYSTEM switch in the STOP position: <ul style="list-style-type: none"> <li>• Rod Motion is blocked or in the wrong direction</li> <li>• T<sub>AVG</sub> goes up</li> <li>• Boric Acid addition exceeds the desired value</li> </ul>

Op Test No.:	<u>ILC-13 NRC</u>	Scenario #	<u>1</u>	Event #	<u>4</u>	Page	<u>17</u>	of	<u>17</u>
Event Description:		Dropped Control Rod resulting in Load Reduction							
Time	Position	Applicant's Actions or Behavior							

	RO	<b>WHEN</b> the desired amount of Boric Acid has been added, <b>THEN</b> verify the following: <ul style="list-style-type: none"> <li>FCV-113A, BORIC ACID FLOW, closes.</li> <li>FCV-113B, BLENDED MU TO CHG SUCT, closes.</li> <li><b>IF</b> in Auto, <b>THEN</b> the operating Boric Acid Pump stops.</li> <li>The RCS MAKEUP SYSTEM is OFF.</li> </ul>
	RO	<b>IF</b> desired, <b>THEN FLUSH</b> the Boric Acid flow path as follows: <ul style="list-style-type: none"> <li><b>PLACE</b> the RCS MAKEUP MODE selector switch in the ALT DILUTE position.</li> <li><b>SET</b> YIC-114, PRIMARY WTR TOTALIZER to 15-20 gallons.</li> <li><b>PLACE</b> FCV-114B, BLENDED MU TO VCT to CLOSE.</li> <li>Momentarily <b>PLACE</b> RCS MAKEUP SYSTEM switch to START.</li> <li><b>IF</b> any of the below conditions occur, <b>THEN</b> momentarily place the RCS MAKEUP SYSTEM switch in the STOP position: <ul style="list-style-type: none"> <li>Unanticipated Rod Motion</li> <li>Primary Water addition reaches the desired value</li> </ul> </li> <li><b>WHEN</b> the desired amount of Primary Water has been added to the RCS, <b>THEN</b> verify the following: <ul style="list-style-type: none"> <li>FCV-114A PW to Blender closes.</li> <li>FCV-113B Blended MU to CHG Suct. closes.</li> <li><b>IF</b> in Auto, <b>THEN</b> the operating Primary Water Pump stops.</li> <li>The RCS MAKEUP SYSTEM is OFF.</li> </ul> </li> </ul>
	RO	<b>RETURN</b> the RCS Makeup System to automatic as follows: <ul style="list-style-type: none"> <li><b>VERIFY</b> FCV-114A Primary WTR Flow Dilute Mode is in AUTO.</li> <li><b>PLACE</b> FCV-114B Blended MU to VCT to the AUTO position.</li> <li><b>PLACE</b> the RCS MAKEUP MODE switch in AUTO.</li> <li><b>VERIFY</b> FCV-113A Boric Acid Flow is in AUTO.</li> <li>Momentarily <b>PLACE</b> the RCS MAKEUP SYSTEM switch in the START position.</li> </ul>
	RO	<b>RECORD</b> , in AUTO LOG, as indicated by PRIMARY WATER TOTALIZER, YIC-114 <b>AND</b> Boric Acid TOTALIZER, YIC-113 the total amount of Primary Water <b>AND</b> Boric Acid added during the boration.
	RO	<b>MONITOR</b> parameters for the expected change in reactivity <b>AND</b> inform the CRS <b>OR</b> the SM of the results of the boration.
<b>End of OP-301, Section 8.2.8 Quick Boration Checklist</b>		

Op Test No.:	<u>ILC-13 NRC</u>	Scenario #	<u>1</u>	Event #	<u>5</u>	Page	<u>18</u>	of	<u>18</u>
Event Description:		LT-460 Reference Leg / PT-456 Sensing Line Failure							
Time	Position	Applicant's Actions or Behavior							

**BOOTH OPERATOR:** After adequate power reduction has been observed and on cue from the Chief Examiner Insert Event #5 (LT-460 Reference Leg / PT-456 Sensing Line Failure).

**EVENT INDICATIONS:**

APP-003-C8, PZR PROT HI LEVEL

Bistable LC460A1 illuminated

APP-002-E2, HVH CONDENSATE COLL

	CRS	AOP-025 may be entered for guidance due to LT-460 failure IAW APP-003-C8, however, not required since LT-460 is not the controlling channel. Determines OWP-029 will be utilized for removal of PT-456 from service.
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**NOTE:** Crew will enter AOP-016 once the determination has been made that the failures are due to a sensing line leak. AOP-016 actions are listed following the AOP-025 actions. AOP-005, Radiation Monitoring System, will be entered once R-11 and/or R-12 are in alarm. AOP-005 follows AOP-016 in this Guide.

	RO	Check LCV-460A&B, LTDN LINE STOP – Closed (NO, go to step 4)				
	BOP	Make PA Announcement for Procedure Entry				
	RO	Restore PZR Level to between 22% and 53% by Performing One of the Following: <ul style="list-style-type: none"><li>Adjust operating Charging Pump speed in Manual</li><li>OR</li><li>Level Controller LC-459G in Manual</li></ul> (Neither action is required since PZR level is being controlled by LT-459.)				
	RO	Check RCP Seal Injection Flow – Between 8 GPM and 13 GPM (YES, not impacted by failures.)				
	RO	Check Number of Operable PZR Level Channels – Greater than one (YES)				
	RO	Place LM-459, PZR LEVEL, In the Switch Position for the Alternate Channel Below: <table><tr><td>Failed Channel</td><td>Switch Position</td></tr><tr><td>LT-460</td><td>461 REPL 460</td></tr></table>	Failed Channel	Switch Position	LT-460	461 REPL 460
Failed Channel	Switch Position					
LT-460	461 REPL 460					
	RO	Verify Selector Switch LR-459 – Selected to the Controlling Channel <ul style="list-style-type: none"><li>REC 459</li></ul>				

Op Test No.: ILC-13 NRC Scenario # 1 Event # 5 Page 19 of 19

Event Description: LT-460 Reference Leg / PT-456 Sensing Line Failure

Time	Position	Applicant's Actions or Behavior
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	RO	<b>Continuous Action Step</b> Restore PZR Level Control To Automatic As Follows: <ul style="list-style-type: none"> <li>• Check Normal Letdown – Isolated (NO)</li> <li>• Start additional Charging Pump as desired. (N/A)</li> <li>• Check PZR level – Within +/- 1% of Programmed Reference Level (YES)</li> <li>• Restore PZR Level control to Automatic (No action required.)</li> </ul>
	RO	Check affected PZR Level – FAILED LOW (NO)
	RO	Check RCP Seal Injection Flow – Between 8 GPM and 13 GPM (YES, not impacted by failures.)
	BOP	Remove the affected Transmitter from Service IAW OWP-030, PLT-2.
	CRS	Contact WCC SRO for assistance with OWPs for LT-460 and PT-456. Also, requests W/R initiation and Maintenance contacted.
	CRS	Briefs the crew on removal of LT-460 from service IAW OWP-030 and PT-456 from service IAW OWP-029.
<b>BOOTH OPERATOR: When requested, implement OWP-030 and OWP-029 IAW SCN file.</b>		
	CRS	Determines the following ITS implications for failure: <b>LT-460:</b> ITS Table 3.3.1 Table 3.3.1-1 Item 8 which requires 3 Pressurizer Water Level – High Channel to be operable will not be met and require entry into ITS 3.3.1 Condition M, which requires the channel to be placed in trip within 6 hours OR reduce thermal power to less than P-7 within 12 hours. <b>PT-456:</b> ITS Table 3.3.1-1, Items 5 and 7 which requires 3 OTΔT Channels and 3 Pressurizer Pressure Channels to be operable will not be met and require entry into ITS 3.3.1 Conditions E and M. Condition E: Channel be placed in trip within 6 hours OR be in Mode 3 in 12 hours. Condition M: Channel be placed in trip in 6 hours or reduce thermal power to less than P-7 within 13 hours. ITS Table 3.3.2-1, Items 1.d and 6.a which requires 3 Pressurizer Pressure – Low Safety Injection Channels and 3 Pressurizer Pressure Low ESFAS Interlock Channels to be operable will not be met and require entry into ITS 3.3.2 Conditions D and H. Condition D: Channel be placed in trip within 6 hours OR be in Mode 3 in 12 hours and Mode 4 in 18 hours. Condition H: Interlock verified in the required state for existing unit condition within 1 hour OR be in Mode 3 in 7 hours and Mode 4 in 13 hours.



Op Test No.: ILC-13 NRC Scenario # 1 Event # 5 Page 20 of 20Event Description: LT-460 Reference Leg / PT-456 Sensing Line Failure

Time	Position	Applicant's Actions or Behavior
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**AOP-016 – Excessive Primary Plant Leakage**

	RO	<b>Continuous Action Step</b> Check RCS Pressure – Greater than 1000 psig. (YES)  Check the following: PZR Level – Less than 14% <u>AND</u> lowering in an uncontrolled manner (NO) <u>OR</u> RCS Subcooling – Less than 35°F (NO)  IF PZR Level can <u>NOT</u> be maintained greater than 14% <u>OR</u> Subcooling can <u>NOT</u> be maintained greater than 35°F, <u>THEN</u> trip the Reactor and Go to EOP-E-0.
	Crew	Make PA Announcement for Procedure Entry
	RO	<b>Continuous Action Step</b> Check VCT Level - LESS THAN 12.5 INCHES (NO) <ul style="list-style-type: none"> <li>IF VCT level lowers to less than 12.5 inches, THEN perform Step 5.</li> </ul> Go To Step 6
	RO	Check Charging Pump Status –LESS THAN TWO RUNNING (NO) <ul style="list-style-type: none"> <li>Go To Step 11.</li> </ul>
	RO	Place running Charging Pump Speed Controllers in MAN AND adjust output to maximum
	RO	Check RCS Level - LOWERING IN AN UNCONTROLLED MANNER (NO) <ul style="list-style-type: none"> <li>Go to Step 20</li> </ul>
	RO	Control Charging Flow To Maintain Desired RCS Level
	RO	<b>Continuous Action Step</b> Monitor RCS Level – Lowering In An Uncontrolled Manner (NO) <ul style="list-style-type: none"> <li>Go to Step 22</li> </ul>
	SRO	Implement ITS LCO 3.4.13

Op Test No.: ILC-13 NRC Scenario # 1 Event # 5 Page 21 of 21

Event Description: LT-460 Reference Leg / PT-456 Sensing Line Failure

Time	Position	Applicant's Actions or Behavior
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	RO	Check for Primary-to-Secondary Leakage as Indicated by One or More of the Following: (NO, go to step 25) <ul style="list-style-type: none"> <li>R-15, R-19A/B/C, R-31A/B/C, Secondary Chemistry Sample Results.</li> </ul>
	RO	Initiate Leak Rate Determination Using One or More of the following Methods: <ul style="list-style-type: none"> <li>OST-051, OST-901, Charging vs Letdown Flow Balance</li> </ul>
	SRO	Implement EALs
<b>AOP-005 – Radiation Monitoring System</b>		
	BOP	Check R-11/R-12 Selector Switch – Selected to CV (YES)
	BOP	Check RCS Temperature – Greater than 200°F (YES)
	BOP	Check Channel R-11/R-12 Low Flow Alarm – Illuminated (NO, Go to Step 5.)
	BOP	Check EOP Network Procedures – Implemented (NO, Go to Step 7)
	BOP	Check Personnel – IN CV (NO, Go to Step 13)
	BOP	Check Containment Ventilation Isolation Valves – Closed (YES)
	BOP	Place the Following CV Iodine Removal Fan Control Switches to Prepurge Position: <ul style="list-style-type: none"> <li>HVE-3 / 4</li> </ul>
	BOP	Request RC to perform a background radiation check at Radiation Monitors R-11 and R-12.
	BOP	Determine if Primary System Leakage is Occurring (YES)
	BOP	Go to AOP-016, Excessive Primary Plant Leakage, while continuing with this procedure.
	BOP	Refer to ITS 3.3.6 and ODCM Table 3.10-1.
<b>BOOTH OPERATOR: On cue from the Chief Examiner Insert Event #6 (Seismic Event and RCS Leak (250 gpm ramped in over 5 ½ minutes)).</b>		

Op Test No.:	ILC-13 NRC	Scenario #	1	Event #	6	Page	22	of	22
Event Description:		Seismic Event and RCS Leak (250 gpm ramped in over 5 ½ minutes)							
Time	Position	Applicant's Actions or Behavior							

**BOOTH OPERATOR: On cue from the Chief Examiner Insert Event #6 (Seismic Event and RCS Leak (250 gpm ramped in over 5 ½ minutes)).**

**EVENT INDICATIONS:**

**APP-036-I5, SEISMIC ALARM**

**APP-003-F4, CHG PMP HI SPEED**

**CV SUMP LEVEL RISE**

**BOOTH OPERATOR: After 1 minute contact the control room as the Load Dispatcher and report that seismic events have been noted in the area from the US Geological Department.**

	CRS	Enters AOP-021 for Seismic Disturbances.
	BOP	Dispatch an Operator to the Seismic Monitors to check local alarms.
	BOP	Make PA Announcement
	RO / BOP	Compare Current RTGB Indications with the Operating Logs to Detect any abnormal trends.
	CRS	Check Either Event Below – Has Occurred <ul style="list-style-type: none"> <li>• Noticeable Tremors or Vibrations <b>(NO)</b></li> <li>OR</li> <li>• Report by Outside Agency <b>(YES)</b></li> </ul>
	CREW	Check For Changes From Pre-earthquake Conditions That May Impair Safety-related Function <ul style="list-style-type: none"> <li>• CRDM operation</li> <li>• Nuclear Instrumentation</li> <li>• RCS radiation levels</li> <li>• Process Radiation Monitors</li> <li>• Area Radiation Monitors</li> <li>• RCS flow, temperature and pressure</li> <li>• Loose Parts Monitor System</li> <li>• RCS Chemistry sample and results</li> <li>• Secondary System Chemistry sample and results</li> <li>• Electrical power sources</li> <li>• Fire Protection System leaks</li> <li>• Spurious relay actuations</li> </ul>
	CRS	Notify the Manager – Operations of the following:



Op Test No.:	ILC-13 NRC	Scenario #	1	Event #	6	Page	23	of	23
Event Description:		Seismic Event and RCS Leak (250 gpm ramped in over 5 ½ minutes)							
Time	Position	Applicant's Actions or Behavior							

		<ul style="list-style-type: none"> <li>A Seismic event has occurred.</li> <li>Any abnormal plant conditions that have been identified.</li> </ul>
	CRS	Implement the EALs
	CRS	Implement Applicable Technical Specification LCOs. TRM 3.17 Seismic Shutdown Limits, should be referenced
<b>BOOTH OPERATOR:</b> After 2 minutes report that the DBE/SSE ALARM on Seismic Monitor "A" is EXTINGUISHED. After 5 minutes report that the OBE ALARM on Seismic Monitor "B" is EXTINGUISHED.		
	CRS	Check Local Monitors – Observed (YES, once report is received for both monitors)
<b>EXAMINER'S NOTE:</b> By this time the crew will identify the RCS leak and either enter AOP-016 or conservatively decide to trip the reactor based on the number of failures that have occurred.		
	CRS	Enters AOP-016 for RCS Leakage
	RO	<b>Continuous Action Step</b> Check RCS Pressure – Greater than 1000 psig. (YES)  Check the following: PZR Level – Less than 14% <u>AND</u> lowering in an uncontrolled manner (NO) OR RCS Subcooling – Less than 35°F (NO)  <u>IF</u> PZR Level can <u>NOT</u> be maintained greater than 14% <u>OR</u> Subcooling can <u>NOT</u> be maintained greater than 35°F, <u>THEN</u> trip the Reactor and Go to EOP-E-0.
	BOP	Make PA Announcement for Procedure Entry
	RO	Control Charging Flow to Maintain Desired RCS Level
	RO	<b>Continuous Action Step</b> Check VCT Level – Less than 12.5 inches (NO, go to Step 6)
	RO	Check Charging Pump Status –LESS THAN TWO RUNNING (NO, go to Step 11)

Op Test No.:	ILC-13 NRC	Scenario #	1	Event #	6	Page	24	of	24
Event Description:		Seismic Event and RCS Leak (250 gpm ramped in over 5 ½ minutes)							
Time	Position	Applicant's Actions or Behavior							

	RO	Place running Charging Pump Speed Controllers in MAN AND adjust output to maximum
	RO	Check RCS Level - LOWERING IN AN UNCONTROLLED MANNER (YES) (If answered as NO, depending on scenario timeline, the crew will control charging flow and ultimately determine that RCS level is lowering in an uncontrolled manner and return to step 1 of AOP-016. This question will eventually be answered as YES.)
	RO	Check Any Letdown - IN SERVICE (YES)
	RO	Verify All Letdown Flowpaths Isolated As Follows: <ul style="list-style-type: none"> <li>• LCV-460A &amp; B, LTDN LINE STOP Valves - CLOSED</li> <li>• HIC-142, PURIFICATION FLOW Controller - ADJUSTED TO 0%</li> <li>• HIC-137, EXCESS LTDN FLOW Controller - ADJUSTED TO 0%</li> <li>• CVC-387, EXCESS LTDN STOP - CLOSED</li> </ul>
	RO	Check RCS Level - LOWERING IN AN UNCONTROLLED MANNER (YES)
	RO	Check RCS Pressure – GREATER THAN 1000 PSIG (YES)
	CRS	Directs the RO to the Trip the reactor, initiate safety injection and go to EOP-E-0.
<b>EXAMINER'S NOTE: A Large Break LOCA will be inserted when the Reactor Trip pushbutton is depressed.</b>		

Op Test No.:	ILC-13 NRC	Scenario #	1	Event #	7 - 12	Page	25	of	25
Event Description:		Large Break LOCA on Reactor Trip							
Time	Position	Applicant's Actions or Behavior							

<b>EXAMINER'S NOTE: A Large Break LOCA will be inserted when the Reactor Trip pushbutton is depressed.</b>		
	RO	Check Reactor tripped (YES)
	BOP	Check Turbine Trip: a. Both turbine stop valves - Closed (YES) b. Close MSR purge and shutoff valves (Manual action required by BOP)
	BOP	Check Power to AC Emergency Busses: a. E1 or E2 – At least one energized (YES) b. E1 and E2 – Both energized (YES)
	RO	Check SI Status: a) Check if SI is actuated: • SI annunciators – ANY ILLUMINATED (YES) • SI equipment – AUTO STARTED (YES) b) Check BOTH trains of SI – ACTUATED • SI pumps – BOTH RUNNING (NO) • RHR pumps – BOTH RUNNING (NO) RNO: Manually actuate BOTH trains of SI (Candidate may start both "A" SI Pump and "A" RHR Pump at this time or wait until Att. 1.)
	CRS	Verifies all immediate actions for EOP-E-0. Announce Adverse numbers are in effect due to CV Pressure Greater than 4 psig.
<b>Critical Task</b>	CRS	FOLDOUT for EOP-E-0 is in effect <u>RCP Trip Criteria</u> IF either condition listed below occurs, THEN trip all RCPs: (YES) • Containment Isolation Phase B – ACTUATED (YES) OR • BOTH of the following satisfied: ○ SI pumps - AT LEAST ONE RUNNING AND CAPABLE OF DELIVERING FLOW (YES, "B" SI Pump is running) AND ○ RCS subcooling based on core exit TCs - LESS THAN 30°F [50°F] (YES)
<b>CRITICAL TASK – STOP ALL RCPs</b>		

Op Test No.:	ILC-13 NRC	Scenario #	1	Event #	7 - 12	Page	26	of	26
Event Description:		Large Break LOCA on Reactor Trip							
Time	Position	Applicant's Actions or Behavior							

**EXAMINER'S NOTE:** Crew may take early actions at this time to address items that did not function or operate as designed.

- Manually start "A" SI Pump and "A" RHR Pump
- Place CR HVAC in Emergency Pressurization Mode
- Manually start "A" CV Spray Pump

	CRS	Perform Attachment 1, Auto Action Verification, While continuing with this procedure. (Should be assigned to BOP.) (Att. 1 steps are presented next followed by the remainder of EOP-E-0.)

**Beginning of EOP-E-0 Attachment 1**  
(Remainder of EOP-E-0 Follows this Section)

Att. 1 <b>Critical Task</b>	BOP	Check ECCS Pumps Running: <ul style="list-style-type: none"> <li>• SI pumps - BOTH RUNNING (NO, Starts "A" SI Pump)</li> <li>• RHR pumps - BOTH RUNNING (NO, Starts "B" RHR Pump)</li> </ul>

**CRITICAL TASK – START "A" SI PUMP**

**EXAMINER'S NOTE:** "B" RHR Pump will trip 10 seconds after starting "A" RHR Pump.

Att. 1	BOP	Check ECCS Valves - PROPER EMERGENCY ALIGNMENT (YES)
Att. 1	BOP	Check CCW Pumps - AT LEAST ONE RUNNING (YES)
Att. 1	BOP	Check Containment Isolation Phase A <ul style="list-style-type: none"> <li>a. Phase A – Actuated (YES)</li> <li>b. Phase A valves – Closed (YES)</li> <li>c. Excess letdown – Isolated (YES) <ul style="list-style-type: none"> <li>• CVC-387 – Closed (YES)</li> <li>• HIC-137 – at 0% DEMAND (YES)</li> </ul> </li> </ul>
Att. 1	BOP	Check Feedwater Isolation: <ul style="list-style-type: none"> <li>a) Main feed pumps – BOTH TRIPPED (YES)</li> <li>b) Main feedwater – ISOLATED <ul style="list-style-type: none"> <li>• FRVs – Closed (YES)</li> <li>• Feedwater reg bypass valves – Closed (YES)</li> <li>• Feedwater header section valves – Closed (YES)</li> </ul> </li> </ul>

Op Test No.:	ILC-13 NRC	Scenario #	1	Event #	7 - 12	Page	27	of	27
Event Description:		Large Break LOCA on Reactor Trip							
Time	Position	Applicant's Actions or Behavior							

Att. 1	BOP	Check if Main Steamlines Should Be Isolated: a) Main steamline isolation – REQUIRED (YES) <ul style="list-style-type: none"> <li>Containment pressure – Greater than 10 psig (YES)</li> </ul> OR <ul style="list-style-type: none"> <li>High steam flow with: (NO)               <ul style="list-style-type: none"> <li>S/G pressure – less than 614 psig</li> </ul> </li> </ul> OR <ul style="list-style-type: none"> <li>Tavg – less than 543°F</li> </ul> b) Check MSIVs and MSIV bypass valves – CLOSED (YES)
Att. 1	BOP	Check Proper Service Water System Operation: a. SW pumps – All running (YES) b. SW booster pumps – Both running (YES) c. Both SW header low pressure alarms (APP-008-F7/F8) – Extinguished (YES)
Att. 1	BOP	Check Both EDGs – Running (YES)
Att. 1	BOP	Check ECCS Flow: a. RCS pressure – less than 1700 psig (YES) b. SI pumps- Flow Indicated (YES) c. RCS pressure – less than 350 psig. (YES) d. RHR – Flow Indicated (YES)
Att. 1	BOP	Check CV Recirculation Fans – All Running (YES, all available)
Att. 1	BOP	Check IVSW - Actuated (YES) <ul style="list-style-type: none"> <li>PCV-1922A – Open (YES)</li> <li>PCV-1922B – Open (YES)</li> </ul>
Att. 1	BOP	Check CV ventilation isolation (YES) <ul style="list-style-type: none"> <li>CV ventilation isolation valves – CLOSED (YES)</li> </ul>

Op Test No.:	ILC-13 NRC	Scenario #	1	Event #	7 - 12	Page	28	of	28
Event Description:		Large Break LOCA on Reactor Trip							
Time	Position	Applicant's Actions or Behavior							

Att. 1 Critical Task	BOP	Check control room ventilation - aligned for pressurization mode (YES) <ul style="list-style-type: none"> <li>• HVA-1A or HVA-1B – Running (YES)</li> <li>• HVE-16 – Stopped (YES)</li> <li>• HVE-19A or HVE-19B – Running (NO, starts HVE-19A or HVE-19B)</li> <li>• Control Room HVAC outside air damper A or B – Open (YES)</li> <li>• CR-D1A-SA – Closed (YES)</li> <li>• CR-D1B-SB – Closed (YES)</li> </ul>
<b>CRITICAL TASK – PLACE CR HVAC IN EMERGENCY PRESSURIZATION MODE</b>		
Att. 1	BOP	Check DS Bus – Energized (YES)
Att. 1	BOP	Check Battery Chargers – Energized (YES) APP-036-D1 – Extinguished (YES) APP-036-D2 – Extinguished (YES)
Att. 1	BOP	Stop R-11/12 Sample Pump
Att. 1	BOP	Locally Reset and Load IACs as necessary (N/A)
Att. 1	BOP	Perform Crew Update to include the following: <ul style="list-style-type: none"> <li>• Attachment Completion</li> <li>• Manual Actions Taken (Started "A" SI and RHR Pumps, Placed CR HVAC in Emergency Pressurization Mode)</li> <li>• Failed Equipment status ("B" RHR Pump has tripped.)</li> <li>• SW status (All operating)</li> </ul>
<b>End of EOP-E-0 Attachment 1</b>		

Op Test No.:	ILC-13 NRC	Scenario #	1	Event #	7 - 12	Page	29	of	29
Event Description:		Large Break LOCA on Reactor Trip							
Time	Position	Applicant's Actions or Behavior							

Continuation of EOP-E-0		
	RO	Check AFW Pumps – Running (ALL running)
	RO	Check AFW Valves – Proper Emergency Alignment (YES) <ul style="list-style-type: none"> <li>• AFW header discharge valves – Full Open (YES)</li> <li>• AFW header section valves – Full Open (YES)</li> <li>• Steam driven AFW pump discharge valves – Full open if pump is running. (YES)</li> </ul>
	RO	Check Total AFW Flow: <ul style="list-style-type: none"> <li>• Reset SI</li> <li>• Control feed flow to maintain NON-faulted S/Gs narrow range level – Between 18% and 50%.</li> <li>• Check total AFW flow- Greater than 300 gpm (YES)</li> </ul>
<b>Critical Tasks</b>	RO	Check CV Spray NOT Required: <ul style="list-style-type: none"> <li>a. CV pressure – Has remained less than 10 psig. (NO)</li> </ul> RNO: Perform the following <ol style="list-style-type: none"> <li>1) Check CV spray actuated. (YES, all actuated except “A” CV Spray Pump) IF CV spray is NOT actuated, THEN manually actuate BOTH trains of CV spray.</li> <li>2) Verify the following:               <ol style="list-style-type: none"> <li>a) Both CV spray pumps are running. (NO, manually starts “A” CV Spray Pump, “B” CV Spray Pump Tripped)</li> <li>b) CV spray pump discharge valves are open: (YES)                   <ul style="list-style-type: none"> <li>• SI-880A</li> <li>• SI-880B</li> <li>• SI-880C</li> <li>• SI-880D</li> </ul> </li> <li>c) CV spray additive tank discharge valves are open: (YES)                   <ul style="list-style-type: none"> <li>• SI-845A</li> <li>• SI-845B</li> </ul> </li> <li>d) Spray additive tank flow is approximately 12 gpm:                   <ul style="list-style-type: none"> <li>• Adjust SI-845C, SAT throttling valve, as necessary.</li> </ul> </li> </ol> </li> <li>3) Verify Containment Isolation Phase B valves are closed. (YES)</li> <li>4) Stop all RCPs.</li> <li>5) Observe CAUTION prior to Step 10 and Go To Step 10.</li> </ol>
<b>CRITICAL TASKS – START “A” CV SPRAY PUMP AND STOP ALL RCP’S</b>		

Op Test No.:	ILC-13 NRC	Scenario #	1	Event #	7 - 12	Page	30	of	30
Event Description:		Large Break LOCA on Reactor Trip							
Time	Position	Applicant's Actions or Behavior							

	RO	<p>Check RCP Seal Cooling:</p> <ul style="list-style-type: none"> <li>• CCW flow to RCP thermal barriers – Normal (NO) <ul style="list-style-type: none"> <li>○ APP-001-C1 / D1 – Extinguished (NO)</li> </ul> </li> <li>OR</li> <li>• Seal injection flow – Normal (YES) <ul style="list-style-type: none"> <li>○ Seal injection flow – Greater than 6 gpm per RCP</li> </ul> </li> <li>OR</li> <li>○ Thermal barrier <math>\Delta</math>Ps – Greater than 5 inches water.</li> </ul>
<b>BOOTH OPERATOR: As requested, adjust CVC-297A,B,C as necessary to control RCP seal injection flow using the P&amp;ID function.</b>		
	RO	<p>Check RCS Temperature</p> <p>With NO RCPs running, RCS cold leg temperatures – Stable at or trending to 547°F (NO)</p> <p>RNO: IF temperature is less then 547°F AND lowering then perform the following: (YES)</p> <ol style="list-style-type: none"> <li>a. Stop dumping steam</li> <li>b. IF cooldown continues, THEN reduce total feed flow to minimum for decay heat removal: <ul style="list-style-type: none"> <li>○ Maintain total feed flow greater than 300 gpm until narrow range level is greater than 18% in at least one S/G.</li> </ul> </li> <li>c. IF cooldown continues, THEN close MSIVs and MSIV bypass valves.</li> </ol>
	RO	<p>Check PZR PORVs and Spray Valves:</p> <ol style="list-style-type: none"> <li>a. PORVs – Closed (YES)</li> <li>b. Normal PZR spray valves – Closed (YES)</li> <li>c. Aux spray valve – Closed (YES)</li> </ol>
	RO	<p>Check If RCPs should be stopped:</p> <ol style="list-style-type: none"> <li>a. RCPs – Any Running (NO, stopped per FOLDOUT)</li> </ol> <p>RNO: Go to Step 14</p>
	BOP	<p>Check if S/G Secondary Pressure Boundaries are Intact:</p> <ol style="list-style-type: none"> <li>a. Check pressures in all S/Gs <ul style="list-style-type: none"> <li>○ None lowering in an uncontrolled manner (YES)</li> <li>○ None Completely depressurized (YES)</li> </ul> </li> </ol>



Op Test No.:	ILC-13 NRC	Scenario #	1	Event #	7 - 12	Page	31	of	31
Event Description:		Large Break LOCA on Reactor Trip							
Time	Position	Applicant's Actions or Behavior							

	BOP	Check if S/G Tubes are Intact: <ul style="list-style-type: none"> <li>Secondary radiation monitors – Have Remained Normal (YES)               <ul style="list-style-type: none"> <li>R-15</li> <li>R-19s</li> <li>R-31s</li> </ul> </li> <li>S/G levels – None Rising in an Uncontrolled Manner. (YES)</li> </ul>
	RO	Check if RCS is Intact: (NO) <ul style="list-style-type: none"> <li>CV radiation – Normal (NO)               <ul style="list-style-type: none"> <li>R-2</li> <li>R-32A/B</li> </ul> </li> <li>CV pressure – Normal (NO)</li> <li>CV sump level – Normal (NO)</li> </ul> RNO: Reset SPDS and initiate monitoring of CSFSTs. Go to EOP-E-1, Loss of Reactor or Secondary Coolant, Step 1. (Crew will identify that a RED Terminus exists for RCS Integrity and transition to FRP-P.1)
	CRS	Determines that <b>FRP-P.1</b> must be entered.
	BOP	<b>FRP-P.1</b> Check CST Level – Less than 10%
	RO	<b>FRP-P.1</b> Determine if RCS cooldown is due to a Large Break LOCA as follows: <ol style="list-style-type: none"> <li>Check both of the following conditions exist:               <ul style="list-style-type: none"> <li>RCS pressure – LESS THAN 350 PSIG (YES)</li> <li>AND</li> <li>RHR flow on FI-605 – GREATER THAN 1200 GPM (YES)</li> </ul> </li> <li>Reset SPDS and return to procedure and step in effect.</li> </ol>
	CRS	Determines that entry into EOP-E-1 is now warranted.
<b>Beginning of EOP-E-1</b>		
	CRS	NOTE FOLDOUT for EOP-E-1 is in effect. (None applicable.)
	RO	Check If RCPs should be stopped: <ol style="list-style-type: none"> <li>RCPs – Any Running (NO, stopped per EOP-E-0 FOLDOUT)</li> </ol> RNO: Go to Step 2

Op Test No.:	ILC-13 NRC	Scenario #	1	Event #	7 - 12	Page	32	of	32
Event Description:		Large Break LOCA on Reactor Trip							
Time	Position	Applicant's Actions or Behavior							

	BOP	Check if S/G Secondary Pressure Boundaries are Intact: <ul style="list-style-type: none"> <li>a. Check pressures in all S/Gs               <ul style="list-style-type: none"> <li>o None lowering in an uncontrolled manner (YES)</li> <li>o None Completely depressurized (YES)</li> </ul> </li> </ul>
	BOP	<b>Continuous Action Step</b> Check Intact S/G Levels: <ul style="list-style-type: none"> <li>a. Narrow range levels – Greater than 18% (YES)</li> <li>b. Control feed flow to maintain narrow range levels – between 18% AND 50%</li> </ul>
	RO	Reset SI
	RO	Reset Containment Isolation Phase A
<b>EXAMINER'S NOTE: "A" RHR Pump will trip ten seconds after resetting Containment Isolation Phase A</b>		
<b>BOOTH OPERATOR: If dispatched to investigate cause of RHR Pump trips, wait 5 minutes and rack out the "B" RHR Pump Breaker IAW SCN File.</b>		
	BOP	Check Secondary Radiation: <ul style="list-style-type: none"> <li>a. Secondary radiation monitors – Have remained normal (YES)               <ul style="list-style-type: none"> <li>o R-15, R-19s, R-31s</li> </ul> </li> <li>b. Perform the following:               <ul style="list-style-type: none"> <li>1) Request periodic activity samples of all S/Gs</li> <li>2) Secondary sample results – Normal (When results available)</li> </ul> </li> </ul>
	RO	Check PZR PORVs and Block Valves: <ul style="list-style-type: none"> <li>a. Power to block valves – Available (YES)</li> <li>b. PORVs – Closed (YES)</li> <li>c. Block valves – At least one open. (YES)</li> </ul>
	RO	Establish Instrument Air to CV: <ul style="list-style-type: none"> <li>a. Check APP-002-F7 – Extinguished (YES)</li> <li>b. Reset IA PCV-1716</li> <li>c. Check IA PCV-1716 – OPEN (YES)</li> </ul>
	RO	Check Power Supply to Charging Pumps – Offsite power available (YES)

Op Test No.:	ILC-13 NRC	Scenario #	1	Event #	7 - 12	Page	33	of	33
Event Description:		Large Break LOCA on Reactor Trip							
Time	Position	Applicant's Actions or Behavior							

	RO	Check if Charging Flow has been established: <ol style="list-style-type: none"> <li>Charging pumps – At least one running. (YES)</li> <li>Establish desired charging flow:               <ul style="list-style-type: none"> <li>Start additional pump(s) as necessary</li> <li>Adjust charging pump speed controllers as necessary to establish desired charging flow.</li> <li>Adjust HIC-121 as necessary to establish desired charging flow:                   <ul style="list-style-type: none"> <li>Maintain seal injection flow – Between 6 gpm and 20 gpm per RCP unless seal injection isolated.</li> </ul> </li> </ul> </li> </ol>
	RO	Check if SI flow should be terminated: <ol style="list-style-type: none"> <li>RCS subcooling base on core exit TCs – Greater than 55°F (NO, Go to Step 12.)</li> </ol>
	RO	<b>Continuous Action Step</b> Check if Containment Spray should be stopped: <ol style="list-style-type: none"> <li>Spray pump – Any running (YES)</li> <li>Containment pressure – Less than 4 psig (NO)                RNO: Perform the following:               <ol style="list-style-type: none"> <li>When containment pressure is less than 4 psig, then do steps 21.c through 12.g. (Will remain above 4 psig.)</li> <li>Observe Caution prior to Step 13 and Continue with Step 13.</li> </ol> </li> </ol>
	RO	Check if RHR Pumps Should be Stopped: <ol style="list-style-type: none"> <li>Check RCS pressure:               <ul style="list-style-type: none"> <li>Pressure – Greater than 350 psig (NO, go to step 15)</li> </ul> </li> </ol>
	BOP	Check if Diesel Generators should be Stopped: <ol style="list-style-type: none"> <li>AC emergency busses – Energized by Offsite Power (YES)               <ul style="list-style-type: none"> <li>E-1</li> <li>E-2</li> </ul> </li> <li>EDG starting air annunciators – Extinguished (YES)               <ul style="list-style-type: none"> <li>APP-010-B2 / B3</li> </ul> </li> <li>Stop unloaded EDGs</li> </ol>
	RO	Initiate Evaluation of Plant Status: <ol style="list-style-type: none"> <li>Check Cold leg recirculation capability:               <ul style="list-style-type: none"> <li>Train A and Train B:</li> </ul> </li> </ol> Crew determines that neither "A" or "B" RHR Pumps are AVAILABLE

Op Test No.:	ILC-13 NRC	Scenario #	1	Event #	7 - 12	Page	34	of	34
Event Description:		Large Break LOCA on Reactor Trip							
Time	Position	Applicant's Actions or Behavior							

<b>Critical Task</b>	CRS	Crew determines that at least ONE train of cold leg recirculation capability can NOT be verified, and resets SPDS and transitions to <b>EPP-15</b> , Loss of Emergency Coolant Recirculation, Step 1.
<b>CRITICAL TASK – IDENTIFY THAT EMERGENCY COOLANT RECIRCULATION CAPABILITY HAS BEEN LOST AND IMPLEMENTS EPP-15</b>		
<b>Beginning of EPP-15</b>		
	RO	<b>Continuous Action Step</b> Check Emergency Coolant Recirculation Capability – Restored (NO) RNO: If Emergency Coolant Recirculation is restored, THEN perform Step 2. Go to Step 3.
	RO	Reset SPDS and Initiate Monitoring of CSFSTs.
	CREW	Foldout Pages are not applicable during performance of this procedure.
	RO	<b>Continuous Action Step</b> Check Suction Source to Any of The following Pumps – Lost (NO, go to step 7) SI Pumps, RHR Pumps, CV Spray Pumps
	RO	Check Emergency Recirculation Equipment – Available Using Supplement D (NO) RNO: Try to restore at least one train while continuing with this procedure.
	RO	Verify the following CV Recirc Fans – Running (NO, HVH-4 is OOS) HVH-1, 2, 3, 4
	RO	<b>Continuous Action Step</b> Check RWST Level – Less than 9%. (NO, go to step 11)
	RO	Place the Containment Spray Key Switch to the OVRD/REST Position

Op Test No.:	ILC-13 NRC	Scenario #	1	Event #	7 - 12	Page	35	of	35
Event Description: Large Break LOCA on Reactor Trip									
Time	Position	Applicant's Actions or Behavior							

	RO	<p>Determine CV Spray Pump Requirements Determine Number of CV Spray Pumps Required using the following Table:</p> <table border="1"> <thead> <tr> <th>RWST</th> <th>Containment Pressure</th> <th>Fan Coolers Running</th> <th>Spray Pumps Required</th> </tr> </thead> <tbody> <tr> <td rowspan="4">Greater than 27%</td> <td>Greater than 42 psig</td> <td>--</td> <td>2</td> </tr> <tr> <td rowspan="3">Between 4 psig and 42 psig</td> <td>0 or 1</td> <td>2</td> </tr> <tr> <td>2 or 3</td> <td>1</td> </tr> <tr> <td>4</td> <td>0</td> </tr> <tr> <td></td> <td></td> <td>Less than 4 psig</td> <td>--</td> <td>0</td> </tr> </tbody> </table> <p>Determines that 1 CV Spray Pump is required.</p>	RWST	Containment Pressure	Fan Coolers Running	Spray Pumps Required	Greater than 27%	Greater than 42 psig	--	2	Between 4 psig and 42 psig	0 or 1	2	2 or 3	1	4	0			Less than 4 psig	--	0
RWST	Containment Pressure	Fan Coolers Running	Spray Pumps Required																			
Greater than 27%	Greater than 42 psig	--	2																			
	Between 4 psig and 42 psig	0 or 1	2																			
		2 or 3	1																			
		4	0																			
		Less than 4 psig	--	0																		
		<p><b>BOOTH OPERATOR:</b> Remove the Malfunction for "B" RHR pump and Rack In "B" RHR pump breaker IAW SCN file and notify the Control Room that Electrical Maintenance personnel have corrected the problem with the "B" RHR Pump breaker (poor breaker alignment) and can be started as needed.</p>																				
	RO	Starts "B" RHR Pump.																				
	CRS	Determines that transition to EOP-E-1 Step 16 is warranted.																				
<p>The Chief Examiner may terminate the scenario at his discretion or once it has been identified that transition out of EPP-15 is allowed.</p>																						

## ILC-13 NRC SCENARIO 1 TURNOVER SHEET

### 1. INITIAL CONDITIONS

- a) Time in Core Life: MOL
- b) Reactor Power: 100%
- c) Turbine Load: 778.5 MWe
- d) Boron Concentration: 848 ppm
- e) Rod Height: 218 CBD
- f) RCS Pressure: 2235 psig
- g) RCS Level: 53.2 %
- h) Xenon: Equilibrium

### 2. TECHNICAL SPECIFICATION LCO ACTIONS STATEMENTS IN EFFECT

<u>T.S. #</u>	<u>Description</u>
3.7.6 Cond. A	Restore required CCW train to Operable status within 72 hours.
3.6.6 Cond. C	Restore containment cooling train to Operable status within 7 days AND 10 days from discovery of failure to meet the LCO.

### 3. CLEARANCES IN EFFECT

- a) "C" CCW OOS for mechanical seal repair. OOS for 6 hours with estimated RTS in 24 hours.
- b) HVH-4 OOS for abnormal motor vibrations. OOS for 24 hours. Available for emergency use only.

### 4. CAUTION CAPS IN EFFECT

- a) None

### 5. PROTECTED EQUIPMENT

- a) "A" and "B" CCW Pumps, "A" and "B" CCW Pump RTGB Control Switches, "A" CCW Pump Breaker 480V-DS 52/34B and "B" CCW Pump Breaker 480V-E1 52/22C.

### 6. DEGRADED EQUIPMENT

- a) None

### 7. SWITCHYARD ACCESS

- a) Unrestricted

### 8. PLANNED EVOLUTIONS

- a) Maintain current power level

### 9. TURNOVER INFORMATION

- a) No additional information.

### 10. REACTIVITY INFORMATION

- a) Review the OST-947 MOL charts for BA and PW additions

### 11. RISK

- a) GREEN

Facility:	HB ROBINSON	Scenario No.:	2	Op Test No.:	ILC-13
Examiners:	_____	Operators:	CRS -		
	_____		RO -		
	_____		BOP -		
Initial Conditions: <ul style="list-style-type: none"> <li>68% EOL, 15,697 MWD/MTU, 139 PPM Boron.</li> <li>CCW Pump "C" is OOS and breaker is racked out</li> <li>HVH-4 is OOS and breaker is racked out</li> </ul>					
Turnover: <ul style="list-style-type: none"> <li>Maintain power at current level while RES is monitoring "A" MFP.</li> </ul>					
Critical Task: <ul style="list-style-type: none"> <li>Manually start HVH-9B to preclude shutdown within 1.5 hours.</li> <li>Open either SI-870A or SI-870B.</li> <li>Isolate feed to "C" S/G and Manually close "A" and "B" MSIV.</li> <li>Stop one Safety Injection Pump to minimize SI flow.</li> </ul>					
Event No.	Malf. No.	Event Type*	Event Description		
1		(C) BOP	HVH-9A Trips with HVH-9B failure to Auto-Start		
2		(R) RO (N) BOP, CRS	"A" MFP Trips / Load Reduction		
3		(C) RO, CRS (TS) CRS	Clogged RCP Seal Injection Strainer		
4		(I) RO, CRS (N) BOP	PT-145 fails Low / Place Excess Letdown in Service		
5		(I) BOP, CRS (TS) CRS	PT-495 fails Low		
6		(M) ALL	72 inch Main Steam Header Fault		
7		ALL	"C" S/G Tube Rupture once S/G has dried out		
8		BOP	Main Turbine fails to Auto-Trip on Reactor Trip		
9		RO	SI-870A/B fail to Auto-Open		
10		BOP	"A" and "B" MSIV fail to Auto-Close and "C" MSIV has failed open		
11		BOP	Feed Header Section Isolation Valves fail to Auto-Close		
12		BOP	"A" MDAFW Pump fails to Auto-Start		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

**ILC-13 NRC SCENARIO 2 SUMMARY DESCRIPTION**

The crew will assume the watch with the plant at 68% RTP. Engineering has requested that power be held at 68% while monitoring the recently replaced motor on "A" MFP. Additionally, Maintenance is currently in progress on Component Cooling Water Pump C for pump mechanical seal replacement. HVH-4 is Out of Service due to Excessive Motor Vibrations. Repairs on HVH-4 are on hold awaiting parts.

On cue from the Chief Examiner, HVH-9A, CV Concrete Shield Cooling Fan, trips and HVH-9B fails to Auto-Start. The operator will verify the standby fan starts by manually starting HVH-9B from the RTGB in accordance with APP-010-A7, HVH-9A/B AIR FLOW LOST/OVLD. Once the Chief Examiner is satisfied with the crew's actions, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, "A" Main Feed Pump will trip. The crew will perform the immediate actions of AOP-010, Main Feedwater / Condensate Malfunction. While performing the remaining actions of AOP-010 the crew will determine that Reactor Power is required to be lowered to less than 60% Reactor Power. The crew will perform the load reduction in accordance with AOP-010 and OP-301, RCS Boration Quick Checklist. Once the Chief Examiner is satisfied with the crew's actions to perform a controlled reduction in power and stabilize the plant, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, the RCP Seal Injection Strainer will become clogged. The crew will determine the strainer is clogged by observing a reduction in RCP seal injection flow to zero flow along with receiving APP-001-A2, Seal Water Injection Filter High  $\Delta P$ , APP-001-B4, RCP Seal Injection HI/LO Flow, and APP-001-B3, RCP A Bearing HI Temperature. APP-001-A2 will direct the crew to dispatch an auxiliary operator to check Seal Water Injection Filter  $\Delta P$  and will ultimately direct the crew to have the auxiliary operator shift seal injection filters using OP-301. The CRS will enter AOP-018, Reactor Coolant Pump Abnormal Conditions, and enter Section C, Loss of Seal Injection. AOP-018 will also diagnose the event as a clogged strainer and direct the crew to shift seal injection filters. Once the seal injection filters are shifted the RCP seal injection flows will return to normal. While seal injection flow is less than 6 gpm to any RCP the CRS will determine that ITS LCO 3.4.17, Condition E, is applicable since seal injection to any RCP is not within limit with at least one charging pump operable. The required action is to initiate action to restore seal injection to affected RCPs immediately and be in Mode 3 in 6 hours and Mode 5 in 36 hours. Once the Chief Examiner is satisfied with the crew's actions to restore seal injection flow and demonstrate Tech Spec compliance, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, Pressure Transmitter PT-145 for Letdown Line Pressure will fail LOW, causing PCV-145 to close and isolate letdown flow. AOP-025, RTGB Instrument Failure, Section A will be implemented to isolate the letdown line, reduce charging flow and place Excess Letdown in service. Once the Chief Examiner is satisfied with the crew's actions, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, PT-495, Main Steam Line "C" Pressure Transmitter, will fail low. The BOP will perform immediate actions of AOP-025, RTGB Instrument Failure, Section G, and take manual control of FCV-498, "C" S/G Feed Regulating Valve, and restore "C" S/G level to the normal band. The crew will then take action to swap to the alternate channel, place the "C" FRV back in Automatic and remove PT-495 from service in accordance with OWP-025, SGP-11. Due to the failure of PT-495, ITS Table 3.3.1 Table 3.3.1-1 Item 14 which requires 2



Steam Flow / Feedwater Flow Mismatch Channels to be operable will not be met and require entry into ITS 3.3.1 Condition E, which requires the channel to be placed in trip with 6 hours OR be in Mode 3 in 12 hours. Due to the failure of PT-495, ITS Table 3.3.2-1, Item 1.e which requires 3 Steam Line High Differential Pressure between Steam header and Steam Lines Channels to be operable will not be met and require entry into ITS 3.3.2 Condition D. Also due to the failure of PT-495, ITS Table 3.3.3-1, Item 20 which requires 2 Steam Generator Pressure Channels per S/G to be operable will be reviewed and determined to be met. ITS Table 3.3.6.1 Item 4 will also be reviewed and determined to be applicable due to affecting Safety Injection ESFAS Instrumentation associated with Containment Ventilation Isolation Instrumentation. Once the Chief Examiner is satisfied with the crew's actions and Tech Spec compliance, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, the plant will experience a fault on the 72 inch Main Steam Header. The crew will determine that a reactor trip is required and transition to EOP-E-0, Reactor Trip or Safety Injection. An automatic safety injection signal will be initiated due to high steam line flow with low Tavg. During the immediate actions of EOP-E-0 it will be determined that the Turbine failed to automatically trip and manual actions will be taken to trip the turbine from the RTGB. During further actions of EOP-E-0 it will be discovered that SI-870A and B, BIT Outlets, fail to automatically open and have to be manually opened from the RTGB in order to provide safety injection flow. All Main Steam Isolation Valves will fail to automatically close and manual actions will be taken to close them from the RTGB. "C" MSIV will remain failed in the open position. V2-6A, B, and C, Feedwater Header Section Valves, will fail to automatically close and will have to be manually closed from the RTGB. "A" Motor Driven Auxiliary Feedwater Pump will fail to automatically start and will be manually started from the RTGB. Once "C" S/G has dried out a 400 gpm tube rupture will ramp in over 60 seconds on "C" S/G. The crew will complete EOP-E-0 and transition to EOP-E-2, Faulted Steam Generator Isolation, and perform the actions to isolate "C" S/G. The crew may choose to perform Supplement G to isolate "C" S/G prior to transitioning to EOP-E-2. Supplement G will direct performance of Supplement N. Once "C" S/G is isolated the crew will then transition to EOP-E-3, Steam Generator Tube Rupture, due to elevated readings on R-31C, Main Steam Line Channel, and continued steam flow from "C" S/G. Since "C" MSIV cannot be closed the crew will direct local isolation of "C" S/G. Ultimately the crew will transition to EPP-17, SGTR with Loss of Reactor Coolant: Subcooled Recovery, and secure all but one RCP and one Safety Injection pump.

The Chief Examiner may terminate the scenario at any time after one safety injection pump has been secured in accordance with EPP-17.

**ILC-13 NRC SCENARIO 2 SIMULATOR SETUP****IC/SETUP:**

- IC-902, SCN 006\_ILC\_13\_NRC\_2.
- Status board is provided to crew is IC-17.

**PRE-LOADED EVENTS:**

The following events should occur on the reactor trip or triggered events following the reactor trip:

- Event 7: "C" S/G Tube Rupture once S/G has dried out
- Event 8: Main Turbine fails to Auto-Trip on Reactor Trip
- Event 9: SI-870A/B fail to Auto-Open
- Event 10: "A" and "B" MSIV fail to Auto-Close and "C" MSIV has failed open
- Event 11: Feed Header Section Isolation Valves fail to Auto-Close
- Event 12: "A" MDAFW Pump fails to Auto-Start

**EVENTS/TRIGGERS INITIATED DURING THE SCENARIO:**

- Event 1: HVH-9A Trips with HVH-9B failure to Auto-Start
- Event 2: "A" MFP Trips / Load Reduction
- Event 3: Clogged RCP Seal Injection Strainer
- Event 4: PT-145 fails Low / Place Excess Letdown in Service
- Event 5: PT-495 fails low
- Event 6: 72 inch Main Steam Header Fault

**EXPECTED PROCEDURE FLOWPATH OR COPIES NEEDED:**

- APP-010
- AOP-010
- APP-001
- AOP-018
- AOP-025, Section A
- AOP-025, Section G
- OWP-025, SGP-11
- EOP-E-0
- Supplement G (Optional)
- Supplement N (Optional)
- EOP-E-2
- EOP-E-3
- EPP-17

Op Test No.: ILC-13 NRC Scenario # 2 Event # 1 Page 5 of 5

Event Description: HVH-9A Trips with HVH-9B failure to Auto Start

Time	Position	Applicant's Actions or Behavior
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**BOOTH OPERATOR: When directed, insert Event 1, HVH-9A Trips with HVH-9B failure to Auto Start**

**EVENT INDICATIONS:**

**APP-010-A7, HVH-9A/B AIR FLOW LOST/OVLD, is illuminated**

**HVH-9A RTGB GREEN OFF light illuminated**

	BOP	Acknowledges alarm and references APP-010-A7.
	BOP	APP-010-A7 – IF the operating fan has tripped, THEN VERIFY the standby fan starts. (Starts HVH-9B)

**NOTE: Crew should notify WCC SRO and/or I&C to write a work request, investigate and initiate repairs, and notify the Operations Manager.**

**BOOTH OPERATOR: Insert Event #2 (MFP A Trips) on cue from the Chief Examiner.**

Op Test No.: ILC-13 NRC Scenario # 2 Event # 2 Page 6 of 6

Event Description: MFP A Trips / Load Reduction

Time	Position	Applicant's Actions or Behavior
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**BOOTH OPERATOR: At the discretion of the Examiner, insert Event 2, MFP A Trips.****EVENT INDICATIONS:****Feed Flow and S/G Level Transients on all S/Gs.****APP-7-A3, FW PMP A MOTOR OVLD/TRIP, illuminated****MFP A indicates OFF****Multiple APP-006, S/G Systems, alarms**

		<b>AOP-010 MAIN FEEDWATER/CONDENSATE MALFUNCTION</b>
	BOP	<b>Immediate Action Step</b> Check Feedwater Regulating Valves - OPERATING PROPERLY (MANUAL OR AUTO): (YES) <ul style="list-style-type: none"> <li>• FCV-478</li> <li>• FCV-488</li> <li>• FCV-498</li> </ul>
	RO	<b>Continuous Action Step</b> Check Reactor Trip Setpoint - BEING APPROACHED (NO) <ul style="list-style-type: none"> <li>• IF a Reactor Trip Setpoint is approached, THEN trip the Reactor and Go to EOP-E-0.</li> <li>• Go to Step 4.</li> </ul>
	SRO	Enters AOP-010, Main Feedwater / Condensate Malfunction
	SRO	Verifies immediate actions complete.
	CREW	Make PA Announcement for Procedure Entry
	BOP	Go to the appropriate Step from the Table Below: <ul style="list-style-type: none"> <li>• Main Feed Pump Trip – Step 6</li> </ul>
	RO	Check Reactor Power – Less than 70% (YES)
	RO	Check Reactor Power – Greater than 60% (YES)

Op Test No.:	ILC-13 NRC	Scenario #	2	Event #	2	Page	7	of	7
Event Description:		MFP A Trips / Load Reduction							
Time	Position	Applicant's Actions or Behavior							

	CREW	Reduce Turbine Load At 1%/MIN To 5%/MIN To Achieve Less Than 60% Reactor Power as follows: a. Verify Rods in AUTOMATIC. (YES) b. Check Turbine Control Mode – AUTOMATIC 1) Depress the IMP IN Pushbutton 2) Set the Desired Load in the SETTER. 3) Set the Desired Load Rate. 4) Depress the GO Pushbutton or the HOLD Pushbutton as Necessary to Reduce Turbine Load c. Borate Per OP-301, RCS Quick Boration Checklist as necessary to maintain AFD within the operating band. Boration steps listed at the end of this section.
	SRO	Go To Step 13
	BOP	Check Main Feed Pumps – At Least One Running (YES)
	SRO	Observe the NOTE prior to Step 38 and go to Step 38.
	BOP	Check S/G Level – At OR Trending to Program (YES)
	BOP	Check Tavg – At or Trending to Tref (YES)
	CREW	Contact Maintenance to Troubleshoot and Correct the Feedwater Problem.
	SRO	Implement the EALs.
	BOP	Check current loading for the following pumps - LESS THAN MAXIMUM (YES) <ul style="list-style-type: none"> <li>• Main Feedwater Pump - 0.715 KAMPS</li> <li>• Condensate Pumps - 370 AMPS</li> <li>• Heater Drain Pumps - 90 AMPS</li> </ul>
BOOTH OPERATOR: Report the following AMPS as the current readings: Main Feedwater Pump   560 AMPS Condensate Pumps       310 AMPS Heater Drain Pumps     75 AMPS		
	SRO	<b>Continuous Action Step</b> Determine Iodine Sampling Requirements As Follows: (NO) a. Check Power Change - GREATER THAN 15% IN ONE HOUR <ul style="list-style-type: none"> <li>• Go To Step 44</li> </ul>

Op Test No.:	ILC-13 NRC	Scenario #	2	Event #	2	Page	8	of	8
Event Description:		MFP A Trips / Load Reduction							
Time	Position	Applicant's Actions or Behavior							

		• IF YES, then implement SR 3.4.16.2
	RO	<b>Continuous Action Step</b> Check APP-005-B5, ROD BANKS A/B/C/D LO LIMIT – EXTINGUISHED (YES)
	RO	Monitor Axial Flux Difference To Ensure Compliance With ITS 3.2.3 (YES)
	CREW	Notify Load Dispatcher Of The Unit's Load Capability
	SRO	Return To Procedure And Step In Effect
<b>NOTE:</b> OP-301, Section 8.2.8 Quick Boration Checklist (shaded area) is included in the following steps, but may be used following the commencement of the plant down power.  Expect about 35 - 45 gallons of Boric Acid to be added.		
	RO	<b>DETERMINE</b> the amount of Boric Acid to add to the RCS and <b>OBTAIN</b> an independent check of the volume required
	RO	<b>OBTAIN</b> permission from the CRS <b>OR</b> the SM to add the amount of boric acid previously determined.
	RO	<b>PLACE</b> the RCS MAKEUP MODE selector switch in the BORATE position.
	RO	<b>SET</b> YIC-113, BORIC ACID TOTALIZER to the desired quantity.
	RO	<b>IF</b> desired, <b>THEN PLACE</b> FCV-113A, BORIC ACID FLOW, in MAN <b>AND</b> manually <b>ADJUST</b> controller FCV-113A, BORIC ACID FLOW, using the UP and DOWN pushbuttons.
	RO	Momentarily <b>PLACE</b> the RCS MAKEUP SYSTEM switch to the START position.



Op Test No.:	ILC-13 NRC	Scenario #	2	Event #	2	Page	9	of	9
Event Description:		MFP A Trips / Load Reduction							
Time	Position	Applicant's Actions or Behavior							

	RO	<p><b>IF</b> any of the below conditions occur, <b>THEN</b> momentarily place the RCS MAKEUP SYSTEM switch in the STOP position:</p> <ul style="list-style-type: none"> <li>Rod Motion is blocked OR is in the wrong direction</li> <li>T<sub>AVG</sub> goes up</li> <li>Boric Acid addition exceeds the desired value</li> </ul>
	RO	<p><b>WHEN</b> the desired amount of Boric Acid has been added to the RCS, <b>THEN</b> verify the following:</p> <ul style="list-style-type: none"> <li>FCV-113A, BORIC ACID FLOW, closes.</li> <li>FCV-113B, BLENDED MU TO CHG SUCT, closes.</li> <li><b>IF</b> in Auto, <b>THEN</b> the operating Boric Acid Pump stops.</li> <li>The RCS MAKEUP SYSTEM is OFF.</li> </ul>
	RO	<p><b>IF</b> desired, <b>THEN FLUSH</b> the Boric Acid flow as follows:</p> <ul style="list-style-type: none"> <li><b>PLACE</b> the RCS MAKEUP MODE selector switch in the ALT DILUTE position.</li> <li><b>SET</b> YIC-114, PRIMARY WTR TOTALIZER to 15-20 gallons.</li> <li><b>PLACE</b> FCV-114B, BLENDED MU TO VCT to the CLOSE position.</li> <li>Momentarily <b>PLACE</b> the RCS MAKEUP SYSTEM switch to the START position.</li> <li><b>IF</b> any of the below conditions occur, <b>THEN</b> momentarily place the RCS MAKEUP SYSTEM switch in the STOP position: <ul style="list-style-type: none"> <li>Unanticipated Rod Motion</li> <li>Primary Water addition reaches the desired value</li> </ul> </li> <li><b>WHEN</b> the desired amount of Primary Water has been added to the RCS, <b>THEN</b> verify the following: <ul style="list-style-type: none"> <li>FCV-114A, PW TO BLENDER, closes.</li> <li>FCV-113B, BLENDED MU TO CHG SUCT, closes.</li> <li><b>IF</b> in Auto, <b>THEN</b> the operating Primary Water Pump stops.</li> <li>The RCS MAKEUP SYSTEM is OFF.</li> </ul> </li> </ul>
	RO	<p><b>RETURN</b> the RCS Makeup System to automatic as follows:</p> <ul style="list-style-type: none"> <li><b>VERIFY</b> FCV-114A, PW TO BLENDER, is in AUTO.</li> <li><b>PLACE</b> FCV-114B, BLENDED MU TO VCT to the AUTO position.</li> <li><b>PLACE</b> the RCS MAKEUP MODE switch in AUTO.</li> <li><b>VERIFY</b> FCV-113A, BORIC ACID FLOW, is in AUTO.</li> <li>Momentarily <b>PLACE</b> the RCS MAKEUP SYSTEM switch in the START position.</li> </ul>

Op Test No.:	<u>ILC-13 NRC</u>	Scenario #	<u>2</u>	Event #	<u>2</u>	Page	<u>10</u>	of	<u>10</u>
Event Description:		MFP A Trips / Load Reduction							
Time	Position	Applicant's Actions or Behavior							

	RO	<b>RECORD</b> , in AUTO LOG, as indicated by PRIMARY WATER TOTALIZER, YIC-114 <b>AND</b> Boric Acid TOTALIZER, YIC-113 the total amount of Primary Water <b>AND</b> Boric Acid added during the boration.
	RO	<b>MONITOR</b> parameters for the expected change in reactivity <b>AND</b> inform the CRS <b>OR</b> the SM the results of the boration.  (END OP-301 Section 8.2.8)
<b>BOOTH OPERATOR:</b> Insert Event #3 (Clogged RCP Seal Injection Strainer) on cue from the Chief Examiner.		



Op Test No.: ILC-13 NRC Scenario # 2 Event # 3 Page 11 of 11Event Description: Clogged RCP Seal Injection Strainer

Time	Position	Applicant's Actions or Behavior
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**BOOTH OPERATOR: At the discretion of the Examiner, insert Event 3, Clogged RCP Seal Injection Strainer****EVENT INDICATIONS:****Reduction in RCP seal injection flows to zero.****APP-001-A2, SEAL WATER INJECTION FILTER HIGH  $\Delta$ P****APP-001-B4, RCP SEAL INJECTION HI/LO FLOW****APP-001-B3, RCP A BEARING HI TEMPERATURE**

	RO	APP-001-A2 – IF Seal Injection is lost to any RCP, THEN REFER TO AOP-018 (Informs SRO of AOP-018 entry requirement.)
	RO	APP-001-A2 – IF RCP Seal Injection flow can NOT be maintained greater than 6 gpm to each RCP, THEN REFER TO AOP-018 AND ITS SR 3.4.17.1. (Informs SRO of ITS SR 3.4.17.1 implication.)
	RO	APP-001-A2 – DISPATCH an operator to check Seal Water Injection Filter $\Delta$ P. (Dispatches IAO to CCP Room.)

**BOOTH OPERATOR: WHEN dispatched, wait 2 minutes and then report that "A" Seal Water Injection Filter indicates pegged high at > 25 psid.**

	RO	IF RCP Seal Injection Filter $\Delta$ P is high AND is NOT caused by high flow, THEN SHIFT filters using OP-301. (Requests permission from SRO and then directs the IAO to shift filters.)
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**BOOTH OPERATOR: WHEN dispatched, wait 7 minutes and then shift RCP Seal Injection Filters IAW SCN File.**

	SRO	Enters AOP-018, RCP Abnormal Conditions
	CREW	Make PA Announcement for Procedure Entry
	SRO	Determines that Section C, Loss of Seal Injection, is the appropriate section.
	RO	Check APP-001-D1, RCP THERM BAR COOL WTR LO FLOW alarm – ILLUMINATED (NO, go to step 11)
	RO	Determine If a Charging Pump Can Be Started: a. Check Charging System Piping – Ruptured (NO, go to Step 12)
	RO	Check SI – Initiated (NO, go to Step 14.)

Op Test No.: ILC-13 NRC Scenario # 2 Event # 3 Page 12 of 12Event Description: Clogged RCP Seal Injection Strainer

Time	Position	Applicant's Actions or Behavior
	RO	Verify at Least ONE Charging Pump - RUNNING
	RO	Check Seal Injection to RCPs: <ul style="list-style-type: none"> <li>• ANY Seal Injection flow – LESS THAN 6 GPM (YES)</li> <li><u>AND</u></li> <li>• ANY Thermal Barrier <math>\Delta P</math> – LESS THAN 5 inches (YES)</li> </ul>
	RO	Adjust any OR all of the following to restore seal injection flow. <ul style="list-style-type: none"> <li>• HIC-121</li> <li>• CCP Speed</li> <li>• CVC-297A/B/C</li> </ul> (Depending on timeline, all OR none of these actions may be taken. Crew may determine that clogged strainer is cause and wait to see impact of swapping seal injection strainers.)
	RO	Check Seal Injection to RCPs: <ul style="list-style-type: none"> <li>• ANY Seal Injection flow – LESS THAN 6 GPM (YES)</li> <li><u>AND</u></li> <li>• ANY Thermal Barrier <math>\Delta P</math> – LESS THAN 5 inches (YES)</li> </ul> (May be answered as NO depending on status of swapping RCP seal injection filters.)
	RO	Check PI-121, CHARGING PUMPS DISCH PRESS Indicator – LESS THAN RCS PRESSURE (NO, go to Step 41.)
	RO	Check APP-001-A2, SEAL WTR INJ FILTER HI $\Delta P$ Alarm – ILLUMINATED (YES, if filters have not been swapped)
	RO	Shift Seal Injection Filters Using OP-301. (Dispatch IAO to perform if not already dispatched.)
	RO	Check Alternate Seal Injection Filter – IN SERVICE (When YES, then go to Step 47.)
	RO	Establish Charging Flow on FI-122A, Charging Line Flow – Greater than 35 gpm (YES)
	RO	Check Normal Letdown – In Service (YES)

Op Test No.: ILC-13 NRC Scenario # 2 Event # 3 Page 13 of 13Event Description: Clogged RCP Seal Injection Strainer

Time	Position	Applicant's Actions or Behavior
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	RO	Control Charging and Letdown Flow to Maintain Pressurizer Level as follows: <ul style="list-style-type: none"> <li>• Within +/- 5% of Reference Level <u>OR</u></li> <li>• PZR level between 30% and 40% with RCP C stopped.</li> </ul>
	RO	Establish Normal Seal Injection <ol style="list-style-type: none"> <li>a. Check RCP Seal Injection – Aligned (YES)</li> <li>b. Check RCP Seal Injection Flow – Between 8 gpm and 13 gpm (YES)</li> </ol>
	RO	Check Seal Injection Flow – Established To All RCPs
	SRO	Implement the EALs
	SRO	Refer to Technical Specifications for any applicable LCOs: Determines that ITS LCO 3.4.17, Condition E, was applicable during the time that seal injection flow was less than 6 gpm to any RCP. Condition D requires that you initiate action to restore seal injection to affected RCPs Immediately and be in Mode 3 in 6 hours and Mode 5 in 36 hours.
	CRS	Notify WCC SRO to initiate Work Request to replace clogged filter.
<b>BOOTH OPERATOR: Insert Event #4 (PT-145 fails low) on cue from the Chief Examiner.</b>		

Op Test No.:	<u>ILC-13 NRC</u>	Scenario #	<u>2</u>	Event #	<u>4</u>	Page	<u>14</u>	of	<u>14</u>
Event Description:		PT-145 fails low / Place Excess Letdown in Service							
Time	Position	Applicant's Actions or Behavior							

**BOOTH OPERATOR:** At the discretion of the Examiner, insert Event 4, PT-145 fails low resulting in placing excess letdown in service.

**EVENT INDICATIONS:**

**AOP-001-B6 – LP LTDN LN HI TEMP**

**AOP-001-D6 - LP LTDN LN HI PRESS**

	RO	References APP-001 and informs SRO of need to refer to AOP-025.
	SRO	Enters AOP25, RTGB Instrument Failure
	RO	Place LCV-460A&B In The CLOSE Position
	RO	Place Excess Letdown in Service Using Attachment 2.
Att. 2	BOP	Verify Closed the following valves: <ul style="list-style-type: none"> <li>• LCV-460A&amp;B</li> <li>• CVC-200A/B/C</li> <li>• CVC-204A/B</li> </ul>
Att. 2	BOP	Verify Open CC-739
Att. 2	BOP	Position CVC-389 to the RCDT Position
Att. 2	BOP	Open CVC-387, Excess Ltdn Stop
Att. 2	BOP	Slowly Open HCV-137, Excess Ltdn Flow, not to exceed 195°F as indicated on TI-139, Excess Ltdn HX Outlet Temp.
Att. 2	BOP	Notify the CRS that Excess Letdown is in service.
Att. 2	BOP	Update the ERFs Calorimetric program to reflect Excess Letdown is in service.
Att. 2	BOP	IF required to control PZR Level, THEN contact Chemistry to perform the alignment for purging the PZR Liquid sample line with full flow to the VCT iaw CP-003.
<b>BOOTH OPERATOR: IF requested to align sample line for purge, wait 5 minutes and implement IAW SCN File.</b>		
Att. 2	BOP/SRO	IF PZR Liquid sample line is used to control PZR Level, TEN remove the calorimetric calculation from service and enter TRM 3.25

Op Test No.:	<u>ILC-13 NRC</u>	Scenario #	<u>2</u>	Event #	<u>4</u>	Page	<u>15</u>	of	<u>15</u>
Event Description:		PT-145 fails low / Place Excess Letdown in Service							
Time	Position	Applicant's Actions or Behavior							

Att. 2	BOP	IF desired to align Excess Letdown to the VCT, THEN perform the following: <ol style="list-style-type: none"> <li>Position CVC-389 to the VCT.</li> <li>Notify Rad. Control that Excess Letdown is in service through the Seal Water Filters and Heat Exchanger, which will result in RAISED radiation levels in those areas.</li> </ol>
	RO	Make PA Announcement for Procedure Entry.
	RO	Check RCP Seal Injection Flow – Between 8 and 13 gpm. (NO) <ul style="list-style-type: none"> <li>Locally throttle CVC-297A/B/C to obtain 8 to 13 gpm.</li> <li>If required to maintain minimum flow, then throttle HIC-121 while maintaining Charging Pump Discharge pressure less than 2500 psig.</li> <li>If the normal Seal Injection Range can NOT be maintained, then an expanded range of between 6 to 20 gpm may be used.</li> <li>Check ITS LCO 3.4.17 for applicability.</li> </ul>
<b>BOOTH OPERATOR: When requested, throttle CVC-297A/B/C as necessary using the P&amp;ID function to obtain requested seal injection flows.</b>		
	SRO	Contact Plant Operations Staff to Expedite Repair of PT-145.
<b>BOOTH OPERATOR: Insert Event #5 (PT-495 fails low) on cue from the Chief Examiner.</b>		

Op Test No.: ILC-13 NRC Scenario # 2 Event # 5 Page 16 of 16

Event Description: PT-495 fails low

Time	Position	Applicant's Actions or Behavior
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**BOOTH OPERATOR: On cue from the Chief Examiner Insert Event #5 (PT-495 fails low).****EVENT INDICATIONS:****APP-006-A4 – STM LINE HI  $\Delta$ P****APP-006-C2 – S/G C STM > FW FLOW****Steam Flow / Feed Flow Transient on S/G C**

	BOP	<b>Immediate Action Step</b> Verify the Affected FRV in MAN <ul style="list-style-type: none"> <li>FCV-498 (FRV "C")</li> </ul>		
	BOP	<b>Immediate Action Step</b> Restore Affected S/G Level to between 39% and 52%		
	BOP	Check Reactor Trip Setpoint – Being Approached (NO, go to Step 5. IF YES, trip the Reactor and go to EOP-E-0.)		
	BOP	Make PA Announcement For procedure entry.		
	BOP	Place the affected S/G Steam Flow Selector Switch to the alternate channel:		
		Failed Channel	Affected Channel	Selected Position
		PT-495	FI-494	CH 495

**BOOTH OPERATOR: If requested to check for instrument steam leaks wait 5 minutes and report no indication of steam leaks.**

	BOP	<b>Continuous Action Step</b> Restore Affected Controller to Automatic as Follows: <ol style="list-style-type: none"> <li>Check S/G Level – Within +/- 1% of Programmed Level</li> <li>Place the affected Controller in AUTO (when within +/-1% of programmed level)</li> </ol>		
	BOP	Remove the Affected Transmitter from Service using OWP-025, SGP-11.		
	SRO	Contact WCC SRO for assistance with OWP and W/R initiation. Contact Maintenance.		
		<b>BOOTH OPERATOR: Implement OWP-025, SGP-11, as requested, IAW SCN File.</b>		

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Event Description: PT-495 fails low

Time	Position	Applicant's Actions or Behavior
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	SRO	<ul style="list-style-type: none"> <li>ITS Table 3.3.1 Table 3.3.1-1 Item 14 which requires 2 Steam Flow / Feedwater Flow Mismatch Channels to be operable will not be met and require entry into ITS 3.3.1 Condition E, which requires the channel to be placed in trip with 6 hours OR be in Mode 3 in 12 hours.</li> <li>ITS Table 3.3.2-1, Items 1.e which requires 3 Steam Line High Differential Pressure between Steam header and Steam Lines Channels to be operable will not be met and require entry into ITS 3.3.2 Condition D.</li> <li>ITS Table 3.3.3-1, Item 20 which requires 2 Steam Generator Pressure Channels per S/G to be operable will be reviewed and determined to be met.</li> <li>ITS Table 3.3.6.1 Item 4 will also be reviewed and determined to be applicable due to affecting Safety Injection ESFAS Instrumentation associated with Containment Ventilation Isolation Instrumentation.</li> </ul>
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**BOOTH OPERATOR:** On cue from the Chief Examiner Insert Event #6 (72 inch Main Steam Header Fault followed by "C" S/G Tube Rupture)

Op Test No.:	ILC-13 NRC	Scenario #	2	Event #	6 - 12	Page	18	of	18
Event Description:		72 inch Main Steam Header Fault followed by "C" S/G Tube Rupture							
Time	Position	Applicant's Actions or Behavior							

**BOOTH OPERATOR: On cue from the Chief Examiner Insert Event #6 (72 inch Main Steam Header Fault followed by "C" S/G Tube Rupture)**

**EVENT INDICATIONS:**

**Audible Steam Noise**

**Steam Flow Rising on all Channels**

**Reactor Power Rising on FWUFM and Nis**

**Multiple alarms on APP-004 and APP-006**

	CREW	Determines that a Reactor Trip is prudent.
	RO	Check Reactor tripped (YES)
	BOP	Check Turbine Trip: a. Both turbine stop valves - Closed (YES) b. Close MSR purge and shutoff valves (Manual action required by BOP)
	BOP	Check Power to AC Emergency Busses: a. E1 or E2 – At least one energized (YES) b. E1 and E2 – Both energized (YES)
	RO	Check SI Status: a) Check if SI is actuated: • SI annunciators – ANY ILLUMINATED (YES) • SI equipment – AUTO STARTED (YES) b) Check BOTH trains of SI – ACTUATED • SI pumps – BOTH RUNNING (YES) • RHR pumps – BOTH RUNNING (YES) (Automatic SI from High Steam Line Flow with Low Tavg)
	CRS	Verifies all immediate actions for EOP-E-0.
<b>Critical Task</b>	CRS	FOLDOUT for EOP-E-0 is in effect (IF crew takes an early action to close the MSIVs then "C" S/G will be identified as Faulted.) <b>Faulted S/G AFW Isolation Criteria</b> a. Reset SI b. Close V2-14C, SDAFW Pump Discharge Valve to "C" S/G c. Close V2-16C, AFW Header Discharge Valve to "C" S/G d. Perform Att. 2, Deenergizing AFW Valves for Faulted S/Gs e. Maintain total feed flow greater than 300 gpm until narrow range level is greater than 8% in at least one S/G.
<b>CRITICAL TASK – ISOLATE FEED TO "C" S/G</b>		



Op Test No.:	ILC-13 NRC	Scenario #	2	Event #	6 - 12	Page	19	of	19
Event Description:		72 inch Main Steam Header Fault followed by "C" S/G Tube Rupture							
Time	Position	Applicant's Actions or Behavior							

<b>EXAMINER'S NOTE:</b>		
Crew may take early actions at this time to address items that did not function or operate as designed.		
<ul style="list-style-type: none"> <li>Manually open SI-870A and/or SI-870B</li> <li>Manually close all MSIVs ("C" MSIV fails remains failed open)</li> <li>Manually start "A" MDAFW Pump</li> <li>Manually close Feedwater Section Isolation Valves</li> </ul>		
	CRS	Perform Attachment 1, Auto Action Verification, While continuing with this procedure. (Should be assigned to BOP.) (Att. 1 steps are presented next followed by the remainder of EOP-E-0.)
<b>Beginning of EOP-E-0 Attachment 1</b> (Remainder of EOP-E-0 Follows this Section)		
Att. 1	BOP	Check ECCS Pumps Running: <ul style="list-style-type: none"> <li>SI pumps - BOTH RUNNING (YES)</li> <li>RHR pumps - BOTH RUNNING (YES)</li> </ul>
Att. 1 <b>Critical Task</b>	BOP	Check ECCS Valves - PROPER EMERGENCY ALIGNMENT (NO) <ul style="list-style-type: none"> <li>Manually Opens SI-870A and/or SI-870B</li> </ul>
<b>CRITICAL TASK – OPEN SI-870A OR SI-870B</b>		
Att. 1	BOP	Check CCW Pumps - AT LEAST ONE RUNNING (YES)
Att. 1	BOP	Check Containment Isolation Phase A <ol style="list-style-type: none"> <li>Phase A – Actuated (YES)</li> <li>Phase A valves – Closed (YES)</li> <li>Excess letdown – Isolated (NO)             <ul style="list-style-type: none"> <li>CVC-387 – Closed (NO, Manually close CVC-387 from RTGB)</li> <li>HIC-137 – at 0% DEMAND (NO, Manually adjust HIC-137 controller to 0%)</li> </ul> </li> </ol>
Att. 1	BOP	Check Feedwater Isolation: <ol style="list-style-type: none"> <li>Main feed pumps – BOTH TRIPPED (YES)</li> <li>Main feedwater – ISOLATED             <ul style="list-style-type: none"> <li>FRVs – Closed (YES)</li> <li>Feedwater reg bypass valves – Closed (YES)</li> <li>Feedwater header section valves – Closed (NO,</li> </ul> </li> </ol>

Op Test No.:	<u>ILC-13 NRC</u>	Scenario #	<u>2</u>	Event #	<u>6 - 12</u>	Page	<u>20</u>	of	<u>20</u>
Event Description:		72 inch Main Steam Header Fault followed by "C" S/G Tube Rupture							
Time	Position	Applicant's Actions or Behavior							

		Manually closes all Feedwater Header Section Valves.)
Att. 1 Critical Task	BOP	Check if Main Steamlines Should Be Isolated: a) Main steamline isolation – REQUIRED (YES) <ul style="list-style-type: none"> <li>• Containment pressure – Greater than 10 psig (NO) OR</li> <li>• High steam flow with: (YES)               <ul style="list-style-type: none"> <li>○ S/G pressure – less than 614 psig OR</li> <li>○ Tavg – less than 543°F</li> </ul> </li> </ul> b) Check MSIVs and MSIV bypass valves – CLOSED (NO, Manually closes "A" and "B" MSIVs. "C" MSIV is failed open.)
<b>CRITICAL TASK – CLOSSES "A" AND "B" MSIVs</b>		
Att. 1	BOP	Check Proper Service Water System Operation: a. SW pumps – All running (YES) b. SW booster pumps – Both running (YES) c. Both SW header low pressure alarms (APP-008-F7/F8) – Extinguished (YES)
Att. 1	BOP	Check Both EDGs – Running (YES)
Att. 1	BOP	Check ECCS Flow: a. RCS pressure – less than 1650 psig (YES) b. SI pumps- Flow Indicated (YES) c. RCS pressure – less than 275 psig. (NO, Go to Step 10)
Att. 1	BOP	Check CV Recirculation Fans – All Running (YES, all available)
Att. 1	BOP	Check IVSW - Actuated (YES) <ul style="list-style-type: none"> <li>• PCV-1922A – Open (YES)</li> <li>• PCV-1922B – Open (YES)</li> </ul>
Att. 1	BOP	Check CV ventilation isolation (YES) <ul style="list-style-type: none"> <li>a. CV ventilation isolation valves – CLOSED (YES)</li> </ul>

Op Test No.:	<u>ILC-13 NRC</u>	Scenario #	<u>2</u>	Event #	<u>6 - 12</u>	Page	<u>21</u>	of	<u>21</u>
Event Description:		72 inch Main Steam Header Fault followed by "C" S/G Tube Rupture							
Time	Position	Applicant's Actions or Behavior							

Att. 1	BOP	Check control room ventilation - aligned for pressurization mode (YES) <ul style="list-style-type: none"> <li>• HVA-1A or HVA-1B – Running (YES)</li> <li>• HVE-16 – Stopped (YES)</li> <li>• HVE-19A or HVE-19B – Running (YES)</li> <li>• Control Room HVAC outside air damper A or B – Open (YES)</li> <li>• CR-D1A-SA – Closed (YES)</li> <li>• CR-D1B-SB – Closed (YES)</li> </ul>
Att. 1	BOP	Check DS Bus – Energized (YES)
Att. 1	BOP	Check Battery Chargers – Energized (YES) APP-036-D1 – Extinguished (YES) APP-036-D2 – Extinguished (YES)
Att. 1	BOP	Stop R-11/12 Sample Pump
Att. 1	BOP	Locally Reset and Load IACs as necessary (N/A)
Att. 1	BOP	Perform Crew Update to include the following: <ul style="list-style-type: none"> <li>• Attachment Completion</li> <li>• Manual Actions Taken (Opened SI-870A/B, Closed FW Header Section Valves, Closed "A" and "B" MSIVs)</li> <li>• Failed Equipment status</li> <li>• SW status (All operating)</li> </ul>
<b>End of EOP-E-0 Attachment 1</b>		

Op Test No.:	ILC-13 NRC	Scenario #	2	Event #	6 - 12	Page	22	of	22
Event Description:		72 inch Main Steam Header Fault followed by "C" S/G Tube Rupture							
Time	Position	Applicant's Actions or Behavior							

Continuation of EOP-E-0		
<b>EXAMINER NOTE:</b> SRO MAY DECIDE TO TAKE A PROMPT AND PRUDENT ACTION AND DIRECT THE BOP TO BEGIN ISOLATING "C" S/G IAW SUPPLEMENT G and N. CREW MAY HAVE DETERMINED THAT "C" S/G HAS A TUBE RUPTURE BY THIS POINT IN THE SCENARIO.		
	RO	Check AFW Pumps – Running (NO, "A" MDAFW Pump must be manually started.)
	RO	Check AFW Valves – Proper Emergency Alignment (YES) <ul style="list-style-type: none"> <li>• AFW header discharge valves – Full Open (YES)</li> <li>• AFW header section valves – Full Open (YES)</li> <li>• Steam driven AFW pump discharge valves – Full open if pump is running. (YES)</li> </ul>
	RO	Check Total AFW Flow: <ul style="list-style-type: none"> <li>• Reset SI</li> <li>• Control feed flow to maintain NON-faulted S/Gs narrow range level – Between 8% and 50%.</li> <li>• Check total AFW flow- Greater than 300 gpm (YES)</li> </ul>
	RO	Check RCP Seal Cooling: <ul style="list-style-type: none"> <li>• CCW flow to RCP thermal barriers – Normal (YES) <ul style="list-style-type: none"> <li>○ APP-001-C1 / D1 – Extinguished (YES)</li> </ul> OR</li> <li>• Seal injection flow – Normal (YES) <ul style="list-style-type: none"> <li>○ Seal injection flow – Greater than 6 gpm per RCP</li> </ul> OR</li> <li>○ Thermal barrier ΔPs – Greater than 5 inches water.</li> </ul>
<b>BOOTH OPERATOR:</b> As requested, adjust CVC-297A,B,C as necessary to control RCP seal injection flow using the P&ID function.		

Op Test No.:	ILC-13 NRC	Scenario #	2	Event #	6 - 12	Page	23	of	23
Event Description:		72 inch Main Steam Header Fault followed by "C" S/G Tube Rupture							
Time	Position	Applicant's Actions or Behavior							

	RO	<p>Check RCS Temperature</p> <p>With any RCPs running, RCS average temperature – Stable at or trending to 547°F (NO)</p> <p>RNO: IF temperature is less then 547°F AND lowering then perform the following: (YES)</p> <ol style="list-style-type: none"> <li>Stop dumping steam</li> <li>IF cooldown continues, THEN reduce total feed flow to minimum for decay heat removal: <ol style="list-style-type: none"> <li>Maintain total feed flow greater than 300 gpm until narrow range level is greater than 8% in at least one S/G.</li> </ol> </li> <li>IF cooldown continues, THEN close MSIVs and MSIV bypass valves.</li> </ol>
	RO	<p>Check PZR PORVs and Spray Valves:</p> <ol style="list-style-type: none"> <li>PORVs – Closed (YES)</li> <li>Normal PZR spray valves – Closed (YES)</li> <li>Aux spray valve – Closed (YES)</li> </ol>
	RO	<p>Check If RCPs should be stopped:</p> <ol style="list-style-type: none"> <li>RCPs – Any Running (YES)</li> <li>SI pumps – At least one running and capable of delivering flow.</li> <li>RCS subcooling based on core exit TCs – Less than 30°F (NO, go to step 14)</li> </ol>
	BOP	<p>Check if S/G Secondary Pressure Boundaries are Intact:</p> <ol style="list-style-type: none"> <li>Check pressures in all S/Gs <ol style="list-style-type: none"> <li>None lowering in an uncontrolled manner (NO)</li> <li>None Completely depressurized (NO)</li> </ol> </li> </ol> <p>RNO: Reset SPDS and initiate monitoring of CSFSTs. Go to EOP-E-2, Faulted Steam Generator Isolation, Step 1.</p>
<b>Beginning of EOP-E-2</b>		
	BOP	<p>Check MSIVs and MSIV Bypass Valves for faulted S/G – CLOSED ("A" and "B" MSIVs manually closed. "C" MSIV failed open)</p>
	BOP	<p>Check IF ANY S/G Secondary Pressure Boundary is Intact:</p> <ol style="list-style-type: none"> <li>Check pressure in all S/G – ANY STABLE OR RISING (YES)</li> </ol>

Op Test No.:	ILC-13 NRC	Scenario #	2	Event #	6 - 12	Page	24	of	24
Event Description:		72 inch Main Steam Header Fault followed by "C" S/G Tube Rupture							
Time	Position	Applicant's Actions or Behavior							

	BOP	Identify Faulted S/Gs: ("C" S/G is faulted) <ul style="list-style-type: none"> <li>a. Check pressures in all S/Gs:             <ul style="list-style-type: none"> <li>• Any S/G pressure lowering in an uncontrolled manner (YES)</li> </ul> </li> <li style="text-align: center;"><u>OR</u></li> <li>• Any S/G Completely depressurized. (YES)</li> </ul>
	BOP	Isolate Faulted S/G: <ul style="list-style-type: none"> <li>a. Check main feedwater to faulted S/B – Isolated (FCV-498, FCV-499, V2-6C) (YES)</li> <li>b. Reset SI</li> <li>c. Isolate AFW flow to faulted S/G             <ul style="list-style-type: none"> <li>• Close V2-14C and V2-16C</li> </ul> </li> <li>d. Check faulted S/G steam line PORV – Closed (RV-3) (YES)</li> <li>e. Close V1-8C</li> <li>f. Perform Att. 1 to De-energize AFW Valves for Faulted S/G</li> <li>g. Locally close MS-38</li> <li>h. Check S/G Blowdown and Blowdown sample valves from faulted S/G – Closed (YES)</li> </ul>
<b>BOOTH OPERATOR: As directed de-energize AFW valves and close MS-38 IAW SCN File.</b>		
	BOP	Check CST level >10% (YES)
	BOP	Check Secondary Radiation: <ul style="list-style-type: none"> <li>a. Request periodic activity samples of all S/Gs</li> <li>b. Unisolated secondary radiation monitors – have remained normal (NO, R-31C is elevated)</li> </ul> RNO: Reset SPDS and Go to EOP-E-3, Steam Generator Tube Rupture, Step 1.
<b>BEGINNING OF EOP-E-3</b>		
	SRO	<u>NOTE</u> <ul style="list-style-type: none"> <li>• FOLDOUT for EOP-E-3 is in effect.</li> <li>• Chemistry should be available for sampling during this procedure.</li> <li>• Step 1 RCP trip criteria applies until an operator controlled RCS cooldown is initiated.</li> </ul>

Op Test No.:	ILC-13 NRC	Scenario #	2	Event #	6 - 12	Page	25	of	25
Event Description:		72 inch Main Steam Header Fault followed by "C" S/G Tube Rupture							
Time	Position	Applicant's Actions or Behavior							

	RO	<b>CONTINUOUS ACTION STEP</b> Check If RCPs Should Be Stopped: a. RCPs - ANY RUNNING (YES) b. SI pumps - AT LEAST ONE RUNNING AND CAPABLE OF DELIVERING FLOW (YES) c. RCS subcooling based on core exit TCs - LESS THAN 30°F [50°F] (NO) RNO: Go to Step 2
	BOP	Identify Ruptured S/G(s): ("C" S/G is ruptured) <ul style="list-style-type: none"> <li>Unexpected rise in any S/G narrow range level <u>OR</u></li> <li>High radiation from any SG steamline (R-31s) <u>OR</u></li> <li>High radiation from any SG blowdown line (R-19s) <u>OR</u></li> <li>High radiation from any S/G sample:               <ul style="list-style-type: none"> <li>Contact Chemistry to sample all S/Gs for activity as necessary</li> </ul> </li> </ul>
	CRS	<b>CAUTION</b> <ul style="list-style-type: none"> <li>If the steam driven AFW pump is the only available source of feed flow, steam supply to the steam driven AFW pump should be maintained from at least one S/G.</li> <li>At least one S/G must be maintained available for RCS cooldown.</li> </ul>

Op Test No.:	ILC-13 NRC	Scenario #	2	Event #	6 - 12	Page	26	of	26
Event Description:		72 inch Main Steam Header Fault followed by "C" S/G Tube Rupture							
Time	Position	Applicant's Actions or Behavior							

<b>Critical Task</b>	BOP	<p>Isolate Flow From Ruptured S/G(s):</p> <ol style="list-style-type: none"> <li>Adjust ruptured S/G(s) steam line PORV controller setpoint to 1060 psig</li> <li>Check ruptured S/G steam line PORV – (RV1-3) CLOSED (YES)</li> <li>Close steam driven AFW pump steam shutoff valve for ruptured S/G: (V1-8C)</li> <li>Locally close the following valve for ruptured S/G(s) while continuing with this procedure: <ul style="list-style-type: none"> <li>MS-38, SG "C" BYPASS DRN &amp; WARM-UP LINE TO AFW PUMP (pipe jungle above/right of V1-8C)</li> </ul> </li> <li>Check S/G blow down and blow down sample valves from ruptured S/G(s) – Closed <ul style="list-style-type: none"> <li>SG3 Blowdown</li> <li>FCV-1932 A &amp; B</li> <li>FCV-1935 A &amp; B SHUT</li> </ul> </li> <li>Check MSIV above and below seat drain valves for ruptured S/G – CLOSED (YES)</li> <li>Close ruptured S/G MSIV and MSIV bypass valve – V1-3C and MS-353C. (NO, V1-3C is failed open.)</li> </ol> <p>RNO:</p> <ol style="list-style-type: none"> <li>Close all remaining MSIVs and MSIV bypass valves. (YES)</li> <li>Verify the following valves are closed <ul style="list-style-type: none"> <li>Turbine stop and governor valves</li> <li>MSR purge and shutoff valves</li> <li>Condenser steam dump valves</li> </ul> </li> <li>Perform Att. 5, Local Isolation of Ruptured S/G with Failed MSIV or Bypass Valve, while continuing with this procedure.</li> <li>Use intact S/Gs steam line PORVs for steam dump.</li> </ol>
		<p><b>BOOTH OPERATOR:</b> Acknowledge direction to perform Att. 5. Wait 5 minutes and close GS-3 IAW SCN File and then report Att. 5 complete. All other valves are not modeled.</p>
<b>CRITICAL TASK – ISOLATION OF "C" S/G</b>		
	SRO	<p><u>CAUTION</u></p> <ul style="list-style-type: none"> <li>If any ruptured S/G is faulted, feed flow to that S/G should remain isolated during subsequent recovery actions unless needed for RCS cooldown.</li> <li>If offsite power is lost after SI reset, manual action may be required to restart safeguards equipment.</li> </ul>



Op Test No.:	ILC-13 NRC	Scenario #	2	Event #	6 - 12	Page	27	of	27
Event Description:		72 inch Main Steam Header Fault followed by "C" S/G Tube Rupture							
Time	Position	Applicant's Actions or Behavior							

	BOP	<b>Continuous Action Step</b> Check Ruptured S/G Level: a. Narrow range level – Greater than 8%. (NO, per caution feed flow will remain isolated. Go to Step 5.)
	SRO	<b>CAUTION</b> Major steam flow paths from the ruptured S/G(s) should be isolated before initiating RCS cooldown. This includes MSIVs and MSIV bypass valves, steam line PORV, and AFW pump steam shutoff valve.
	BOP / SRO	Check Ruptured S/G Pressure – Greater than 370 psig. (NO) RNO: Reset SPDS and Go to EPP-17, SGTR with Loss of Reactor Coolant: Subcooled Recovery, Step 1.
<b>Beginning of EPP-17</b>		
	SRO	Open Foldout E (None applicable)
	RO	Reset SAFETY INJECTION
	RO	Reset CONTAINMENT ISOLATION PHASE A <u>AND</u> PHASE B
	BOP	<b>Continuous Action Step</b> Check Loss Of Offsite Power – IN PROGRESS (NO, go to step 8)
	RO	<b>Continuous Action Step</b> Establish Instrument Air To CV As Follows: <ul style="list-style-type: none"> <li>• Check APP-002-F7, INSTR AIR HDR LO PRESS – EXTINGUISHED (YES)</li> <li>• Momentarily place IA PCV-1716, INSTRUMENT AIR ISO TO CV Switch, to RESET</li> <li>• Check INST AIR VALVE TO CV PCV-1716 – OPEN (YES)</li> </ul>
	RO	<b>Continuous Action Step</b> Determine If CV Spray Should Be Stopped As Follows: <ul style="list-style-type: none"> <li>• Check CV Spray Pumps – RUNNING (NO, go to step 11)</li> </ul>

Op Test No.: ILC-13 NRC Scenario # 2 Event # 6 - 12 Page 28 of 28

Event Description: 72 inch Main Steam Header Fault followed by "C" S/G Tube Rupture

Time	Position	Applicant's Actions or Behavior
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	BOP	<b>Continuous Action Step</b> Control Ruptured S/G Level As Follows : a. Check ruptured S/G level - LESS THAN 8% [18%] (YES) b. Check ruptured S/G(s) – Also Faulted (YES) c. Check ruptured-faulted S/G(s) needed for RCS Cooldown RNO: Stop feed flow to ruptured-faulted S/G(s) and go to Step 12.
	RO	<b>Continuous Action Step</b> Determine If RHR Pumps Should Be Stopped a. Check RCS pressure: • GREATER THAN 275 PSIG [400 PSIG] (YES) <u>AND</u> • STABLE OR INCREASING b. Verify RHR Pumps – Stopped c. Check RCS pressure – Less than 275 psig [400 PSIG] (NO, go to Step 13)
	RO	Initiate Evaluation Of Plant Status : a. Check Auxiliary Building radiation monitors – NORMAL (YES) b. Contact Chemistry to obtain the following periodic samples : • RCS for boron and activity • Ruptured S/G(s) for boron • Pressurizer for boron c. Contact Plant Operations Staff to determine additional actions to evaluate plant status, while continuing with this procedure
	RO	Establish Charging Flow As Follows : • Check Charging Pumps – ALL STOPPED (NO, go to step 14.h.) • Verify charging flow on FI-122A – Greater than 35 GPM (YES)
	RO	Align Charging Pump Suction To RWST as follows: a. From the RTGB, verify LCV-115B, EMERG MU TO CHG SUCT - OPEN b. Verify LCV-115C, VCT OUTLET - CLOSED c. Start all available Charging Pumps d. Increase running Charging Pumps speed to maximum e. Verify maximum charging flow on FI-122A (YES)

Op Test No.:	ILC-13 NRC	Scenario #	2	Event #	6 - 12	Page	29	of	29
Event Description:		72 inch Main Steam Header Fault followed by "C" S/G Tube Rupture							
Time	Position	Applicant's Actions or Behavior							

	BOP	Identify Faulted S/Gs As Follows: a. Check pressure in all S/Gs: <ul style="list-style-type: none"> <li>ANY S/G PRESSURE DECREASING IN AN UNCONTROLLED MANNER (YES)</li> </ul> OR <ul style="list-style-type: none"> <li>ANY S/G COMPLETELY DEPRESSURIZED (NO)</li> </ul>
	BOP	Check Faulted S/Gs – PREVIOUSLY ISOLATED (YES)
	BOP	Control Intact S/G Levels As Follows : a. Check intact S/G levels – ANY GREATER THAN 8% (YES) b. Control feed flow to maintain intact S/G levels between 8% and 50% c. Check intact S/G levels – ANY INCREASING IN AN UNCONTROLLED MANNER (NO, go to step 19)
	RO	<b>Continuous Action Step</b> Ensure Adequate Shutdown Margin Exists As Follows: a. Check boron sample results – AVAILABLE (NO, go to step 20)
	BOP	Initiate RCS Cooldown To Cold Shutdown As Follows: a. Maintain cooldown rate in RCS cold legs less than 100°F in the last 60 minute b. Maintain RCS temperature and pressure within limits of Curve 3.4, Reactor Coolant System Pressure – Temperature Limitations For Cooldown c. Check intact S/Gs - AT LEAST ONE AVAILABLE FOR RCS COOLDOWN (YES) d. Check steam dump to Condenser – Available (NO) RNO: Dump steam using Steam Line PORVs and go to step 21.
	RO	Check RCS Hot Leg Temperatures – Less than 543°F (YES)
	BOP	Restore Steam Dumps as follows: Check steam dump to condenser – Available (NO, continue RCS cooldown using Steam Line PORVs and go to step 23.)
	RO	Defeat Low Tavg Safety Injection Signal as follows: a. Momentarily place Safety Injection Tavg Selector Switch to BLOCK position. b. Verify LO TEMP SAFETY INJECTION BLOCKED status light – Illuminated. (YES)

Op Test No.: ILC-13 NRC Scenario # 2 Event # 6 - 12 Page 30 of 30

Event Description: 72 inch Main Steam Header Fault followed by "C" S/G Tube Rupture

Time	Position	Applicant's Actions or Behavior
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	RO	<b>Continuous Action Step</b> Determine if subcooled recovery is appropriate as follows: Check RWST level – Greater than 56% (YES) Check ruptured S/G Level – Less than 84% (YES)
	RO	Check RCS Subcooling – Greater than 35°F (YES)
	RO	Check SI and RHR Pump Status: <ul style="list-style-type: none"> <li>SI Pumps – Any running (YES)</li> </ul> OR <ul style="list-style-type: none"> <li>RHR Pumps – Any running in LO Head Injection Mode (YES)</li> </ul>
	RO	<b>Continuous Action Step</b> Check PZR Level – Greater than 73%
	RO	Energize PZR Heaters to Maintain Steam Bubble
	RO	<b>Continuous Action Step</b> Depressurize RCS to Refill PZR as follows: Check PZR Level – Less than 27%. (NO, go to step 32)
	RO	Check RCP Status – All Stopped (NO, go to step 37)
	RO	Establish Normal PZR Spray as Follows: a. Check RCP Status – Only One Running (NO, Stop all but one RCP) b. Check RCP C – Running (YES, unless stopped in step above) c. Check RCP B – Running (NO) RNO: Place PCV-455A, PZR Spray Valve Controller, in MAN and adjust output to ZERO. Go to Step 38.

Op Test No.: ILC-13 NRC Scenario # 2 Event # 6 - 12 Page 31 of 31

Event Description: 72 inch Main Steam Header Fault followed by "C" S/G Tube Rupture

Time	Position	Applicant's Actions or Behavior
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		<p>Determine if one SI Pump should be stopped:</p> <p>a. Check SI Pumps – Any running (YES)</p> <p>b. Determine required RCS subcooling from table:</p> <table border="1"> <thead> <tr> <th rowspan="2">Charging Pump Status</th> <th colspan="2">Any RCP Running</th> </tr> <tr> <th>One SI Pump Running</th> <th>Two SI Pumps Running</th> </tr> </thead> <tbody> <tr> <td>None Running</td> <td>Do NOT stop SI Pump</td> <td>72°F</td> </tr> <tr> <td>One Running</td> <td>197°F</td> <td>68°F</td> </tr> <tr> <td>Two Running</td> <td>176°F</td> <td>65°F</td> </tr> <tr> <td>Three Running</td> <td>158°F</td> <td>62°F</td> </tr> </tbody> </table> <p>c. Check RCS subcooling – Less than required subcooling (NO, go to step 38.f.)</p> <p>f. Check PZR level – Greater than 27% (YES)</p> <p>g. Stop on SI Pump</p> <p>h. Check RCS Pressure – Stable or increasing (YES)</p> <p>i. Go to Step 38.a.</p>	Charging Pump Status	Any RCP Running		One SI Pump Running	Two SI Pumps Running	None Running	Do NOT stop SI Pump	72°F	One Running	197°F	68°F	Two Running	176°F	65°F	Three Running	158°F	62°F
Charging Pump Status	Any RCP Running																		
	One SI Pump Running	Two SI Pumps Running																	
None Running	Do NOT stop SI Pump	72°F																	
One Running	197°F	68°F																	
Two Running	176°F	65°F																	
Three Running	158°F	62°F																	
	RO	<p>a. Check SI Pumps – Any running (YES)</p> <p>b. Determine required RCS subcooling from table:</p> <table border="1"> <thead> <tr> <th rowspan="2">Charging Pump Status</th> <th colspan="2">Any RCP Running</th> </tr> <tr> <th>One SI Pump Running</th> <th>Two SI Pumps Running</th> </tr> </thead> <tbody> <tr> <td>None Running</td> <td>Do NOT stop SI Pump</td> <td>72°F</td> </tr> <tr> <td>One Running</td> <td>197°F</td> <td>68°F</td> </tr> <tr> <td>Two Running</td> <td>176°F</td> <td>65°F</td> </tr> <tr> <td>Three Running</td> <td>158°F</td> <td>62°F</td> </tr> </tbody> </table> <p>d. Check RCS subcooling – Less than required subcooling (NO, go to step 38.f.)</p> <p>f. Check PZR level – Greater than 27% (YES)</p> <p>g. Stop on SI Pump</p> <p>h. Check RCS Pressure – Stable or increasing (YES)</p> <p>i. Go to Step 38.a.</p>	Charging Pump Status	Any RCP Running		One SI Pump Running	Two SI Pumps Running	None Running	Do NOT stop SI Pump	72°F	One Running	197°F	68°F	Two Running	176°F	65°F	Three Running	158°F	62°F
Charging Pump Status	Any RCP Running																		
	One SI Pump Running	Two SI Pumps Running																	
None Running	Do NOT stop SI Pump	72°F																	
One Running	197°F	68°F																	
Two Running	176°F	65°F																	
Three Running	158°F	62°F																	
		a. Check SI Pumps – Any running (NO, go to step 39)																	
	RO	Check RCS subcooling – Less than required subcooling (NO, go to step 38.f.)																	
<p><b>The Chief Examiner may terminate the scenario at his discretion or once one safety injection pump has been secured in accordance with EPP-17.</b></p>																			

## **ILC-13 NRC SCENARIO 2 TURNOVER SHEET**

### **1. INITIAL CONDITIONS**

- a) Time in Core Life: EOL
- b) Reactor Power: 68%
- c) Turbine Load: 485 MWe
- d) Boron Concentration: 139 ppm
- e) Rod Height: 165 CBD
- f) RCS Pressure: 2235 psig
- g) RCS Level: 41.9 %
- h) Xenon: Equilibrium

### **2. TECHNICAL SPECIFICATION LCO ACTIONS STATEMENTS IN EFFECT**

<u>T.S. #</u>	<u>Description</u>
3.7.6 Cond. A	Restore required CCW train to Operable status within 72 hours.
3.6.6 Cond. C	Restore containment cooling train to Operable status within 7 days AND 10 days from discovery of failure to meet the LCO.

### **3. CLEARANCES IN EFFECT**

- a) "C" CCW OOS for mechanical seal repair. OOS for 6 hours with estimated RTS in 24 hours.
- b) HVH-4 OOS for abnormal motor vibrations. OOS for 24 hours. Available for emergency use only.

### **4. CAUTION CAPS IN EFFECT**

- a) None

### **5. PROTECTED EQUIPMENT**

- a) "A" and "B" CCW Pumps, "A" and "B" CCW Pump RTGB Control Switches, "A" CCW Pump Breaker 480V-DS 52/34B and "B" CCW Pump Breaker 480V-E1 52/22C.

### **6. DEGRADED EQUIPMENT**

- a) None

### **7. SWITCHYARD ACCESS**

- a) Unrestricted

### **8. PLANNED EVOLUTIONS**

- a) Maintain current power level

### **9. TURNOVER INFORMATION**

- a) Maintain current power level while RES is monitoring the recently replaced motor on "A" MFP.

### **10. REACTIVITY INFORMATION**

- a) Review the OST-947 MOL charts for BA and PW additions

### **11. RISK**

- a) GREEN

Facility:	HB ROBINSON	Scenario No.:	3	Op Test No.:	ILC-13
Examiners:	_____	Operators:	CRS -		
	_____		RO -		
	_____		BOP -		

Initial Conditions:

- 100% EOL, 15,697 MWD/MT
- CCW Pump "C" is OOS and
- HVH-4 is OOS and breaker i

Turnover:

- Maintain power at current lev

Critical Task:

- Establish Containment Isolaf
- Manually start "A" MDAFW p
- Secure all RCPs due to a los
- Manually Start "A" SI Pump
- Direct local actions to Swap Charging Pump suction to the RWST to prevent Gas Binding of the Charging Pumps. (Contingency)

*3 questions*

*Need W. 11:00 am, -*

*3, 26, 34.*

*July 1 record*

*to log. -*

Event No.	Malfunction No.	Event Type*	Event Description
1		(I) BOP, CRS (TS) CRS	PT-447 fails Low
2		(C) RO, CRS	TCV-144 Controller fails closed with TCV-143 auto-swap failure
3		(I) RO (TS) CRS	NI-44 Upper Detector fails High
4		(R) RO (N) BOP, CRS	HCV-1459 fails Open with "A" MFP Vibrations / Load Reduction
5		(I) BOP, CRS (TS) CRS	S/G Level Median Selector Module failure
6		(M) ALL	Three Main Turbine Governor Valves randomly oscillate and ultimately fail close
7		(M) ALL	Loss of 4KV Bus 3 with "B" EDG failure (Loss of E-2)
8		(M) ALL	Locked Rotor on "B" RCP results in total seal stack failure and suction line leak.
9		BOP	SDAFW Pump Trips and "A" and "B" MDAFW pumps fail to Auto-Start.
10		RO	CVC-200A and CVC-204A/B fail to close on Phase A
11		RO	"A" SI Pump fails to Auto-Start on SI

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

**ILC-13 NRC SCENARIO 3 SUMMARY DESCRIPTION**

The crew will assume the watch with the plant at 100% RTP. Maintenance is currently in progress on Component Cooling Water Pump C for pump mechanical seal replacement. HVH-4 is Out of Service due to Excessive Motor Vibrations. Repairs on HVH-4 are on hold awaiting parts.

On cue from the Chief Examiner, PT-447, Turbine First Stage Pressure Transmitter, fails low. The crew will perform the immediate actions of AOP-025, RTGB Instrument Failure, Section H, and verify S/Gs trending to 39% and place Rod Control in Manual. S/G levels will be restored to normal, alternate channel selected and feedwater regulating valves returned to automatic. Rod control will be returned to automatic once Tavg verified in the required band. PT-447 will then be removed from service in accordance with OWP-033, FSP-2. Failure of PT-447 will result in ITS Table 3.3.1-1, Item 17e, requirement to have 2 Turbine Impulse Pressure, P-7 inputs available for Reactor Protection System Interlocks to not be met. ITS LCO 3.3.1, Condition T, will be entered which requires that the P-7 interlock be verified in the required state for existing unit conditions within 1 hour OR be in Mode 3 in 7 hours. ITS Table 3.3.2-1, Items 1f, 1g, 4d, and 4e, requirement to have 2 High Steam Flow in Two Steam Lines for Safety Injection and Steam Line Isolation will not be met. ITS LCO 3.3.2, Condition D, will be entered which requires that the channel be placed in trip within 6 hours OR be in Mode 3 in 12 hours AND be in Mode 4 in 18 hours. ITS Table 3.3.6.1 Item 4 will also be reviewed and determined to be applicable due to affecting Safety Injection ESFAS Instrumentation associated with Containment Ventilation Isolation Instrumentation. Once the Chief Examiner is satisfied with the crew's actions and Tech Spec compliance, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, TCV-144, Letdown Temperature Controller, will fail close causing letdown temperature to rise above 135°F. TCV-123, VCT/DEMIN DIV, will fail to divert letdown flow to the VCT and manual action will be taken to divert letdown flow from the RTGB in accordance with APP-001-A6, LTDN FLOW HI TEMP DEMIN BYPD. The operator will then determine that TCV-144 has failed closed and take manual actions at the RTGB to open TCV-144 to re-establish cooling flow to the Non-regenerative Heat Exchanger in accordance with APP-001-A6. Once the Chief Examiner is satisfied with the crew's actions, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, NI-44, Power Range, Upper Detector will fail high. The channel will be removed from service in accordance with OWP-011, NI-4. NI-44 failure will result in ITS Table 3.3.1-1, Items 2, 17.c and 17.d, requirements to have 4 Power Range Neutron Flux Channels to not be met. ITS LCO 3.3.1, Conditions D, S and T will be entered. Condition D requires that the channel be placed in trip within 6 hours and SR 3.2.4.2 be performed once per 12 hours. Conditions S and T requires that the interlock is verified in the required state for existing unit conditions within 1 hour OR be in Mode 3 in 7 hours (Condition S) OR be in Mode 2 in 7 hours (Condition T). Once the Chief Examiner is satisfied with the crew's actions and Tech Spec compliance, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, HCV-1459 will fail open. The crew will perform the immediate actions of AOP-010, Main Feedwater / Condensate Malfunction. While performing the remaining actions of AOP-010 the crew will determine that Reactor Power is required to be controlled less than 100% and take action to lower turbine load. Once Reactor Power is stabilized below 100%, the crew will receive a report from Operations Management that Engineering has noted an unusual noise and vibration on "A" MFP and recommends that



Reactor Power be reduced in accordance with AOP-038, Rapid Downpower, and secure "A" MFP. Once the Chief Examiner is satisfied with the crew's actions to lower reactor power in a controlled manner, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, the "A" S/G level median selector module will fail resulting in a loss of S/G level input to the "A" Feedwater Regulating Valve. The crew will take immediate actions of AOP-010, Main Feedwater / Condensate Malfunction, with the BOP taking manual control of "A" FRV. Once the Chief Examiner is satisfied with the crew's actions to control and stabilize "A" S/G level, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, three main turbine governor valves will begin to randomly oscillate and ultimately fail closed resulting in a Secondary Load Rejection. The crew may decide to take a conservative action and initiate a reactor trip and transition to EOP-E-0, Reactor Trip or Safety Injection. However, the crew may enter AOP-015, Secondary Load Rejection, and attempt to diagnose the problem. Once in AOP-015 the crew will eventually reach a continuous action step that requires the crew to trip the reactor if greater than two governor valves indicate closed. During the fast-bus transfer following the Reactor Trip, 4KV Bus 3 will lose power from the Start-up Transformer due to breaker 52/17 tripping open. On the loss of 4KV Bus 3 the "B" RCP will experience a locked rotor along with a total seal stack failure and suction line leak. Additionally, "B" EDG will fail resulting in a loss of power to 480V Bus E-2. Due to the seal failure and suction line leak on "B" RCP a safety injection will be required. Only "A" train ECCS components will be available due to the loss of Bus E-2. However, "A" SI Pump does not auto-start and must be manually started from the RTGB. Also during the reactor trip the Steam Driven Auxiliary Feedwater Pump will trip and neither "A" or "B" Motor Driven Auxiliary Feedwater Pump will automatically start. CVC-200A, Letdown Orifice Isolation, and CVC-204A and CVC-240B, Letdown Line Isolation Valves, fail to close as required on the Phase A signal. During the performance of EOP-E-0 the crew should dispatch personnel to investigate and troubleshoot the failure of "B" EDG. If dispatched, maintenance personnel will determine and correct the cause (fuel racks found tripped and reset) and recommend that the "B" EDG be started locally. If personnel are not dispatched then 480V Bus E-2 will remain deenergized. With 480V Bus E-2 deenergized MCC-6 will not have power and thus LCV-115C, VCT Isolation, will remain in the open position preventing Charging Pump suction swapover to the RWST. If not identified this will eventually result in a loss of suction to the Charging Pumps and lead to gas binding if LCV-115C is not closed locally. If gas binding of the Charging Pumps occurs then all Charging Pumps will be secured, LCV-115C will have to be locally closed and Charging Pumps vented prior to restoring charging pump flow.

The crew will progress through EOP-E-0 and address the malfunctions discussed above. Additionally, subcooling will lower to the point at which RCP Trip Criteria is met and all RCPs will be secured. EOP-E-0 will eventually direct the crew to transition to EOP-E-1, Loss of Reactor or Secondary Coolant. At some point during the performance of EOP-E-0 or EOP-E-1 the crew is expected to realize that "B" RCP experienced a seal failure and that AOP-018, Reactor Coolant Pump Abnormal Conditions, is required to be implemented since it is a Concurrent AOP. The crew will perform EOP-E-1 and eventually transition to EPP-8, Post LOCA Cooldown and Depressurization, and initiate RCS Cooldown to Cold Shutdown and Depressurization of the RCS to refill the PZR.

The Chief Examiner may terminate the scenario at any time after RCS Cooldown and/or RCS Depressurization has commenced in accordance with EPP-8.

**ILC-13 NRC SCENARIO 3 SIMULATOR SETUP****IC/SETUP:**

- IC-902, SCN 006\_ILC\_13\_NRC\_3.
- Status board is provided to crew is IC-21.

**PRE-LOADED EVENTS:**

The following events should occur on the reactor trip or triggered events following the reactor trip:

- Event 7: Loss of 4 KV bus 3 with "B" EDG failure (Loss of E-2)
- Event 8: Locked Rotor on "B" results in total seal stack failure and suction line leak
- Event 9: SDAFW Pump Trips and "A" and "B" MDAFW pumps fail to Auto-Start
- Event 10: CVC-200A and CVC-204A/B fail to close on Phase A
- Event 11: "A" SI Pump fails to Auto-Start on SI

**EVENTS/TRIGGERS INITIATED DURING THE SCENARIO:**

- Event 1: PT-447 fails Low
- Event 2: TCV-144 Controller fails closed with TCV-143 auto-swap failure
- Event 3: NI-44 Upper Detector fails High
- Event 4: HCV-1459 fails Open with "A" MFP vibrations / Load Reduction
- Event 5: S/G Level Median Selector Module failure
- Event 6: Three Main Turbine Governor Valves randomly oscillate and ultimately fail close

**EXPECTED PROCEDURE FLOWPATH OR COPIES NEEDED:**

- AOP-025, Section H
- OWP-033, FSP-2
- APP-001
- APP-005
- OWP-011, NI-4
- AOP-010 (Twice)
- AOP-038
- EOP-E-0
- AOP-018
- EOP-E-1
- EPP-8

Op Test No.: ILC-13 NRC Scenario # 3 Event # 1 Page 5 of 5

Event Description: PT-447, Turbine First Stage Pressure Transmitter, fails low.

Time	Position	Applicant's Actions or Behavior
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**BOOTH OPERATOR: When directed, insert Event 1, PT-447 fails low**

**EVENT INDICATIONS:**

PT-447 pressure indication fail to 0 PSIG

APP-003-D4, TAVG/TREF DEV

APP-005-F5, AMSAC TROUB/BYPD

APP-006-D4, E4, F4, S/G A, B, C STM LINE HI FLOW

APP-006-A3, B3, C3, S/G A, B, C LVL DEV

TR-408 Pen #2 defaults to 547°F

	BOP	<b>Immediate Action Step:</b> Check Turbine Load Reduction in progress or has occurred. (NO, Go TO Step 3)
	BOP	<b>Immediate Action Step:</b> Check S/G Level trend controlling in AUTO to 39%. (YES)
	RO	<b>Immediate Action Step:</b> Manually control Reactor power and T <sub>AVG</sub> : a. Place the Rod Control Selector Switch in Manual. b. Operate rods to maintain reactor power less than 100%.
	SRO	Enters AOP-025 and Verifies immediate actions complete.
	CREW	Make PA Announcement for Procedure Entry.
	BOP	Check S/G levels stabilized at between 39% and 52%. (In progress) RNO: When S/G level is stabilized at between 39% to 52%, then go to step 6.b.
	BOP	Verify ALL FRV Controllers in MAN • FCV-478, FCV-488, and FCV-498.
	BOP	Place the First Stage Pressure Selector Switch to the alternate channel (PT-446).
	BOP	Restore each S/G level to program level using FRVs or Bypass Valves
	BOP	<b>Continuous Action Step:</b> Restore each FRV to AUTOMATIC as follows: a. Check S/G level within +/- 1% of program level. b. Place the affected controller in AUTO.

Op Test No.: ILC-13 NRC Scenario # 3 Event # 1 Page 6 of 6

Event Description: PT-447, Turbine First Stage Pressure Transmitter, fails low.

Time	Position	Applicant's Actions or Behavior
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	BOP	<b>Continuous Action Step:</b> Restore Rod Control to AUTOMATIC as follows: <ul style="list-style-type: none"> <li>• Check <math>T_{AVG}</math> within <math>-0.5</math> to <math>+0.5^{\circ}\text{F}</math> of <math>T_{REF}</math> AND Axial Offset within the target band. (NO)               <ul style="list-style-type: none"> <li>◦ Restore <math>T_{AVG}</math> using manual rod control prior to placing rods in auto.</li> </ul> </li> <li>• Place the Rod Control Selector Switch in AUTO.</li> </ul>
	SRO	Remove PT-447 from service using OWP-033, FSP-2.
<b>BOOTH OPERATOR:</b> When requested, perform steps of OWP-033 to remove PT-447 from service. Actions should include AMSAC portion of OWP-033. If requested to check PT-447, report that there is no visible damage or leakage noted.		
	SRO	Check ITS LCO 3.3.1 and 3.3.2 for applicability <ul style="list-style-type: none"> <li>• ITS Table 3.3.1-1 Item 17e, Turbine Impulse Pressure, P-7 input Condition T requires to verify interlock is in required state for existing unit conditions within 1 hour or be in Mode 2 within 7 hours (Current plant conditions requires that the REACTOR TRIP BLOCK P-7 status light be extinguished).</li> <li>• ITS Table 3.3.2-1 Items 1f, 1g, 4d, and 4e for Safety Injection and Steam Line Isolation High Steam Line Flow with Low Tave or Low Steam Line Pressure – Condition D: Place channel in trip within 6 hours OR Be in Mode 3 in 12 hours AND Be in Mode 4 within 18 hours.</li> <li>• ITS Table 3.3.6-1 Item 4 Safety Injection for Containment Ventilation Isolation Instrumentation refers to LCO 3.3.2 Functions 1.a-f (which have already been addressed).</li> </ul>
	SRO	Go to Procedure Main Body, Step 2
	SRO	Implement the EALs
<b>NOTE:</b> Crew should notify WCC SRO and/or I&C to write a work request, investigate and initiate repairs, and notify the Operations Manager.		
<b>BOOTH OPERATOR:</b> Insert Event #2 (TCV-144 Controller fails closed with TCV-143 auto-swap failure) on cue from the Chief Examiner.		

Op Test No.:	<u>ILC-13 NRC</u>	Scenario #	<u>3</u>	Event #	<u>2</u>	Page	<u>7</u>	of	<u>7</u>
Event Description:		TCV-144 Controller fails closed with TCV-143 auto-swap failure.							
Time	Position	Applicant's Actions or Behavior							

**BOOTH OPERATOR:** At the discretion of the Examiner, insert Event 2, TCV-144 Controller fails closed with TCV-143 auto-swap failure

**EVENT INDICATIONS:**

**APP-001-A6 – LTDN FLOW HI TEMP DEMIN BYPD**

	RO	Refers to APP-001-A6, LTDN FLOW HI TEMP DEMIN BYPD, and monitors letdown parameters.
APP-001-A6	RO	IF letdown temperature is greater than 135°F, THEN VERIFY controller TC-143 is diverted to the VCT. (RO must take manual action to divert TCV-143 to the VCT.)
APP-001-A6	RO	IF CCW flow to the Non-regenerative Heat Exchange is low, THEN INCREASE Component Cooling Water flow using TC-144. (RO must take manual control of TC-144 and adjust as necessary to raise CCW flow to the NRHX.)
	SRO	Contact the WCC SRO to initiate a W/R and contact Maintenance to prepare for troubleshooting and repair.

**BOOTH OPERATOR:** If / When contacted as WCC SRO or Maintenance, acknowledge the report and state that a W/R will be initiated and Work Week Coordinator will be contacted.

**BOOTH OPERATOR:** Insert Event #3 (NI-44 Upper Detector fails High) on cue from the Chief Examiner.

Op Test No.: ILC-13 NRC Scenario # 3 Event # 3 Page 8 of 8Event Description: NI-44 Upper Detector fails High

Time	Position	Applicant's Actions or Behavior
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**BOOTH OPERATOR: At the discretion of the Examiner, insert Event 3, NI-44 Upper Detector fails High**

**EVENT INDICATIONS:****APP-005-A4 - PR SINGLE CH HI RANGE ALERT****APP-005-B4 – PR OVERPOWER ROD STOP****APP-005-C3 – PR DET LOSS OF VOLT****APP-005-D6 - Δ FLUX WARNING / STATUS****APP-005-F3 – PR UPPER CH HI FLUX DEV / AUTO DEFEAT****NI-44 Upper detector output pegged HIGH**

	RO	Identifies that NI-44 Upper Detector has failed. Refers the various APP-005 alarms annunciator procedures.
	RO	Informs SRO of APP direction to remove failed Power Range Detector from service IAW OWP-011.
	SRO	Briefs OWP-011, NI-4, for removal of NI-44 from service.
	SRO	Contacts the WCC SRO and directs the initiation of W/R and contact of Maintenance. Also, requests WCC SRO assist with implementation of OWP-011.
	RO/BOP	Implement OWP-011, NI-4 <ul style="list-style-type: none"> <li>• Remove NI-44 from ERFIS SCN: NIN0044A</li> <li>• Dropped Rod Mode Switch – Bypass</li> <li>• NIS Rod Drop Bypass NI-44 Status Light – ILLUM</li> <li>• NI-44 Out of Service Trip Switch – Tripped (Behind NI Panel)</li> <li>• Bistable Light HI POW RANGE HI FLUX NC44R – ILLUM</li> <li>• Rod Stop Bypass Switch – Bypass PR 44</li> <li>• Comparator Channel Defeat Switch – Select PR 44</li> <li>• Detector Current Comparator Drawer:               <ul style="list-style-type: none"> <li>○ Upper Section Switch – Select PR 44</li> <li>○ Lower Section Switch – Select PR 44</li> </ul> </li> </ul> (NI-44 Instrument Power Fuses are not to be removed per ** note since power is greater than P-10.)

Op Test No.: ILC-13 NRC Scenario # 3 Event # 3 Page 9 of 9Event Description: NI-44 Upper Detector fails High

Time	Position	Applicant's Actions or Behavior
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SRO

Implements applicable ITS LCOs:

ITS Table 3.3.1-1, Items 2, 17.c and 17.d, requirements to have 4 Power Range Neutron Flux Channels is not met. ITS LCO 3.3.1, Conditions D, S and T will be entered.

Condition D requires that the channel be placed in trip within 6 hours and SR 3.2.4.2 be performed once per 12 hours.

Conditions S and T requires that the interlock is verified in the required state for existing unit conditions within 1 hour OR be in Mode 3 in 7 hours (Condition S) OR be in Mode 2 in 7 hours (Condition T).

**BOOTH OPERATOR: Insert Event #4 (HCV-1459 fails Open with "A" MFP Vibrations / Load Reduction) on cue from the Chief Examiner.**

Op Test No.:	<u>ILC-13 NRC</u>	Scenario #	<u>3</u>	Event #	<u>4</u>	Page	<u>10</u>	of	<u>10</u>
Event Description:		HCV-1459 fails Open with "A" MFP Vibrations / Load Reduction							
Time	Position	Applicant's Actions or Behavior							

**BOOTH OPERATOR:** At the discretion of the Examiner, insert Event 4, HCV-1459 fails Open with "A" MFP Vibrations / Load Reduction

**EVENT INDICATIONS:**

APP-007-B6 – HDT HI/LO LVL

HCV-1459 Open light illuminated

Calorimetric Power rising

	BOP	<b>AOP-010, Main Feedwater / Condensate Malfunction</b> <b>Immediate Action</b> Check Feedwater Regulating Valves – Operating Properly (YES) <ul style="list-style-type: none"> <li>FCV-478 / 488 / 498</li> </ul>
	RO	<b>Continuous Action Step</b> Check Reactor Trip Setpoint – Being Approached (NO, go to step 4)
	BOP	Make PA Announcement For Procedure Entry
	BOP	Go to the appropriate step from the Table below: HCV-1459 Failed Open – Step 35
<b>NOTE:</b> Crew may take action IAW OMM-001-2 to reduce Reactor Power to less than 2339 MWth by use of the Valve Position Limiter.		



Op Test No.: ILC-13 NRC Scenario # 3 Event # 4 Page 11 of 11

Event Description: HCV-1459 fails Open with "A" MFP Vibrations / Load Reduction

Time	Position	Applicant's Actions or Behavior
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	BOP	<p>Determine if HCV-1459 has failed as follows:</p> <ol style="list-style-type: none"> <li>Check HCV-1459 – Open (YES)</li> <li>Maintain Reactor Power less than 100% by reducing Turbine Load at 1%/min to 5%/min as follows: <ol style="list-style-type: none"> <li>Verify rods in Automatic <ol style="list-style-type: none"> <li>Check Turbine Control Mode – Automatic (YES)</li> <li>Depress the IMP IN Pushbutton</li> <li>Set the Desired Load in the SETTER</li> <li>Set the Desired Load Rate</li> <li>Depress the GO Pushbutton or the HOLD Pushbutton as Necessary to Reduce Turbine Load.</li> </ol> </li> <li>Borate per OP-301, RCS Boration Quick Checklist, as necessary to maintain AFD within the operating band. <b>(Boration steps are listed below and are shaded.)</b></li> <li>Continue power reduction until Feed Water Pump suction pressures are greater than 400 psig</li> <li>Check Feed Water Pump suction pressures – Greater than 400 psig (YES)</li> </ol> </li> <li>Verify HCV-1459 – Closed (NO) RNO: Locally isolate HCV-1459 by closing C-52A, HCV-1459 Inlet.</li> </ol>
<b>BOOTH OPERATOR: When requested, wait 2 minutes and report the Feed Water Pump suction pressures as indicated on the P&amp;ID function. When directed, wait 3 minutes and isolate HCV-1459 IAW SCN file.</b>		
<b>Beginning of OP-301, Quick Boration Checklist</b>		
	RO	DETERMINE the amount of Boric Acid to add to the RCS
	RO	OBTAIN an independent check of the volume required.
	RO	<b>OBTAIN</b> permission from the CRS <b>OR</b> the SM to borate.
	RO	<b>PLACE</b> the RCS MAKEUP MODE selector switch to BORATE.
	RO	<b>SET</b> YIC-113, BORIC ACID TOTALIZER to desired quantity.
	RO	<b>IF</b> desired, <b>THEN PLACE</b> FCV-113A, BORIC ACID FLOW, in MAN <b>AND</b> manually <b>ADJUST</b> using the UP and DOWN pushbuttons.

Op Test No.:	ILC-13 NRC	Scenario #	3	Event #	4	Page	12	of	12
Event Description:		HCV-1459 fails Open with "A" MFP Vibrations / Load Reduction							
Time	Position	Applicant's Actions or Behavior							

	RO	Momentarily <b>PLACE</b> the RCS MAKEUP SYSTEM switch to START.
	RO	<p><b>IF</b> any of the below conditions occur, <b>THEN</b> momentarily place the RCS MAKEUP SYSTEM switch in the STOP position:</p> <ul style="list-style-type: none"> <li>• Rod Motion is blocked or in the wrong direction</li> <li>• T<sub>AVG</sub> goes up</li> <li>• Boric Acid addition exceeds the desired value</li> </ul>
	RO	<p><b>WHEN</b> the desired amount of Boric Acid has been added, <b>THEN</b> verify the following:</p> <ul style="list-style-type: none"> <li>• FCV-113A, BORIC ACID FLOW, closes.</li> <li>• FCV-113B, BLENDED MU TO CHG SUCT, closes.</li> <li>• <b>IF</b> in Auto, <b>THEN</b> the operating Boric Acid Pump stops.</li> <li>• The RCS MAKEUP SYSTEM is OFF.</li> </ul>
	RO	<p><b>IF</b> desired, <b>THEN FLUSH</b> the Boric Acid flow path as follows:</p> <ul style="list-style-type: none"> <li>• <b>PLACE</b> the RCS MAKEUP MODE selector switch in the ALT DILUTE position.</li> <li>• <b>SET</b> YIC-114, PRIMARY WTR TOTALIZER to 15-20 gallons.</li> <li>• <b>PLACE</b> FCV-114B, BLENDED MU TO VCT to CLOSE.</li> <li>• Momentarily <b>PLACE</b> RCS MAKEUP SYSTEM switch to START.</li> <li>• <b>IF</b> any of the below conditions occur, <b>THEN</b> momentarily place the RCS MAKEUP SYSTEM switch in the STOP position: <ul style="list-style-type: none"> <li>○ Unanticipated Rod Motion</li> <li>○ Primary Water addition reaches the desired value</li> </ul> </li> <li>• <b>WHEN</b> the desired amount of Primary Water has been added to the RCS, <b>THEN</b> verify the following: <ul style="list-style-type: none"> <li>○ FCV-114A PW to Blender closes.</li> <li>○ FCV-113B Blended MU to CHG Suct. closes.</li> <li>○ <b>IF</b> in Auto, <b>THEN</b> the operating Primary Water Pump stops.</li> <li>○ The RCS MAKEUP SYSTEM is OFF.</li> </ul> </li> </ul>
	RO	<p><b>RETURN</b> the RCS Makeup System to automatic as follows:</p> <ul style="list-style-type: none"> <li>• <b>VERIFY</b> FCV-114A Primary WTR Flow Dilute Mode is in AUTO.</li> <li>• <b>PLACE</b> FCV-114B Blended MU to VCT to the AUTO position.</li> <li>• <b>PLACE</b> the RCS MAKEUP MODE switch in AUTO.</li> <li>• <b>VERIFY</b> FCV-113A Boric Acid Flow is in AUTO.</li> <li>• Momentarily <b>PLACE</b> the RCS MAKEUP SYSTEM switch in the START position.</li> </ul>

Op Test No.:	ILC-13 NRC	Scenario #	3	Event #	4	Page	13	of	13
Event Description:		HCV-1459 fails Open with "A" MFP Vibrations / Load Reduction							
Time	Position	Applicant's Actions or Behavior							

	RO	<b>RECORD</b> , in AUTO LOG, as indicated by PRIMARY WATER TOTALIZER, YIC-114 <b>AND</b> Boric Acid TOTALIZER, YIC-113 the total amount of Primary Water <b>AND</b> Boric Acid added during the boration.
	RO	<b>MONITOR</b> parameters for the expected change in reactivity <b>AND</b> inform the CRS <b>OR</b> the SM of the results of the boration.
<b>End of OP-301, Quick Boration Checklist</b>		
	SRO	Contact I&C to Troubleshoot <b>AND</b> Correct the HCV-1459 Problem
	CREW	Make PA Announcement for Procedure Entry Unless Previously Made.
	BOP	Check S/G Level – At OR Trending to Program (YES)
	RO	Check Tavg – At OR Trending to Tref (YES)
<b>BOOTH OPERATOR: Contact the SRO as Operations Manager and report that Engineering has noted an unusual noise and vibration on "A" MFP. Recommend that Reactor Power be reduced in accordance with AOP-038, Rapid Downpower, and secure "A" MFP as soon as plant conditions support.</b>		
	SRO	Contact Maintenance to Troubleshoot and Correct the Feedwater Problem
	SRO	Implement the EALs
<b>NOTE: The SRO may continue in AOP-010 once the downpower has commenced in accordance with AOP-038. The remaining steps in AOP-010 are notifications and parameter verifications and are not listed in this scenario guide.</b>		
	SRO	Determines the need to transition to AOP-038 and commence Rapid Downpower.
	CREW	Notify Plant Personnel of Procedure Entry Using the Plant Page System.

Op Test No.: ILC-13 NRC Scenario # 3 Event # 4 Page 14 of 14

Event Description: HCV-1459 fails Open with "A" MFP Vibrations / Load Reduction

Time	Position	Applicant's Actions or Behavior
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	RO	Determine Corrected Boration and Target Rod Height for Target Power Level using Most Recently Performed OST-947, Operations Reactivity Plan. <ul style="list-style-type: none"> <li>• Target Load Reduction Rate ____ %/min</li> <li>• Target Power Level ____.</li> <li>• Target Rod Height ____.</li> <li>• Corrected Boration ____ Gallons</li> </ul>
	SRO	Perform Brief of Control Room Personnel to include the following <ul style="list-style-type: none"> <li>• Reason for downpower</li> <li>• Target Power Level</li> <li>• Target Rod Height</li> <li>• Rate of load reduction</li> <li>• Amount of boric acid addition</li> </ul>
	RO	<b>Continuous Action Step</b> Check Required Power Reduction Rate – Less than or equal to 5%/min. (YES)
	RO	Energize All available PZR Heaters
	RO	Check Rod Control – IN AUTO (YES)
	RO	Initiate Boration Using Att. 1, RCS Boration, While Continuing with this procedure.
Att. 1	RO	Place the RCS Makeup Mode Selector Switch to BORATE
Att. 1	RO	IF Frequent Boric Acid Transfer Pump Starts are anticipated, THEN place Boric Acid Transfer Pump Switch Aligned to BLEND to ON.
Att. 1	RO	Set YIC-113 to amount determined in Main Body Step 2.
Att. 1	RO	Momentarily place the RCS Makeup System Switch to START.
Att. 1	RO	IF Boric Acid flow is NOT achieving the desired effect, THEN place FCV-113A in MAN and manually adjust controller FCV-113A using UP and DOWN pushbuttons.

Op Test No.:	<u>ILC-13 NRC</u>	Scenario #	<u>3</u>	Event #	<u>4</u>	Page	<u>15</u>	of	<u>15</u>
Event Description:		HCV-1459 fails Open with "A" MFP Vibrations / Load Reduction							
Time	Position	Applicant's Actions or Behavior							

Att. 1	RO	When the desired amount of Boric Acid has been added to the RCS OR the RCS Makeup System Switch is placed in STOP, THEN verify the following: <ol style="list-style-type: none"> <li>FCV-113A closes</li> <li>FCV-113B closes</li> <li>IF in AUTO, THEN operating Boric Acid Pump stops</li> <li>RCS Makeup System is OFF</li> </ol>
	BOP	Initiate Turbine Load Reduction While Continuing with this procedure: <ol style="list-style-type: none"> <li>Check EH Turbine Control – IN OPER AUTO</li> <li>Prepare for Turbine Load Reduction As Follows:               <ol style="list-style-type: none"> <li>Check IMP IN – ILLUMINATED</li> <li>SET desired load in the SETTER</li> <li>Select the desired Load Rate</li> </ol> </li> <li>Depress the GO pushbutton to initiate Turbine Load reduction.</li> </ol>
	BOP	Adjust Turbine Load to Control Tavg within 5°F of Tref using one of the following: <ul style="list-style-type: none"> <li>Adjust Load Rate</li> <li>OR</li> <li>Depress GO and HOLD pushbuttons</li> </ul>
	SRO	Initiate Notification of the following: <ul style="list-style-type: none"> <li>Load Dispatcher of Load Reduction</li> <li>E&amp;C to control secondary chemistry</li> <li>RC for elevated radiation levels in CV Pump Bays and Pipe Alley</li> <li>On-call Duty Manager to activate the Event Response Team</li> <li>E&amp;C for impending 15% power change for I-131 sampling within 2 to 6 hours</li> </ul>
	BOP	Check Auxiliary Boilers – At Least One Operating (NO, not needed since staying on-line.)
	RO	<b>Continuous Action Step</b> Check Tavg – Within 5°F of Tref (IF NO, then take necessary action with Turbine Load reduction or boration rate)
	RO	<b>Continuous Action Step</b> Check Axial Flux Distribution – Within Target Band (IF NO, then refer to ITS 3.2.3, Axial Flux Difference, for required actions.)

Op Test No.:	<u>ILC-13 NRC</u>	Scenario #	<u>3</u>	Event #	<u>4</u>	Page	<u>16</u>	of	<u>16</u>
Event Description: HCV-1459 fails Open with "A" MFP Vibrations / Load Reduction									
Time	Position	Applicant's Actions or Behavior							

	BOP	Check APP-006-F5, Steam Dump Armed – Extinguished (NO, no actions required since > 15%. Illuminated due to PT-447 failure.)
	SRO	Check any of the following conditions – MET: <ul style="list-style-type: none"> <li>• Target load/power has been reached (NO)</li> <li>• Load reduction is no longer required (NO)</li> <li>• CRS/SM directs termination of load reduction (NO)</li> </ul> Go to Step 16
	RO	Check Reactor Power – Less than 85% (NO) (In hold until at 85% Power. Once at 85% power one Heater Drain Pump will be secured.
<b>BOOTH OPERATOR: Once the Chief Examiner is satisfied with the crew's actions to lower reactor power in a controlled manner, Insert Event #5 ("A" S/G Level Median Selector Module Failure) on cue from the Chief Examiner.</b>		

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Event Description: "A" S/G Level Median Selector Module Failure

Time	Position	Applicant's Actions or Behavior
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**BOOTH OPERATOR:** After adequate power reduction has been observed and on cue from the Chief Examiner Insert Event #5 ("A" S/G Level Median Selector Module Failure).

**EVENT INDICATIONS:**

Feed flow transient on "A" S/G

APP-006-A3 – S/G A LVL DEV

	CREW	Determines entry into AOP-010 is warranted due to Feedwater Flow Transient
	BOP	<p><b>Immediate Action Step</b> Check Feedwater Regulating Valves – Operating Properly (Manual OR Auto):</p> <ul style="list-style-type: none"> <li>• FCV-478, FRV "A" (NO)</li> <li>• FCV-488, FRV "B" (YES)</li> <li>• FCV-498, FRV "C" (YES)</li> </ul> <p>RNO: Perform the following:</p> <ol style="list-style-type: none"> <li>Verify FRV for affected S/G in manual control. (Places FCV-478 in Manual)</li> <li>Attempt to stabilize S/G level using FRV and/or FRV Bypass Valves by matching steam flow with feed flow.</li> <li>Stop any load change in progress. (Place turbine controls to HOLD.)</li> <li>Restore affected S/G level to between 39% and 52%.</li> <li>IF unable to control S/G level, THEN trip the Reactor and go to EOP-E-0.</li> <li>Go to Step 37.</li> </ol>
	BOP	Make PA Announcement for Procedure Entry
	BOP	Check S/G Level – At OR Trending to Program (YES)
	RO	Check Tav <sub>g</sub> – At OR Trending to Tref (YES)
	SRO	Contact Maintenance to Troubleshoot and Correct the Feedwater Problem
	SRO	Implement the EALs

**BOOTH OPERATOR:** On cue from the Chief Examiner Insert Event #6 (Main Turbine Governor Valves randomly oscillate and ultimately fail close)



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Event Description:		Main Turbine Governor Valves Randomly Oscillate and Ultimately Fail Close, Loss of 4KV Bus 3 with "B" EDG Failure, Locked Rotor on "B" RCP results in total seal stack failure and suction line leak.							
Time	Position	Applicant's Actions or Behavior							

**BOOTH OPERATOR: On cue from the Chief Examiner Insert Event #6, Main Turbine Governor Valves randomly oscillate and ultimately fail close**

**EVENT INDICATIONS:**

**Governor valve indications and lights oscillate**

**Steam Flow and S/G Level Transients**

**Lowering Main Generator Output**

	SRO	May enter AOP-015, Secondary Load Rejection, and attempt to diagnose the problem. The crew will most likely trip once the governor valves fail closed. AOP-015 steps listed for contingency.
	BOP	Check S/G Levels – Trending to Program Level (YES)
	RO	Check Tavg – Trending to Tref (YES)
	CREW	Make PA Announcement for Procedure Entry
	BOP	Check Load Reduction – Greater than 100 MWe. (YES, Once Governor valves fail close)
	BOP	<b>Continuous Action Step</b> Check Turbine Governor Valves – Greater than 2 indicate closed (by light or position indication) (YES, within 60 seconds of initiating the event.)
	SRO	Trip the Reactor AND go to <b>EOP-E-0</b> .
<b>Beginning of EOP-E-0</b>		
	RO	Check Reactor tripped (YES)
	BOP	Check Turbine Trip: a. Both turbine stop valves - Closed (YES) b. Close MSR purge and shutoff valves (Manual action required by BOP)
	BOP	Check Power to AC Emergency Busses: a. E1 or E2 – At least one energized (YES) b. E1 and E2 – Both energized (YES)



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Event Description:		Main Turbine Governor Valves Randomly Oscillate and Ultimately Fail Close, Loss of 4KV Bus 3 with "B" EDG Failure, Locked Rotor on "B" RCP results in total seal stack failure and suction line leak.							
Time	Position	Applicant's Actions or Behavior							

	RO	Check SI Status: a) Check if SI is actuated: • SI annunciators – ANY ILLUMINATED (YES) • SI equipment – AUTO STARTED (YES) b) Check BOTH trains of SI – ACTUATED • SI pumps – BOTH RUNNING (NO) • RHR pumps – BOTH RUNNING (YES) RNO: Manually actuate BOTH trains of SI
	CRS	Verifies all immediate actions for EOP-E-0.
<b>EXAMINER'S NOTE:</b> During the fast-bus transfer, 4 KV Bus 3 will lose power from the Startup Transformer due to breaker 52/17 tripping open. "B" RCP will experience a locked rotor along with a total seal stack failure and suction line leak. Additionally, "B" EDG will fail resulting in a loss of 480V Bus E-2.		
<b>EXAMINER'S NOTE:</b> Crew may take early actions at this time to address items that did not function or operate as designed. • Manually start "A" SI Pump • Manually start "A" MDAFW Pump • Manually close CVC-200A and CVC-204A/B		
<b>Critical Task</b>	CRS	FOLDOUT for EOP-E-0 is in effect <u>RCP Trip Criteria</u> IF either condition listed below occurs, THEN trip all RCPs: (YES) • Containment Isolation Phase B – ACTUATED (NO) OR • BOTH of the following satisfied: ○ SI pumps - AT LEAST ONE RUNNING AND CAPABLE OF DELIVERING FLOW (YES, "A" SI Pump is running) AND ○ RCS subcooling based on core exit TCs - LESS THAN 30°F (YES, depending on scenario timeline)
<b>CRITICAL TASK – STOP ALL RCPs</b>		

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Event Description:		Main Turbine Governor Valves Randomly Oscillate and Ultimately Fail Close, Loss of 4KV Bus 3 with "B" EDG Failure, Locked Rotor on "B" RCP results in total seal stack failure and suction line leak.							
Time	Position	Applicant's Actions or Behavior							

	CRS	Perform Attachment 1, Auto Action Verification, While continuing with this procedure. (Should be assigned to BOP.) (Att. 1 steps are presented next followed by the remainder of EOP-E-0.)
<b>Beginning of EOP-E-0 Attachment 1</b> (Remainder of EOP-E-0 Follows this Section)		
Att. 1 Critical Task	BOP	Check ECCS Pumps Running: <ul style="list-style-type: none"> <li>SI pumps - BOTH RUNNING (NO, Starts "A" SI Pump)</li> <li>RHR pumps - BOTH RUNNING (NO, only "A" RHR pump has power.)</li> </ul>
<b>CRITICAL TASK – START "A" SI PUMP</b>		
Att. 1	BOP	Check ECCS Valves - PROPER EMERGENCY ALIGNMENT (YES)
Att. 1	BOP	Check CCW Pumps - AT LEAST ONE RUNNING (YES)
Att. 1 Critical Task	BOP	Check Containment Isolation Phase A <ul style="list-style-type: none"> <li>a. Phase A – Actuated (YES)</li> <li>b. Phase A valves – Closed (NO, Manually closes CVC-200A and CVC-204A and CVC-204B)</li> <li>c. Excess letdown – Isolated (YES) <ul style="list-style-type: none"> <li>CVC-387 – Closed (YES)</li> <li>HIC-137 – at 0% DEMAND (YES)</li> </ul> </li> </ul>
<b>CRITICAL TASK – Establish Containment Isolation (Close CVC-200A and CVC-204A and CVC-204B)</b>		
Att. 1	BOP	Check Feedwater Isolation: <ul style="list-style-type: none"> <li>a) Main feed pumps – BOTH TRIPPED (YES)</li> <li>b) Main feedwater – ISOLATED <ul style="list-style-type: none"> <li>FRVs – Closed (YES)</li> <li>Feedwater reg bypass valves – Closed (YES)</li> <li>Feedwater header section valves – Closed (YES)</li> </ul> </li> </ul>

Op Test No.:	<u>ILC-13 NRC</u>	Scenario #	<u>3</u>	Event #	<u>6 - 12</u>	Page	<u>21</u>	of	<u>21</u>
Event Description:		Main Turbine Governor Valves Randomly Oscillate and Ultimately Fail Close, Loss of 4KV Bus 3 with "B" EDG Failure, Locked Rotor on "B" RCP results in total seal stack failure and suction line leak.							
Time	Position	Applicant's Actions or Behavior							

Att. 1	BOP	Check if Main Steamlines Should Be Isolated: a) Main steamline isolation – REQUIRED (NO) <ul style="list-style-type: none"> <li>Containment pressure – Greater than 10 psig (NO)</li> </ul> OR <ul style="list-style-type: none"> <li>High steam flow with: (NO)               <ul style="list-style-type: none"> <li>S/G pressure – less than 614 psig</li> </ul> </li> </ul> OR <ul style="list-style-type: none"> <li>Tavg – less than 543°F</li> </ul> RNO: Go to Step 7
Att. 1	BOP	Check Proper Service Water System Operation: a. SW pumps – All running (NO, verifies all available running.) b. SW booster pumps – Both running (NO, verifies "A" SWBP running.) c. Both SW header low pressure alarms (APP-008-F7/F8) – Extinguished (YES)
Att. 1	BOP	Check Both EDGs – Running (NO, "B" EDG has failed to start. Attempt to start from the RTGB. Will not be successful.)
Att. 1	BOP	Check ECCS Flow: a. RCS pressure – less than 1650 psig (YES) b. SI pumps- Flow Indicated (YES) c. RCS pressure – less than 275 psig. (NO, go to step 10)
Att. 1	BOP	Check CV Recirculation Fans – All Running (NO, verifies all available running.)
Att. 1	BOP	Check IVSW - Actuated (YES) <ul style="list-style-type: none"> <li>PCV-1922A – Open (YES)</li> <li>PCV-1922B – Open (YES)</li> </ul>
Att. 1	BOP	Check CV ventilation isolation (YES) <ul style="list-style-type: none"> <li>CV ventilation isolation valves – CLOSED (YES)</li> </ul>

Op Test No.:	ILC-13 NRC	Scenario #	3	Event #	6 - 12	Page	22	of	22
Event Description:		Main Turbine Governor Valves Randomly Oscillate and Ultimately Fail Close, Loss of 4KV Bus 3 with "B" EDG Failure, Locked Rotor on "B" RCP results in total seal stack failure and suction line leak.							
Time	Position	Applicant's Actions or Behavior							

Att. 1	BOP	Check control room ventilation - aligned for pressurization mode (YES) <ul style="list-style-type: none"> <li>• HVA-1A or HVA-1B – Running (YES)</li> <li>• HVE-16 – Stopped (YES)</li> <li>• HVE-19A or HVE-19B – Running (YES)</li> <li>• Control Room HVAC outside air damper A or B – Open (YES)</li> <li>• CR-D1A-SA – Closed (YES)</li> <li>• CR-D1B-SB – Closed (YES)</li> </ul>
Att. 1	BOP	Check DS Bus – Energized (YES)
Att. 1	BOP	Check Battery Chargers – Energized APP-036-D1 – Extinguished (YES) APP-036-D2 – Extinguished (NO, Acknowledge restart of battery chargers within 30 minutes of power loss using OP-601, DC Supply System.)
Att. 1	BOP	Stop R-11/12 Sample Pump
Att. 1	BOP	Locally Reset and Load IACs as necessary (N/A)
Att. 1	BOP	Perform Crew Update to include the following: <ul style="list-style-type: none"> <li>• Attachment Completion</li> <li>• Manual Actions Taken (Started "A" SI pump and closed CVC-200A and CVC-204A/B)</li> <li>• Failed Equipment status ("B" EDG has not started. Battery Charger B/B-1 Trouble Alarm.)</li> <li>• SW status (All available operating)</li> </ul>
	SRO	Contacts WCC SRO or directs BOP to contact WCC SRO to have Maintenance assist with troubleshooting and repair to "B" EDG as top priority.
<b>BOOTH OPERATOR:</b> If dispatched to "B" EDG, wait 10 minutes, and report that the fuel racks were found tripped. Inform control room that the fuel racks have been reset and request to locally start "B" EDG. Once permission granted, execute commands to start "B" EDG IAW SCN file.  If dispatched to close LCV-115C, wait 3 minutes and execute command to close LCV-115C IAW SCN file.		

Op Test No.:	ILC-13 NRC	Scenario #	3	Event #	6 - 12	Page	23	of	23
Event Description:		Main Turbine Governor Valves Randomly Oscillate and Ultimately Fail Close, Loss of 4KV Bus 3 with "B" EDG Failure, Locked Rotor on "B" RCP results in total seal stack failure and suction line leak.							
Time	Position	Applicant's Actions or Behavior							

**End of EOP-E-0 Attachment 1**

**Continuation of EOP-E-0**

	RO	Check AFW Pumps – Running <ul style="list-style-type: none"> <li>a. Motor driven AFW pumps – Both Running (NO, manually starts "A" MDAFW Pump)</li> <li>b. S/G levels – Two S/Gs less than 16% (YES)</li> <li>c. Steam Driven AFW pump steam shutoff valves – ALL OPEN (NO, opens V1-8A/B/C.)</li> </ul> <i>NOTE: SDAFW pump has tripped and will not start. V1-8s will open and eventually re-close.</i>
	RO	Check AFW Valves – Proper Emergency Alignment (YES) <ul style="list-style-type: none"> <li>• AFW header discharge valves – Full Open (YES)</li> <li>• AFW header section valves – Full Open (YES)</li> <li>• Steam driven AFW pump discharge valves – Full open if pump is running. (YES, but should be closed once it is determined that the SDAFW pump has tripped.)</li> </ul>
	RO	Check Total AFW Flow: <ul style="list-style-type: none"> <li>• Reset SI</li> <li>• Control feed flow to maintain NON-faulted S/Gs narrow range level – Between 8% and 50%.</li> <li>• Check total AFW flow- Greater than 300 gpm (YES)</li> </ul>
	RO	Check CV Spray NOT Required: <ul style="list-style-type: none"> <li>a. CV pressure – Has remained less than 10 psig. (YES)</li> <li>b. CV spray – NOT Actuated (YES)</li> </ul>
	RO	Check RCP Seal Cooling: <ul style="list-style-type: none"> <li>• CCW flow to RCP thermal barriers – Normal (YES)               <ul style="list-style-type: none"> <li>○ APP-001-C1 / D1 – Extinguished (YES)</li> </ul> </li> <li>OR</li> <li>• Seal injection flow – Normal (YES)               <ul style="list-style-type: none"> <li>○ Seal injection flow – Greater than 6 gpm per RCP</li> <li>OR</li> <li>○ Thermal barrier ΔPs – Greater than 5 inches water.</li> </ul> </li> </ul>

Op Test No.:	ILC-13 NRC	Scenario #	3	Event #	6 - 12	Page	24	of	24
Event Description:		Main Turbine Governor Valves Randomly Oscillate and Ultimately Fail Close, Loss of 4KV Bus 3 with "B" EDG Failure, Locked Rotor on "B" RCP results in total seal stack failure and suction line leak.							
Time	Position	Applicant's Actions or Behavior							

**BOOTH OPERATOR:** As requested, adjust CVC-297A,B,C as necessary to control RCP seal injection flow using the P&ID function.

**EXAMINER'S NOTE:** During the check RCP parameter's the crew should realize that seal injection flow is extremely high on "B" RCP and nearly zero on "A" and "C" RCP. Further review of RCP parameters should lead the crew to determine that "B" RCP has experience a seal failure. The SRO should direct performance of AOP-018, Reactor Coolant Pump Abnormal Conditions, as manpower permits. AOP-018 Actions are listed at the end of the simulator guide.

**When / IF "B" EDG is restored, the crew will have to take manual actions to start "B" Train ECCS components.**

	RO	<p>Check RCS Temperature</p> <p>With NO RCPs running, RCS cold leg temperatures – Stable at or trending to 547°F (NO, Depending on scenario timeline the RCPs could still be running.)</p> <p>RNO: IF temperature is greater then 547°F AND rising then perform the following: (YES)</p> <ul style="list-style-type: none"> <li>• IF condenser is available, THEN dump steam to condenser:               <ol style="list-style-type: none"> <li>a. Place steam dump mode switch in Steam Pressure mode.</li> <li>b. Adjust steam pressure controller as necessary</li> </ol> </li> <li>OR</li> <li>• Dump steam using S/G steam line PORVs.</li> </ul>
	RO	<p>Check PZR PORVs and Spray Valves:</p> <ol style="list-style-type: none"> <li>a. PORVs – Closed (YES)</li> <li>b. Normal PZR spray valves – Closed (YES)</li> <li>c. Aux spray valve – Closed (YES)</li> </ol>
	RO	<p>Check If RCPs should be stopped:</p> <ol style="list-style-type: none"> <li>a. RCPs – Any Running (NO, stopped per FOLDOUT)</li> </ol> <p>RNO: Go to Step 14</p>
	BOP	<p>Check if S/G Secondary Pressure Boundaries are Intact:</p> <ol style="list-style-type: none"> <li>a. Check pressures in all S/Gs               <ul style="list-style-type: none"> <li>o None lowering in an uncontrolled manner (YES)</li> <li>o None Completely depressurized (YES)</li> </ul> </li> </ol>

Op Test No.:	<u>ILC-13 NRC</u>	Scenario #	<u>3</u>	Event #	<u>6 - 12</u>	Page	<u>25</u>	of	<u>25</u>
Event Description:		Main Turbine Governor Valves Randomly Oscillate and Ultimately Fail Close, Loss of 4KV Bus 3 with "B" EDG Failure, Locked Rotor on "B" RCP results in total seal stack failure and suction line leak.							
Time	Position	Applicant's Actions or Behavior							

	BOP	Check if S/G Tubes are Intact: <ul style="list-style-type: none"> <li>Secondary radiation monitors – Have Remained Normal (YES)               <ul style="list-style-type: none"> <li>R-15</li> <li>R-19s</li> <li>R-31s</li> </ul> </li> <li>S/G levels – None Rising in an Uncontrolled Manner. (YES)</li> </ul>
	RO	Check if RCS is Intact: (NO) <ul style="list-style-type: none"> <li>CV radiation – Normal (NO)               <ul style="list-style-type: none"> <li>R-2</li> <li>R-32A/B</li> </ul> </li> <li>CV pressure – Normal (NO)</li> <li>CV sump level – Normal (NO)</li> </ul> RNO: Reset SPDS and initiate monitoring of CSFSTs. Go to EOP-E-1, Loss of Reactor or Secondary Coolant, Step 1.
<b>Beginning of EOP-E-1</b>		
	CRS	NOTE FOLDOUT for EOP-E-1 is in effect. (None applicable.)
	RO	Check If RCPs should be stopped: <ul style="list-style-type: none"> <li>RCPs – Any Running (NO, stopped per EOP-E-0 FOLDOUT)</li> </ul> RNO: Go to Step 2
	BOP	Check if S/G Secondary Pressure Boundaries are Intact: <ul style="list-style-type: none"> <li>Check pressures in all S/Gs               <ul style="list-style-type: none"> <li>None lowering in an uncontrolled manner (YES)</li> <li>None Completely depressurized (YES)</li> </ul> </li> </ul>
	BOP	<b>Continuous Action Step</b> Check Intact S/G Levels: <ul style="list-style-type: none"> <li>Narrow range levels – Greater than 8% (NO)                RNO: Maintain total feed flow greater than 300 gpm until narrow range level is greater than 8% in at least one S/G.</li> <li>Control feed flow to maintain narrow range levels – between 8% AND 50%</li> </ul>
	RO	Reset SI

Op Test No.:	<u>ILC-13 NRC</u>	Scenario #	<u>3</u>	Event #	<u>6 - 12</u>	Page	<u>26</u>	of	<u>26</u>
Event Description:		Main Turbine Governor Valves Randomly Oscillate and Ultimately Fail Close, Loss of 4KV Bus 3 with "B" EDG Failure, Locked Rotor on "B" RCP results in total seal stack failure and suction line leak.							
Time	Position	Applicant's Actions or Behavior							

	RO	Reset Containment Isolation Phase A
	BOP	Check Secondary Radiation: <ol style="list-style-type: none"> <li>Secondary radiation monitors – Have remained normal (YES)               <ul style="list-style-type: none"> <li>R-15, R-19s, R-31s</li> </ul> </li> <li>Perform the following:               <ol style="list-style-type: none"> <li>Request periodic activity samples of all S/Gs</li> <li>Secondary sample results – Normal (When results available)</li> </ol> </li> </ol>
	RO	<b>Continuous Action Step</b> Check PZR PORVs and Block Valves: <ol style="list-style-type: none"> <li>Power to block valves – Available (YES)</li> <li>PORVs – Closed (YES)</li> <li>Block valves – At least one open. (YES)</li> </ol>
	RO	Establish Instrument Air to CV: <ol style="list-style-type: none"> <li>Check APP-002-F7 – Extinguished (YES)</li> <li>Reset IA PCV-1716</li> <li>Check IA PCV-1716 – OPEN (YES)</li> </ol>
	RO	Check Power Supply to Charging Pumps – Offsite power available (YES)
	RO	Check if Charging Flow has been established: <ol style="list-style-type: none"> <li>Charging pumps – At least one running. (YES)</li> <li>Establish desired charging flow:               <ul style="list-style-type: none"> <li>Start additional pump(s) as necessary</li> <li>Adjust charging pump speed controllers as necessary to establish desired charging flow.</li> <li>Adjust HIC-121 as necessary to establish desired charging flow:                   <ul style="list-style-type: none"> <li>Maintain seal injection flow – Between 6 gpm and 20 gpm per RCP unless seal injection isolated.</li> </ul> </li> </ul> </li> </ol>



Op Test No.:	ILC-13 NRC	Scenario #	3	Event #	6 - 12	Page	27	of	27
Event Description:		Main Turbine Governor Valves Randomly Oscillate and Ultimately Fail Close, Loss of 4KV Bus 3 with "B" EDG Failure, Locked Rotor on "B" RCP results in total seal stack failure and suction line leak.							
Time	Position	Applicant's Actions or Behavior							

**BOOTH OPERATOR:** As requested, adjust CVC-297A,B,C as necessary to control RCP seal injection flow using the P&ID function.

If "B" EDG has not been started AND LCV-115C remains OPEN, check the Charging Pump status under the malfunction screen to see if the Charging Pumps have become gas bound. If gas binding is occurring report to the Control Room that extremely loud metallic noise is emanating from the running Charging Pumps.

**EXAMINER'S NOTE:** During the check RCP parameter's the crew should realize that seal injection flow is extremely high on "B" RCP and nearly zero on "A" and "C" RCP. Further review of RCP parameters should lead the crew to determine that "B" RCP has experience a seal failure. The SRO should direct performance of AOP-018, Reactor Coolant Pump Abnormal Conditions, as manpower permits. AOP-018 Actions are listed at the end of the simulator guide.

If gas binding occurs on the Charging Pumps the Crew should secure all running charging pumps and develop a recovery plan.

**BOOTH OPERATOR:** If requested to close LCV-115C and vent the charging pumps, wait 10 minutes and then execute the restoration of charging pump suction command IAW SCN file.

	RO	<b>Continuous Action Step</b> Check if SI flow should be terminated: a. RCS subcooling base on core exit TCs – Greater than 35°F (NO, Go to Step 12.)
	RO	<b>Continuous Action Step</b> Check if Containment Spray should be stopped: a. Spray pump – Any running (YES) RNO: Observe Caution prior to Step 13 and Go to Step 13.

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Event Description: Main Turbine Governor Valves Randomly Oscillate and Ultimately Fail Close, Loss of 4KV Bus 3 with "B" EDG Failure, Locked Rotor on "B" RCP results in total seal stack failure and suction line leak.

Time	Position	Applicant's Actions or Behavior
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	RO	<p>Check if RHR Pumps Should be Stopped:</p> <ol style="list-style-type: none"> <li>Check RCS pressure: <ol style="list-style-type: none"> <li>Pressure – Greater than 275 psig (YES)</li> <li>Pressure – Stable or Rising (YES)</li> </ol> </li> <li>RHR pumps – Any running with suction aligned to RWST (YES, "A" RHR Pump)</li> <li>Stop RHR pumps (Stops "A" RHR pump)</li> <li>Monitor RCS pressure.</li> </ol>
	RO/BOP	<p>Check RCS and S/G Pressure:</p> <ul style="list-style-type: none"> <li>Check pressure in all S/Gs – Stable OR Rising (YES)</li> <li>Check RCS pressure – Stable OR Lowering</li> </ul>
	BOP	<p>Check if Diesel Generators should be Stopped:</p> <ol style="list-style-type: none"> <li>AC emergency busses – Energized by Offsite Power <ul style="list-style-type: none"> <li>E-1 (YES)</li> </ul> </li> <li>EDG starting air annunciator – Extinguished (APP-010-B2) (YES)</li> <li>Stop unloaded EDG. (Stops "A" EDG) <ul style="list-style-type: none"> <li>E-2 (NO)</li> </ul> </li> </ol> <p>RNO (for E-2 being deenergized): Perform the following: (For "B" EDG)</p> <ol style="list-style-type: none"> <li>Try to restore offsite power to AC emergency busses.</li> <li>IF any AC emergency bus is NOT energized, THEN try to restore power to affected bus from the EDG. (Crew should dispatch personnel to attempt to repair and/or start "B" EDG, if not already performed.</li> <li>Locally load the following on AC emergency buss(es) as necessary: <ul style="list-style-type: none"> <li>Instrument Air compressor after reset.</li> <li>Battery chargers.</li> </ul> </li> <li>IF DS bus in NOT energized, THEN place DSDG in service (DS bus is energized.)</li> <li>Implement Supplement S, EDG Monitoring, while continuing with this procedure. (Not applicable until "B" EDG is started.)</li> <li>Verify emergency oil pump is running (YES)</li> <li>Locally verify air side seal oil backup pump is running. (YES)</li> </ol>
<b>BOOTH OPERATOR: If requested to verify air side seal oil backup pump running, wait 3 minutes and report to control room that it is running.</b>		

Op Test No.: ILC-13 NRC Scenario # 3 Event # 6 - 12 Page 29 of 29

Event Description: Main Turbine Governor Valves Randomly Oscillate and Ultimately Fail Close, Loss of 4KV Bus 3 with "B" EDG Failure, Locked Rotor on "B" RCP results in total seal stack failure and suction line leak.

Time	Position	Applicant's Actions or Behavior
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	RO	<p>Initiate Evaluation of Plant Status:</p> <ol style="list-style-type: none"> <li>Check Cold leg recirculation capability: <ul style="list-style-type: none"> <li>Train A and Train B:</li> <li>IF "B" EDG still OOS – Crew determines on Train "A" is available.</li> <li>IF "B" EDG has been restored – Crew determine that both Train "A" and Train "B" is available.</li> </ul> </li> <li>Check auxiliary building radiation – NORMAL (YES)</li> <li>Contact Chemistry to obtain samples for RCS boron and activity and CV atmosphere.</li> <li>Evaluate plant equipment to support long term recovery as necessary: <ul style="list-style-type: none"> <li>RHR pumps (both available)</li> <li>SI pumps (both running)</li> <li>CV spray pumps (both available)</li> <li>CV fans (three running)</li> <li>AFW pumps (both MDAFW pumps available)</li> <li>SW system (all SWPs and SWBPs available)</li> <li>CCW system (two available)</li> <li>IVSW system (system in service)</li> <li>EDG fuel and auxiliaries. ("A" EDG available and "B" EDG running)</li> </ul> </li> <li>Start / align plant equipment to assist in recovery as necessary: <ul style="list-style-type: none"> <li>Aux. Boiler</li> <li>Other plant equipment needed during cooldown to cold shutdown.</li> </ul> </li> </ol>
<b>BOOTH OPERATOR: Acknowledge direction to start Auxiliary Boilers. Take no actions.</b>		
	RO	<p>Check if RCS cooldown and depressurization if required:</p> <ol style="list-style-type: none"> <li>RCS pressure – Greater than 275 psig. (YES)</li> <li>Reset SPDS and Go to EPP-8, Post LOCA Cooldown and Depressurization, Step 1.</li> </ol>
	SRO	Open Foldout B (None applicable.)

Op Test No.:	ILC-13 NRC	Scenario #	3	Event #	6 - 12	Page	30	of	30
Event Description:		Main Turbine Governor Valves Randomly Oscillate and Ultimately Fail Close, Loss of 4KV Bus 3 with "B" EDG Failure, Locked Rotor on "B" RCP results in total seal stack failure and suction line leak.							
Time	Position	Applicant's Actions or Behavior							

	RO	<b>Continuous Action Step</b> Determine if RHR Pumps should be stopped: <ul style="list-style-type: none"> <li>a. Check RCS pressure greater than 275 psig and stable or increasing (YES)</li> <li>b. Verify RHR Pumps – Stopped (YES)</li> <li>c. Check RCS pressure – less than 275 psig (NO)</li> </ul> RNO: IF RCS pressure decreases below 275 psig during this procedure, THEN restart RHR pumps. Go to Step 3.
	BOP	Check Emergency Busses – Any Energized by Emergency Diesel (YES, E-2 powered from "B" EDG if personnel dispatched to start.)
	RO/BOP	Perform the following: <ul style="list-style-type: none"> <li>a. Verify each running EDG has loaded required equipment: <ul style="list-style-type: none"> <li>• MDAFW Pump (Verifies "B" MDAFW pump available or running.)</li> <li>• CCW pump ("C" CCW pump is OOS)</li> <li>• SW pump (Verifies "C" and "D" SWPs are running.)</li> <li>• SW Booster Pump (Verifies "B" SWBP is running.)</li> </ul> </li> <li>b. Verify EDG capacity using Supplement F and load the following equipment on the EDG: <ul style="list-style-type: none"> <li>• Charging Pumps (Verifies "C" Charging Pump running.)</li> <li>• Instrument Air Compressor (If not already accomplished, dispatches an operator to reset and start "B" IAC)</li> </ul> </li> <li>c. Check Battery Chargers – In Service: <ul style="list-style-type: none"> <li>• APP-036-D1 – Extinguished (YES)</li> <li>• APP-036-D2 – Extinguished (YES, if E-2 powered from "B" EDG)</li> </ul> </li> <li>d. Check PZR Heaters – Power Available (YES)</li> </ul>
<b>BOOTH OPERATOR: When dispatched, wait 3 minutes and reset and start "B" IAC IAW SCN file.</b>		

Op Test No.:	ILC-13 NRC	Scenario #	3	Event #	6 - 12	Page	31	of	31
Event Description:		Main Turbine Governor Valves Randomly Oscillate and Ultimately Fail Close, Loss of 4KV Bus 3 with "B" EDG Failure, Locked Rotor on "B" RCP results in total seal stack failure and suction line leak.							
Time	Position	Applicant's Actions or Behavior							

	BOP	<p>Check all Non-emergency AC Busses – Energized by Offsite Power. (NO, E-2 energized by "B" EDG)</p> <p>RNO:</p> <ol style="list-style-type: none"> <li>Verify one of the following pumps are running: <ul style="list-style-type: none"> <li>Turning gear oil pump OR Emerg Oil Pump (YES)</li> </ul> </li> <li>Verify one of the following pumps are running: Seal Oil Backup Pump or Air Side Seal Oil Backup Pump (YES)</li> <li>Determine the cause of the loss of offsite power. IF due to a failure within the plant, THEN restore power using OP-603, Electrical Distribution, after repairs are completed. (YES, breaker 52/17 tripped on over-current.)</li> </ol>
<b>BOOTH OPERATOR: If requested, state that Electrical technicians are working with the Planner and Engineering to determine the appropriate course of action to restore breaker 52/17.</b>		
	RO	<p>Establish Charging flow as follows:</p> <ol style="list-style-type: none"> <li>Check Charging Pumps – All Stopped (NO, go to step 6.h.)</li> <li>Verify charging flow on FI-122A – Greater than 35 gpm. (YES)</li> </ol>
	RO	<p>Align Charging Pump Suction to RWST as follows:</p> <ol style="list-style-type: none"> <li>From the RTGB, verify LCV-115B – OPEN (YES)</li> <li>Verify LCV-115C – CLOSED (If "B" EDG still OOS, then an operator will have to be dispatched to locally close LCV-115C. If this is the case then most likely the Charging Pumps will be gas bound.)</li> <li>Start all available charging pumps. (Verifies all available charging pumps are running.)</li> <li>Increase running Charging Pumps speed to maximum.</li> <li>Verify maximum charging flow on FI-122A. (YES)</li> </ol>
	BOP	<p>Control Intact S/G Levels As follows:</p> <ol style="list-style-type: none"> <li>Check intact S/G levels – Greater than 8%. (YES)</li> <li>Control feed flow to maintain intact S/G levels between 8% and 50%.</li> <li>Check intact S/G levels – Any increasing in an uncontrolled manner. (NO)</li> </ol> <p>RNO: Go to step 9.</p>
	RO/BOP	Contact Chemistry to Obtain periodic Boron Samples of the RCS and Pressurizer.

Op Test No.:	ILC-13 NRC	Scenario #	3	Event #	6 - 12	Page	32	of	32
Event Description:		Main Turbine Governor Valves Randomly Oscillate and Ultimately Fail Close, Loss of 4KV Bus 3 with "B" EDG Failure, Locked Rotor on "B" RCP results in total seal stack failure and suction line leak.							
Time	Position	Applicant's Actions or Behavior							

	RO	Check boron sample results – Available (NO, go to step 11.)
<b>BOOTH OPERATOR: When contacted as Chemistry for boron sample results, report that the technician is in route to obtain the sample. Expect results within the hour.</b>		
	BOP	Initiate RCS Cooldown to cold shutdown as follows: <ol style="list-style-type: none"> <li>Maintain cooldown rate in RCS cold legs less than 100°F/hr in the last 60 minutes.</li> <li>Maintain RCS temperature and pressure within limits of curve 3.4, Reactor Coolant System Pressure – Temperature limitation for cooldown.</li> <li>Check steam dump to condenser – Available (NO) RNO: Dump steam from intact S/Gs using Steam Line PORVs. Go to step 12.</li> </ol>
	RO	Check RCS Hot Leg Temperatures – Less than 543°F (YES)
	BOP	Check Steam Dump to Condenser – Available (NO) RNO: Continue RCS cooldown using Steam Line PORVs. Go to Step 14.
	RO	Defeat Low Tavg Safety Injection Signal as follows: <ol style="list-style-type: none"> <li>Momentarily place Safety Injection T-avg Selector Switch to BLOCK position.</li> <li>Verify Lo Temp Safety Injection Blocked status light – Illuminated. (YES)</li> </ol>
	RO	Check RCS Pressure – Less than 1950 psig. (YES)
	RO	Defeat Low Pressure Safety Injection Signal as follows: <ol style="list-style-type: none"> <li>Momentarily place Pzr Press/HI Stm Line DP Switch to BLOCK position.</li> <li>Verify Lo Press Safety Injection Blocked status light – Illuminated. (YES)</li> </ol>
	RO	Check RCS Subcooling – Greater than 35°F (YES)

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Event Description: Main Turbine Governor Valves Randomly Oscillate and Ultimately Fail Close, Loss of 4KV Bus 3 with "B" EDG Failure, Locked Rotor on "B" RCP results in total seal stack failure and suction line leak.

Time	Position	Applicant's Actions or Behavior
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	RO	Check SI and RHR Pump status: <ul style="list-style-type: none"> <li>SI Pumps – Any running (YES)</li> </ul> OR <ul style="list-style-type: none"> <li>RHR Pumps – Any running in Lo Head Injection Mode. (NO)</li> </ul>
	RO	Determine PZR Heater Status: <ul style="list-style-type: none"> <li>a. Check RCS Leak Location – Known to be PZR (NO, go to step 20)</li> </ul>
	RO	<b>Continuous Action Step</b> Check PZR Level – Greater than 73% (NO) RNO: Place all PZR Heaters in OFF IF PZR level increases above 73%, THEN energize PZR heaters to maintain steam bubble. Go to step 22.
	RO	<b>Continuous Action Step</b> Depressurize RCS to Refill PZR as Follows: <ul style="list-style-type: none"> <li>a. Check PZR level – Less than 27% (YES)</li> <li>b. Use normal PZR spray to depressurize the RCS (NO, RCPs secured.) RNO: Use one PZR PORV</li> <li>c. Check PZR level – Greater than 27% (NO) RNO: WHEN PZR level greater than 27%, THEN stop RCS depressurization. Go to step 23.</li> </ul>
	RO	Check RCP Status – ALL STOPPED (YES)
<b>The Chief Examiner may terminate the scenario at his discretion or once RCS Cooldown and/or RCS Depressurization has commenced in accordance with EPP-8.</b>		

Op Test No.:	ILC-13 NRC	Scenario #	3	Event #	8	Page	34	of	34
Event Description:		AOP-018 Steps to Address Total Seal Stack Failure of "B" RCP							
Time	Position	Applicant's Actions or Behavior							

AOP-018 – RCP Abnormal Conditions		
<b>EXAMINER'S NOTE:</b> AOP-018 will be entered once it is determined by the crew that a seal failure has occurred on "B" RCP. AOP-018 is a concurrent AOP and should be performed while in the EOP Network.		
	RO / BOP	Determines that Section A, RCP Seal Failure is applicable.
	RO / BOP	<b>Continuous Action Step</b> Check any RCP #1 Seal Leakoff Flow – Greater than 5.7 GPM (YES)
	RO / BOP	Check Either of the following conditions exist: <ul style="list-style-type: none"> <li>RCP#1 Seal Leakoff flow on Unaffected RCP – Reduced (YES)</li> </ul> OR <ul style="list-style-type: none"> <li>RCP Thermal Barrier <math>\Delta P</math> on affected RCP – Reduced (YES)</li> </ul>
	RO / BOP	Check Plant Status – Mode 1 OR Mode 2 (NO) RNO: Stop the affected RCP (Verified stopped. Go to step 5)
	RO / BOP	Check Time Elapsed Since Stopping the Affected RCPs – Greater than 3 minutes (YES)
	RO / BOP	Close CVC-303B, Seal Leakoff Valve
	RO / BOP	Check SI – Actuated (YES)
	RO / BOP	<b>Continuous Action Step</b> Establish Instrument Air to CV as follows: <ol style="list-style-type: none"> <li>Check APP-002-F2 – Extinguished (YES)</li> <li>Reset Safety Injection</li> <li>Reset Containment Isolation Phase A</li> <li>Momentarily place IA PCV-1716, to RESET position.</li> <li>Check PCV-1716 - OPEN</li> </ol>
	RO / BOP	Go to Step 30
	RO / BOP	Check RCP(s) B OR C – Running (NO, Go to Step 33)
	RO / BOP	Check RCP Seal Injection Flow – Between 8 gpm and 13 gpm (NO) RNO: Locally throttle CVC-297A/B/C to obtain flow to each RCP between 6 gpm to 20 gpm. IF required to maintain minimum flow, THEN throttle HIC-121, Charging Flow Valve, while maintaining Charging Pump Discharge pressure less than 2500 psig.



Op Test No.:	ILC-13 NRC	Scenario #	3	Event #	8	Page	35	of	35
Event Description:		AOP-018 Steps to Address Total Seal Stack Failure of "B" RCP							
Time	Position	Applicant's Actions or Behavior							

<b>BOOTH OPERATOR: As requested, adjust CVC-297A,B,C as necessary to control RCP seal injection flow using the P&amp;ID function.</b>		
	RO / BOP	Check FCV-626 – Closed (NO, go to step 40)
	RO / BOP	Review OP-101, RCS and RCP Startup and Operation, Precautions and Limitations Relating to RCP Number 1 Seal Leakoff Flow and Take Appropriate Actions. (No actions required.)
	RO / BOP	Implement the EALs (Informs SRO of EALs)
	RO / BOP	Refer to ITS
	RO / BOP	Go to Main Body, Step 2.

## ILC-13 NRC SCENARIO 3 TURNOVER SHEET

### 1. INITIAL CONDITIONS

- a) Time in Core Life: EOL
- b) Reactor Power: 100%
- c) Turbine Load: 751.7 MWe
- d) Boron Concentration: 96 ppm
- e) Rod Height: 218 CBD
- f) RCS Pressure: 2235 psig
- g) RCS Level: 53.2 %
- h) Xenon: Equilibrium

### 2. TECHNICAL SPECIFICATION LCO ACTIONS STATEMENTS IN EFFECT

<u>T.S. #</u>	<u>Description</u>
3.7.6 Cond. A	Restore required CCW train to Operable status within 72 hours.
3.6.6 Cond. C	Restore containment cooling train to Operable status within 7 days AND 10 days from discovery of failure to meet the LCO.

### 3. CLEARANCES IN EFFECT

- a) "C" CCW OOS for mechanical seal repair. OOS for 6 hours with estimated RTS in 24 hours.
- b) HVH-4 OOS for abnormal motor vibrations. OOS for 24 hours. Available for emergency use only.

### 4. CAUTION CAPS IN EFFECT

- a) None

### 5. PROTECTED EQUIPMENT

- a) "A" and "B" CCW Pumps, "A" and "B" CCW Pump RTGB Control Switches, "A" CCW Pump Breaker 480V-DS 52/34B and "B" CCW Pump Breaker 480V-E1 52/22C.

### 6. DEGRADED EQUIPMENT

- a) None

### 7. SWITCHYARD ACCESS

- a) Unrestricted

### 8. PLANNED EVOLUTIONS

- a) Maintain current power level

### 9. TURNOVER INFORMATION

- a) No additional information.

### 10. REACTIVITY INFORMATION

- a) Review the OST-947 MOL charts for BA and PW additions

### 11. RISK

- a) GREEN

Facility:	HB ROBINSON		Scenario No.:	4	Op Test No.:	ILC-13
Examiners:	_____		Operators:	CRS -		
	_____			RO -		
	_____			BOP -		
Initial Conditions:						
<ul style="list-style-type: none"> <li>• 10E-8 amps, EOL, 15,697 MWD/MTU, 513 PPM Boron.</li> <li>• No equipment out of service.</li> </ul>						
Turnover:						
<ul style="list-style-type: none"> <li>• Startup in progress in accordance with GP-003, Step 8.4. Raise Power to the POAH and stabilize power until relieved by on-coming crew.</li> </ul>						
Critical Task:						
<ul style="list-style-type: none"> <li>• Manually Trip the reactor.</li> <li>• Establish Containment Isolation.</li> <li>• Isolate "A" Steam Generator in accordance with EOP-E-3.</li> <li>• Restart ECCS equipment after loss of off-site power.</li> <li>• Establish Auxiliary Feedwater</li> </ul>						
Event No.	Malf. No.	Event Type*	Event Description			
1		(R) RO, (N) CRS	Withdraw Rods to the Point of Adding Heat			
2		(I) RO, CRS (TS) CRS	PT-445 fails High with PCV-456 failing to fully close			
3		(C) BOP, CRS (TS) CRS	SW Break at Suction of "A" SWBP			
4		(C) RO, CRS	"B" RCP Thermal Barrier leak / FCV-626 failure			
5		(C) RO, CRS	"A" S/G Tube Leak			
6		(M) ALL	"A" S/G Tube Rupture			
7		RO	Failure of Automatic Rx Trip and Right Hand Rx Trip Button			
8		(M) ALL	Loss of Startup Transformer			
9		BOP	MDAFW Pump Motor Operated Discharge Valves fail to Auto-Open (V2-16s)			
10		BOP	Feed Regulating Bypass Valves fail to close on Phase A.			
11		BOP	SDAFW Pump Steam Supply Valves (V1-8s) fail to Auto-Open on Loss of Startup Transformer			
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor						

**ILC-13 NRC SCENARIO 4 SUMMARY DESCRIPTION**

The crew will assume the watch with the plant at 10E-8 amps performing a plant startup in accordance with GP-003, Normal Plant Startup from Hot Shutdown to Critical. The crew will continue with GP-003 at Step 8.4, Post Critical Operations, and withdraw control rods to the Point of Adding Heat and then stabilize Reactor Power between 3% and 5%. Once the Chief Examiner is satisfied with the crew's actions to stabilize reactor power, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, PT-445, Pressurizer Pressure Transmitter, fails High. The crew will perform the immediate actions of AOP-025, RTGB Instrument Failure, Section C, and attempt to close PCV-456, PZR PORV. PCV-456 will fail to fully close and the operator will take manual action to close the PORV Block Valve. Once the PORV Block Valve is closed PZR Pressure will automatically recover to normal band. Due to the failure of PCV-456 to fully close the CRS will determine that ITS LCO 3.4.11, Condition B, is applicable due to one PORV inoperable and not capable of being manually cycled. This LCO requires that the block valve be closed within 1 hour and power removed from the associated block valve within 1 hour and restore PORV to operable status within 72 hours. Once the Chief Examiner is satisfied with the crew's actions to control PZR Pressure and Tech Spec compliance, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, a Service Water Break will occur at the Suction of "A" SWBP. The crew will implement AOP-022, Loss of Service Water, Section D, for Leak on South Service Water Header Downstream of Check Valve SW-545. The crew will perform required valve and Service Water Booster Pump manipulations from the RTGB and direct field actions in accordance with AOP-022 attachments to isolate the ruptured section of Service Water piping and restore various components to operable status. The Service Water Break will result in entry into ITS LCO 3.7.5, Condition C, due to Service Water supply to AFW system being inoperable and requires that the plant be in Mode 3 in 6 hours and Mode 4 in 18 hours without reliance on steam generator for heat removal. ITS LCO 3.7.7, Condition A, is also applicable due to one Service Water train inoperable and requires that the train be restored to operable status within 72 hours or be in Mode 3 in 6 hours and Mode 5 in 36 hours. Once the Chief Examiner is satisfied with the crew's actions and Tech Spec compliance, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, "B" RCP will experience a 40 gpm thermal barrier leak. This will be identified by a rising trend and alarm on R-17, rising CCW surge tank level, and RCP thermal barrier cooling water high flow alarm. FCV-626, Thermal Barrier Flow Control, will receive the signal to auto-close, however the breaker to the MOV will trip leaving the valve in mid-position. The crew will take action to close CC-735, Thermal Barrier Outlet Isolation, from the RTGB due to the FCV-626 failure. Once the Chief Examiner is satisfied with the crew's actions, the Chief Examiner will cue the next event.

On cue from the Chief Examiner, a 300 gpm tube leak on "A" S/G will be ramped over a six minute time period. The crew will enter AOP-035, S/G Tube Leak, and attempt to control pressurizer level. Ultimately the crew will determine that the leak is greater than the capacity of available charging pumps and initiate a reactor trip and safety injection. The reactor will not trip on an automatic signal or by depressing the right hand reactor trip pushbutton. The RO will identify this failure and trip the reactor by depressing the left hand reactor trip pushbutton. On the initiation of the Reactor Trip the S/G tube leak will degrade to 1000 gpm. On initiation of the

Safety Injection the Feedwater Regulating Bypass Valves will fail to close on the Phase A signal. The BOP will take manual action to adjust the individual valve's potentiometer on the RTGB to close the valves. Additionally, the Motor Driven Feedwater Pumps Discharge Valves will fail to Auto-Open. This failure will be identified, but the crew may determine it not necessary to open the valves until needed due to adequate S/G levels present at the onset of the major event. The crew will carry out the actions of EOP-E-0, Reactor Trip or Safety Injection, identifying the conditions noted above and stabilizing the plant. The crew will transition from EOP-E-0 to EOP-E-3, Steam Generator Tube Rupture. Once "A" S/G has been isolated and an operator dispatched to de-energize the associated AFW valves the plant will experience a loss of off-site power. On the loss of off-site power, the Main Steam Supply valves to the Steam Driven AFW Pump will fail to open. The crew will take required actions to restart safeguards equipment since SI would have been reset at this point in the EOP Network. After safeguards equipment has been restarted the crew will perform an RCS cooldown and depressurization to stop the primary to secondary leakage. The crew will be required to either open the MDAFW Pump Motor Operated Discharge Valves (V2-16s) or manually start the SDAFW pump to provide AFW flow during the RCS cooldown. Once the primary to secondary leakage is stopped, both safety injection pumps will be secured.

The Chief Examiner may terminate the scenario at any time after the safety injection pumps have been secured in accordance with EOP-E-3, or at his discretion.

**ILC-13 NRC SCENARIO 4 SIMULATOR SETUP****IC/SETUP:**

- IC-19, SCN 006\_ILC\_13\_NRC\_4.
- Status board is provided to crew is IC-19.

**PRE-LOADED EVENTS:**

The following events should occur on the reactor trip or triggered events following the reactor trip:

- Event 7: Failure of Automatic Rx Trip and Right Hand Rx Trip Button
- Event 8: Loss of Startup Transformer
- Event 9: MDAFW Pump Motor Operated Discharge Valves fail to Auto-Open (V2-16s)
- Event 10: Feed Regulating Bypass Valves fail to close on Phase A.
- Event 11: SDAFW Pump Steam Supply Valves (V1-8s) fail to Auto-Open on Loss of Startup Transformer

**EVENTS/TRIGGERS INITIATED DURING THE SCENARIO:**

- Event 1: Withdraw Rods to the Point of Adding Heat
- Event 2: PT-445 fails High with PCV-456 failing to fully close
- Event 3: SW Break at Suction of "A" SWBP
- Event 4: "B" RCP Thermal Barrier leak / FCV-626 failure
- Event 5: "A" S/G Tube Leak
- Event 6: "A" S/G Tube Rupture

**EXPECTED PROCEDURE FLOWPATH OR COPIES NEEDED:**

- GP-003
- AOP-025, Section C
- AOP-022
- AOP-014
- AOP-035
- EOP-E-0
- Supplement M
- EOP-E-3

Op Test No.:	ILC-13 NRC	Scenario #	4	Event #	1	Page	5	of	5
Event Description:		Withdraw Rods to the Point of Adding Heat							
Time	Position	Applicant's Actions or Behavior							

**BOOTH OPERATOR: No actions required.**

**EVENT INDICATIONS:**

**Not applicable.**

**EXAMINER'S NOTE:** The crew will assume the watch with the Reactor at 10E-8 amps performing a plant startup in accordance with GP-003. The crew should be given adequate time to brief the evolution prior to entering the simulator. The crew will start at Section 8.4, Step 8.4.7.

	SRO	Performs brief on Identification of reaching the POAH, startup rate limitations and maximum power limit of 5%.
	RO	Adjust Control Rod position as necessary to establish a positive SUR and raise reactor power to the POAH.

**EXAMINER'S NOTE:**

The crew will monitor for indications of the Point of Adding Heat (POAH) which are as follows:

- The POAH is that power level identified b NO control rod motion and:
- IF MTC is negative, then SUR will be lowering
- Onset of RCS temperature rise, Onset of PZR pressure rise, Onset PZR level rise.
- Reduction in AUTO Charging Pump speed demand.
- Rising indication of AUTO Steam Dump demand on PC-464B, Steam Header Pressure, when Steam Dumps are being used for RCS Temperature Control.
- Small rise in Steam Generator Steam Flow.

	RO	Adjust control rods as necessary to achieve the following while continuing with this procedure: <ul style="list-style-type: none"> <li>• RCS Tavg between 547°F and 551°F</li> <li>• Reactor Power 3% to less than or equal to 5%.</li> </ul>
	SRO	When Reactor power is greater than 1%, then notify Reactor Engineering to commence logging data required by EST-067.
	BOP	Controlling S/G levels by adjusting the Feed Regulating Valve Bypass Valves.

**EXAMINER'S NOTE:** If Reactor Power rises above 5% the Crew should declare the plant in Mode 1 and update ERFIS.

**BOOTH OPERATOR:** Insert Event #2 (PT-445 fails HIGH with PCV-456 failing to fully close) on cue from the Chief Examiner.

Op Test No.:	ILC-13 NRC	Scenario #	4	Event #	2	Page	6	of	6
Event Description:		PT-445 fails HIGH with PCV-456 failing to fully close							
Time	Position	Applicant's Actions or Behavior							

**BOOTH OPERATOR:** At the discretion of the Examiner, insert Event 2, PT-445 fails HIGH with PCV-456 failing to fully close

**EVENT INDICATIONS:**

APP-003-C3, PRT HI PRESS

APP-003-D6, PZR PORV / SAFETY VLV OPEN

APP-003-D8, PZR CONTROL HI/LO PRESS

PT-445 indication rising to high limit of gauge.

PCV-456 RTGB indication RED open light illuminates.

Pressurizer Pressure lowering.

Pressurizer Control Bank Heaters energize.

	RO	<b>Immediate Action Step</b> Determine If PZR PORVs Should Be Closed: <ul style="list-style-type: none"> <li>• Check PZR pressure - LESS THAN 2335 PSIG (YES)</li> <li>• Verify Both PZR PORVs - CLOSED (NO, PCV-456 has failed at mid-position)</li> </ul> RNO: IF any PZR PORV can NOT be closed, THEN close its PORV BLOCK Valve. (Closes RC-535, PORV BLOCK)
	RO	<b>Immediate Action Step</b> Control The PZR SPRAY VALVES AND PZR Heaters To Restore RCS Pressure To The Desired Control Band (RO should allow PC-444J to control pressure in AUTO, unless controller needs to be unsaturated due to possible overshoot while restoring pressure.)
	SRO	Enters AOP-025, RTGB Instrument Failure, Section C, Pressurizer Pressure Transmitter Failure, and verifies immediate actions.
	CREW	Make PA Announcement for Procedure Entry
	RO	Check PT-444 – Failed Transmitter (NO) RNO: IF PT-445 has failed, then go to step 7. (YES)
	RO	Verify Selector Switch PM-444 – Selected to the Operable Channel – REC 444 (YES, no action required.)



Op Test No.:	<u>ILC-13 NRC</u>	Scenario #	<u>4</u>	Event #	<u>2</u>	Page	<u>7</u>	of	<u>7</u>
Event Description:		PT-445 fails HIGH with PCV-456 failing to fully close							
Time	Position	Applicant's Actions or Behavior							

	SRO	<p>Check the following ITS LCOs for applicability:</p> <p>ITS 3.3.4 – Not applicable since the required number of channels (1) remain operable.</p> <p>ITS 3.4.1 – Not applicable since the plant is in Mode 2. However, if reactor power has increased above 5% then ITS 3.4.1 will be applicable and Condition A entered if PZR Pressure is lowered below 2205 psig. One or more RCS DNB parameters not within limits – Restore RCS DNB parameters to within limit within 2 hours, will be entered if PZR Pressure lowered to less than 2205 psig.</p> <p>ITS 3.4.11 – ITS LCO 3.4.11, Condition B will be entered due to one PORV inoperable and not capable of being manually cycled. The LCO requires that the block valve be closed with 1 hour and remove power from associated block valve in 1 hour and restore PORV to operable status within 72 hours.</p>
	SRO	<p>Informs WCC SRO of the Inoperable PZR PORV and requests a W/R be initiated and Maintenance contacted to being planning for troubleshooting and repair. Directs WCC SRO to dispatch an AO to open the breaker for RC-535 and prepare and install a clearance to maintain power removed.</p>
<b>BOOTH OPERATOR: If / When contacted as WCC SRO, acknowledge the request to initiate a W/R for RC-535 , contacting Maintenance and dispatching an AO to open the breaker for RC-535. Wait 5 minutes and the open the breaker for RC-535 IAW SCN file.</b>		
	SRO	Go to Procedure Main Body, Step 2.
	CRS	Implement the EALs
	CRS	Return to Procedure and Step in Effect
<b>BOOTH OPERATOR: Insert Event #3 (Service Water Break at Suction of "A" SWBP) on cue from the Chief Examiner.</b>		

Op Test No.: ILC-13 NRC Scenario # 4 Event # 3 Page 8 of 8

Event Description: Service Water Break at Suction of "A" SWBP

Time	Position	Applicant's Actions or Behavior
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**BOOTH OPERATOR: At the discretion of the Examiner, insert Event 3, Service Water Break at Suction of "A" SWBP****EVENT INDICATIONS:****APP-035-H1 – WDBRP Trouble****APP-008-F7 – SOUTH SW HDR LO PRESS****APP-008-F8 – NORTH SW HDR LO PRESS**

APP-008-F7	BOP	Recognizes no SW Pump has tripped and determines that a rupture in a SW Header has occurred and informs the SRO to refer to AOP-022.
	BOP	<b>Immediate Action Step</b> Check the following Alarms Extinguished <ul style="list-style-type: none"> <li>• APP-008-E7, S SW HDR STRAINER PIT HI LEVEL (YES)</li> <li>• APP-008-E8, N SW HDR STRAINER PIT HI LEVEL (YES)</li> </ul>
	BOP	<b>Continuous Action Step</b> Check SW – Any Available (YES)
	CREW	Make PA Announcement for Procedure Entry
	BOP	Check Leak Location – Identified (NO, unless determine in Auxiliary Building based on WDBRP Trouble alarm.) RNO: Perform local inspections as necessary to determine leak location. (Dispatches Inside AO to inspect the Auxiliary Building to determine leak location.)
<b>BOOTH OPERATOR: Once dispatched to inspect Auxiliary Building, wait 1 minute and then contact the control room and inform them that a Service Water Break has occurred at the Suction of "A" SWBP. Water level in Auxiliary Building Hallway is approximately one inch.</b>		
	SRO	Perform appropriate section for leak location: South Service Water Header Downstream of Check Valve SW-545 – Section D
	BOP	Close V6-12A to isolate the Service Water Header
	BOP	Close V6-16B to isolate the Turbine Building from the affected Service Water Header.

Op Test No.: ILC-13 NRC Scenario # 4 Event # 3 Page 9 of 9

Event Description: Service Water Break at Suction of "A" SWBP

Time	Position	Applicant's Actions or Behavior
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	BOP	Verify the following valves OPEN: (YES) <ul style="list-style-type: none"> <li>• V6-12D</li> <li>• V6-12B</li> <li>• V6-12C</li> <li>• V6-16A</li> <li>• V6-16C</li> </ul>
	BOP	<b>Continuous Action Step</b> Verify the following SW Booster Pump alignment: SW Booster Pump B – Running (YES) SW Booster Pump A – Stopped (YES)
	SRO	Perform Attachment 7 while continuing with this procedure. (Crew dispatches an AO to perform Attachment 7.)
<b>BOOTH OPERATOR:</b> When requested Attachment 7 in accordance with the following timeline in minutes from the time contacted: <ul style="list-style-type: none"> <li>• T+3 – Perform steps 1 and 2 IAW SCN file and contact Control Room IAW Step 3.</li> <li>• T+4 – Perform step 4 IAW SCN file</li> <li>• T+6 – Perform RNO for step 9 IAW SCN file and contact Control Room IAW RNO step 9.</li> <li>• T+10 – Perform Step 12 IAW SCN file.</li> <li>• T+11 – Contact the Control Room and inform them that Att. 7 is complete and that SW has been Cross-Connected to supply the following equipment: EDG A, IAC A, SAC, HVH-6A, HVH-8A</li> </ul>		
	RO	Determine if actions for Auxiliary Building Flooding are necessary as follows: Check for any of the following indications of flooding: <ul style="list-style-type: none"> <li>• Water level on Auxiliary Building first floor – Greater than 6 inches by local indication (NO)</li> <li><u>OR</u></li> <li>• APP-001-E4 – Illuminated (NO)</li> <li><u>OR</u></li> <li>• APP-001-E5 – Illuminated (NO)</li> </ul> RNO: Go to Step 7
<b>BOOTH OPERATOR:</b> If contacted with regard to water level on Auxiliary Building first floor, report that level is still at approximately one inch.		
	BOP	Verify the following equipment – Stopped: (YES) <ul style="list-style-type: none"> <li>• EDG A</li> <li>• MDAFW Pump A</li> </ul>

Op Test No.: ILC-13 NRC Scenario # 4 Event # 3 Page 10 of 10

Event Description: Service Water Break at Suction of "A" SWBP

Time	Position	Applicant's Actions or Behavior
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	BOP	Verify the following Valves at the Intake Structure – Closed <ul style="list-style-type: none"> <li>• SW-187</li> <li>• SW-851</li> <li>• SW-857</li> </ul>
<b>BOOTH OPERATOR: When directed to close the above valves, wait 10 minutes and close valves IAW SCN file and report status to control room.</b>		
	BOP	Check Circulating Water Pump Status – Any running (YES)
	BOP	Check SW-187 – Closed (NO, not until 10 minutes after being dispatched as noted above in BOOTH OPERATOR notes.) RNO: When SW-187 is closed, then perform step 11. Go to step 12.
	BOP	Step 11 (To be completed once SW-187 reported as closed.) Determine if adequate seal water is available to circulating water pumps as follows: APP-008-E4 – Extinguished (YES) APP-008-E5 – Extinguished (YES) APP-008-E6 – Extinguished (YES)
	SRO	Check Steps 1 and 2 Complete (YES, depending on timeline.)
	BOP	Check N. SW Header Press. on PI-1616 – Greater than 40 psig (YES)
	RO	Determine Maximum allowable CCW temperature as follows: Check RCS temperature – Less than or equal to 350°F (NO) RNO: Maintain CCW Heat Exchanger outlet temperature indicated on TI-607 less than or equal to 105°F. Go to step 15.
	SRO	Check Step 11 of Att. 7 – Complete (YES, depending on timeline.)
	BOP	Determine if a SW Booster Pump should be started: Check SWBPs – All stopped (NO) RNO: Verify one SWBP is running (YES, go to step 17.)
	BOP	Check Service Water Cooling from SI pumps to drain header – Flow Observed. (YES, once report received from AO.)
<b>BOOTH OPERATOR: When directed to determine if adequate flow is observed from SI pumps to drain header, wait 2 minutes and report that adequate flow was observed.</b>		

Op Test No.: ILC-13 NRC Scenario # 4 Event # 3 Page 11 of 11

Event Description: Service Water Break at Suction of "A" SWBP

Time	Position	Applicant's Actions or Behavior
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	BOP	Align Emergency Cooling Water to MDAPFW Pump A using Att. 2 while continuing with this procedure.
		<b>BOOTH OPERATOR: When directed align emergency cooling water to MDAPFW Pump A, wait 15 minutes and contact the control room and request that they start the Motor Driven Fire Pump. Once Fire Pump is started, wait 5 minutes and inform the control room that emergency cooling water has been aligned to the MDAPFW Pump A.</b>
	SRO	Perform the following: <ul style="list-style-type: none"> <li>Inspect the area of the leak.</li> <li>Report findings to the Control Room</li> <li>Identify and Isolate the source of the SW leak.</li> </ul>
		<b>BOOTH OPERATOR: When/If dispatched to isolate the leak and remove power from "A" SWBP, wait 5 minutes and isolate the leak and remove power from "A" SWBP, as directed, IAW SCN file.</b>
	SRO	<b>Continuous Action Step</b> Check Attachment 7 – Completed (YES, depending on timeline.)
	BOP	Check SW to Instrument Air Compressor A and Station Air Compressor – Isolated (NO, go to step 22)
	SRO	Refer to ITS LCOs for Applicability ITS LCO 3.7.5, Condition C, due to Service Water supply to AFW system being inoperable and requires that the plant be in Mode 3 in 6 hours and Mode 4 in 18 hours without reliance on steam generator for heat removal.  ITS LCO 3.7.7, Condition A, due to one Service Water train inoperable and requires that the train be restored to operable status within 72 hours or be in Mode 3 in 6 hours and Mode 5 in 36 hours.
	SRO	Implement the EALs
	SRO	Return to procedure and step in effect
		<b>BOOTH OPERATOR: Insert Event #4 ("B" RCP Thermal Barrier Leak / FCV-626 Failure) on cue from the Chief Examiner.</b>

Op Test No.:	ILC-13 NRC	Scenario #	4	Event #	4	Page	12	of	12
Event Description:		"B" RCP Thermal Barrier Leak / FCV-626 Failure							
Time	Position	Applicant's Actions or Behavior							

**BOOTH OPERATOR:** At the discretion of the Examiner, insert Event 4, "B" RCP Thermal Barrier Leak / FCV-626 Failure

**EVENT INDICATIONS:**

APP-001-B2, RCP LABYRTH SEAL LO  $\Delta$ P

APP-001-B4, RCP SEAL INJ HI/LO FLOW

APP-001-C1, RCP THERM BAR COOL WTR HI FLOW

APP-001-D1, RCP THERM BAR COOL WTR LO FLOW

APP-001-E1, RCP THERM BAR COOL WTR HI TEMP

RR-1 for R-17

APP-036-D8, PROCESS MONITOR HI RAD (R-17 in alarm)

FCV-626 indicates both RED and GREEN lights illuminated

CCW Surge Tank slowly rising.

	SRO	Implement the EALs
	BOP	Make PA Announcement For Procedure Entry
	RO	Go to Appropriate Section for Indicated Malfunction: Rising CCW Inventory OR R-17 Alarming, Section B.
	RO	Check FCV-626 – AUTO CLOSED (NO, indicates stuck mid-position) RNO: IF APP-001-C1 is illuminated the perform one of the following: <ul style="list-style-type: none"> <li>At the RTGB, verify FCV-626 is closed (FCV-626 will not close)</li> </ul> OR <ul style="list-style-type: none"> <li>IF FCV-626 will NOT close, the close CC-735 and go to step 2. (RO will close CC-735)</li> </ul>
	RO	Check RCP Seal Leakoff – Any greater than 5 gpm (NO, go to step 4)
	RO	<b>Continuous Action Step</b> Check the following indications of an RCP Thermal Barrier Failure – Both Exist <ul style="list-style-type: none"> <li>RCP Thermal Barrier Cooling – Isolated due to High Flow (YES)</li> </ul> AND <ul style="list-style-type: none"> <li>R-17 – Rising trend or Alarm. (YES)</li> </ul>
	RO	Check Seal Injection flow to the Affected RCP(s) – LOST (NO, go to step 7.)
	RO	Dispatch Operator to Containment to Perform Att. 6, RCP Thermal Barrier Isolation.

Op Test No.:	<u>ILC-13 NRC</u>	Scenario #	<u>4</u>	Event #	<u>4</u>	Page	<u>13</u>	of	<u>13</u>
Event Description:		<u>"B" RCP Thermal Barrier Leak / FCV-626 Failure</u>							
Time	Position	Applicant's Actions or Behavior							

**BOOTH OPERATOR:** If dispatched to the Containment to perform Att. 6, acknowledge the report and take no additional action. If contacted on status later, state that you are waiting on the HP to perform CV entry brief.

	RO	Check RCP status as follows: a. Check RCP B OR C - Running (YES) b. Check RCP B – Running (YES) c. Check RCP C – Running (YES)
	SRO	When Att. 6 is completed, then go to step 23.
<b>BOOTH OPERATOR:</b> Insert Event #5 ("A" S/G Tube Leak) on cue from the Chief Examiner.		

Op Test No.: ILC-13 NRC Scenario # 4 Event # 5-11 Page 14 of 14

Event Description: "A" S/G Tube Leak to Tube Rupture, Loss of SUT, V2-16s and V1-8s fail to Auto-Open, Feed Regulating Bypass Valves fail to close on Phase A.

Time	Position	Applicant's Actions or Behavior
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**BOOTH OPERATOR: After adequate power reduction has been observed and on cue from the Chief Examiner Insert Event #5 ("A" S/G Tube Leak)****EVENT INDICATIONS:**

Rising Speed on AUTO Charging Pump

PZR Level lowering

APP-003-F4, CHG PMP HI SPEED

RR-1 on R-15

APP-036-C7, R-24 MONITOR HI (R-24A HIGH)

APP-036-D8, PROCESS MONITOR HI RAD (R-15 in Alarm)

	SRO	Determines entry into AOP-035 is warranted based plant indications.

**EXAMINER'S NOTE: The tube leak is ramping in over 6 minutes to 300 gpm.**

	RO	<b>Continuous Action Step</b> Determine if Reactor Trip needed as follows: <ol style="list-style-type: none"> <li>Check the following               <ul style="list-style-type: none"> <li>PZR Level – Less than 7% (NO)</li> </ul> </li> <li>OR               <ul style="list-style-type: none"> <li>RCS Subcooling – Less than 35°F (NO)</li> </ul> </li> </ol> RNO: IF the conditions above are met then trip the reactor and go to EOP-E-0. Go to Step 2.
	BOP	Make PA Announcement for Procedure Entry
	RO	<b>Continuous Action Step</b> Check VCT Level – Less than 12.5 inches (NO, go to step 5)
	RO	Check RCS Level – Lowering in an uncontrolled manner (YES)
	RO	Adjust Charging Flow as follows: <ol style="list-style-type: none"> <li>Check Charging Pump Status – At least two running (YES)</li> <li>Place running Charging Pumps Speed Controllers in MAN <u>AND</u> adjust output to maximum</li> </ol>
	RO	Check RCS Level – Lowering in an Uncontrolled Manner (YES)
	RO	Check Letdown – In Service (YES)
	RO	Verify All Letdown Flowpaths Isolated as follows: <ul style="list-style-type: none"> <li>LCV-460A &amp; B – CLOSED</li> <li>HIC-137 – Adjusted to 0%</li> </ul>



Op Test No.:	ILC-13 NRC	Scenario #	4	Event #	5-11	Page	15	of	15
Event Description:		"A" S/G Tube Leak to Tube Rupture, Loss of SUT, V2-16s and V1-8s fail to Auto-Open, Feed Regulating Bypass Valves fail to close on Phase A.							
Time	Position	Applicant's Actions or Behavior							

		<ul style="list-style-type: none"> <li>CVC-387 - CLOSED</li> </ul>
	RO	Check RCS Level – Lowering in an uncontrolled manner (YES, if leak has been inserted for more than 3 minutes.)
	SRO	Directs the RO to Trip the Reactor and Initiate Safety Injection and go to EOP-E-0
Critical Task	RO	Depresses the Right Hand Reactor Trip Pushbutton <ul style="list-style-type: none"> <li>Check Reactor Trip (NO) RNO: Manually trip the reactor. (RO depresses the Left Hand Reactor Trip Pushbutton.</li> <li>Check Reactor Trip (YES)</li> </ul>
<b>CRITICAL TASK – MANUALLY TRIPS THE REACTOR</b>		
<b>EXAMINER'S NOTE: Upon tripping the reactor the S/G tube leak will degrade to a 1000 gpm tube rupture.</b>		
	BOP	Check Turbine Trip: <ol style="list-style-type: none"> <li>Both turbine stop valves - Closed (YES)</li> <li>Close MSR purge and shutoff valves (Verifies valves closed)</li> </ol>
	BOP	Check Power to AC Emergency Busses: <ol style="list-style-type: none"> <li>E1 or E2 – At least one energized (YES)</li> <li>E1 and E2 – Both energized (YES)</li> </ol>
	RO	Check SI Status: <ol style="list-style-type: none"> <li>Check if SI is actuated:               <ul style="list-style-type: none"> <li>SI annunciators – ANY ILLUMINATED (YES)</li> <li>SI equipment – AUTO STARTED (YES)</li> </ul> </li> <li>Check BOTH trains of SI – ACTUATED               <ul style="list-style-type: none"> <li>SI pumps – BOTH RUNNING (YES)</li> <li>RHR pumps – BOTH RUNNING (YES)</li> </ul> </li> </ol>
	SRO	Verifies all immediate actions for EOP-E-0.
	SRO	Places FOLDOUT for EOP-E-0 in effect (NONE apply)

Op Test No.:	ILC-13 NRC	Scenario #	4	Event #	5-11	Page	16	of	16
Event Description:		"A" S/G Tube Leak to Tube Rupture, Loss of SUT, V2-16s and V1-8s fail to Auto-Open, Feed Regulating Bypass Valves fail to close on Phase A.							
Time	Position	Applicant's Actions or Behavior							

**EXAMINER'S NOTE:** Crew may take early actions at this time to address items that did not function or operate as designed.

- Manually open MDAFW Pump Discharge Valves (V2-16s)
- Manually close the FRV Bypass Valves

	CRS	Perform Attachment 1, Auto Action Verification, While continuing with this procedure. (Should be assigned to BOP.) (Att. 1 steps are presented next followed by the remainder of EOP-E-0.)
<b>Beginning of EOP-E-0 Attachment 1</b> (Remainder of EOP-E-0 Follows this Section)		
Att. 1	BOP	Check ECCS Pumps Running: <ul style="list-style-type: none"> <li>• SI pumps - BOTH RUNNING (YES)</li> <li>• RHR pumps - BOTH RUNNING (YES)</li> </ul>
Att. 1	BOP	Check ECCS Valves - PROPER EMERGENCY ALIGNMENT (YES)
Att. 1	BOP	Check CCW Pumps - AT LEAST ONE RUNNING (YES)
Att. 1	BOP	Check Containment Isolation Phase A <ol style="list-style-type: none"> <li>Phase A – Actuated (YES)</li> <li>Phase A valves – Closed (YES)</li> <li>Excess letdown – Isolated (YES) <ul style="list-style-type: none"> <li>• CVC-387 – Closed (YES)</li> <li>• HIC-137 – at 0% DEMAND (YES)</li> </ul> </li> </ol>
Att. 1 <b>Critical Task</b>	BOP	Check Feedwater Isolation: <ol style="list-style-type: none"> <li>Main feed pumps – BOTH TRIPPED (YES)</li> <li>Main feedwater – ISOLATED <ul style="list-style-type: none"> <li>• FRVs – Closed (YES)</li> <li>• Feedwater reg bypass valves – Closed (NO)</li> <li>• Feedwater header section valves – Closed (YES)</li> </ul> </li> </ol> RNO: Manually close valves as necessary (Closes all three Feedwater reg bypass valves.)
<b>CRITICAL TASK – ESTABLISH CONTAINMENT ISOLATION BY CLOSING THE FEEDWATER REG BYPASS VALVES</b>		

Op Test No.:	ILC-13 NRC	Scenario #	4	Event #	5-11	Page	17	of	17
Event Description:		"A" S/G Tube Leak to Tube Rupture, Loss of SUT, V2-16s and V1-8s fail to Auto-Open, Feed Regulating Bypass Valves fail to close on Phase A.							
Time	Position	Applicant's Actions or Behavior							

Att. 1	BOP	Check if Main Steamlines Should Be Isolated: a) Main steamline isolation – REQUIRED (NO, Go to Step 7)
Att. 1	BOP	Check Proper Service Water System Operation: a. SW pumps – All running (YES) b. SW booster pumps – Both running (NO due to previous leak) c. Both SW header low pressure alarms (APP-008-F7/F8) – Extinguished (NO) RNO: Perform the following: 1) Isolate SW to the Turbine Building: • Close V6-16C, SW turbine building isolation <u>OR</u> • Close V6-16A and V6-16B, SW turbine building supply 2) WHEN this Attachment is complete, THEN perform Supplement M, Component Alignment for Loss of SW to Turbine Building, as time permits.
Att. 1	BOP	Check Both EDGs – Running (YES)
Att. 1	BOP	Check ECCS Flow: a. RCS pressure – less than 1650 psig (NO, depending on scenario timeline, go to step 10) b. SI pumps- Flow Indicated (YES, if RCS pressure below shutoff head of SI pumps) c. RCS pressure – less than 350 psig. (NO, go to step 10)
Att. 1	BOP	Check CV Recirculation Fans – All Running (YES)
Att. 1	BOP	Check IVSW - Actuated (YES) • PCV-1922A – Open (YES) • PCV-1922B – Open (YES)
Att. 1	BOP	Check CV ventilation isolation (YES) a. CV ventilation isolation valves – CLOSED (YES)

Op Test No.:	<u>ILC-13 NRC</u>	Scenario #	<u>4</u>	Event #	<u>5-11</u>	Page	<u>18</u>	of	<u>18</u>
Event Description:		"A" S/G Tube Leak to Tube Rupture, Loss of SUT, V2-16s and V1-8s fail to Auto-Open, Feed Regulating Bypass Valves fail to close on Phase A.							
Time	Position	Applicant's Actions or Behavior							

Att. 1	BOP	Check control room ventilation - aligned for pressurization mode (YES) <ul style="list-style-type: none"> <li>• HVA-1A or HVA-1B – Running (YES)</li> <li>• HVE-16 – Stopped (YES)</li> <li>• HVE-19A or HVE-19B – Running (YES)</li> <li>• Control Room HVAC outside air damper A or B – Open (YES)</li> <li>• CR-D1A-SA – Closed (YES)</li> <li>• CR-D1B-SB – Closed (YES)</li> </ul>
Att. 1	BOP	Check DS Bus – Energized (YES)
Att. 1	BOP	Check Battery Chargers – Energized (YES) APP-036-D1 – Extinguished (YES) APP-036-D2 – Extinguished (YES)
Att. 1	BOP	Stop R-11/12 Sample Pump
Att. 1	BOP	Locally Reset and Load IACs as necessary (N/A)
Att. 1	BOP	Perform Crew Update to include the following: <ul style="list-style-type: none"> <li>• Attachment Completion</li> <li>• Manual Actions Taken (Closed FRV bypass valves)</li> <li>• Failed Equipment status (None)</li> <li>• SW status (Isolated SW to the Turbine Building and will be performing Supplement M)</li> </ul>
<b>End of EOP-E-0 Attachment 1</b>		
<b>Beginning of Supplement M</b>		

Op Test No.:	ILC-13 NRC	Scenario #	4	Event #	5-11	Page	19	of	19
Event Description:		"A" S/G Tube Leak to Tube Rupture, Loss of SUT, V2-16s and V1-8s fail to Auto-Open, Feed Regulating Bypass Valves fail to close on Phase A.							
Time	Position	Applicant's Actions or Behavior							

Supp. M	BOP	<ol style="list-style-type: none"> <li>1. Shutdown secondary as follows: <ol style="list-style-type: none"> <li>a. Check S/Gs – Any ruptured (YES)</li> <li>b. Adjust ruptured Steam Line PORV setpoint to 1060 psig using Status Board</li> <li>c. Close all MSIVS and MSIV Bypass Valves</li> <li>d. Break vacuum to the Condenser as follows: <ol style="list-style-type: none"> <li>1) Depress and hold the THINK Pushbutton</li> <li>2) Open Vacuum Breaker Valves: MS-70A / B</li> <li>3) WHEN the valves are open, THEN release the THINK pushbutton.</li> </ol> </li> <li>e. Verify the following equipment stopped: <ul style="list-style-type: none"> <li>• FW PMP A / B</li> <li>• COND PUMP A / B</li> <li>• Heater Drain Pump A / B</li> <li>• GOV Fluid Pump A / B (Pull to Lock)</li> <li>• Vacuum Pump A / B</li> </ul> </li> </ol> </li> <li>2. Return to procedure and step in effect.</li> </ol>
<b>End of Supplement M</b>		
<b>Continuation of EOP-E-0</b>		
	RO	Check AFW Pumps – Running <ol style="list-style-type: none"> <li>a. MDAFW Pumps – Both running (YES)</li> <li>b. S/G Levels – Two S/Gs less than 16% (NO continue w/ step 7)</li> </ol>
Critical Task	RO	Check AFW Valves – Proper Emergency Alignment (YES) <ul style="list-style-type: none"> <li>• AFW header discharge valves – Full Open (NO, verifies valves will manually open)</li> <li>• AFW header section valves – Full Open (YES)</li> <li>• Steam driven AFW pump discharge valves – Full open if pump is running. (YES)</li> </ul>
<b>CRITICAL TASK – ESTABLISH AUXILIARY FEEDWATER</b>		
<b>EXAMINER'S NOTE:</b> Depending on S/G Levels, then candidate decide not to open the AFW Header Discharge Valves until needed during the RCS cooldown in EOP-E-3.		

Op Test No.:	ILC-13 NRC	Scenario #	4	Event #	5-11	Page	20	of	20
Event Description:		"A" S/G Tube Leak to Tube Rupture, Loss of SUT, V2-16s and V1-8s fail to Auto-Open, Feed Regulating Bypass Valves fail to close on Phase A.							
Time	Position	Applicant's Actions or Behavior							

	RO	Check Total AFW Flow: <ul style="list-style-type: none"> <li>Reset SI</li> <li>Control feed flow to maintain NON-faulted S/Gs narrow range level – Between 18% and 50%.</li> <li>Check total AFW flow- Greater than 300 gpm (YES)</li> </ul>
	RO	<b>Continuous Action Step</b> Check CV Spray NOT Required: <ul style="list-style-type: none"> <li>a. CV pressure – Has remained less than 10 psig. (YES)</li> <li>b. CV Spray – NOT ACTUATED (YES)</li> </ul>
	RO	Check RCP Seal Cooling: <ul style="list-style-type: none"> <li>CCW flow to RCP thermal barriers – Normal (NO)               <ul style="list-style-type: none"> <li>APP-001-C1 / D1 – Extinguished (NO)</li> </ul> </li> <li>OR</li> <li>Seal injection flow – Normal (YES)               <ul style="list-style-type: none"> <li>Seal injection flow – Greater than 6 gpm per RCP</li> </ul> </li> <li>OR</li> <li>Thermal barrier ΔPs – Greater than 5 inches water.</li> </ul>
<b>BOOTH OPERATOR: As requested, adjust CVC-297A,B,C as necessary to control RCP seal injection flow using the P&amp;ID function.</b>		
	RO	<b>Continuous Action Step</b> Check RCS Temperature With any RCPs running, RCS cold leg temperatures – Stable at or trending to 547°F (YES) RNO: IF temperature is less then 547°F AND lowering then perform the following: <ul style="list-style-type: none"> <li>a. Stop dumping steam</li> <li>b. IF cooldown continues, THEN reduce total feed flow to minimum for decay heat removal:               <ul style="list-style-type: none"> <li>Maintain total feed flow greater than 300 gpm until narrow range level is greater than 18% in at least one S/G.</li> </ul> </li> <li>c. IF cooldown continues, THEN close MSIVs and MSIV bypass valves.</li> </ul> RNO: IF temperature is greater than 547°F and rising, THEN perform the following: <ul style="list-style-type: none"> <li>Dump steam using S/G steam line PORVs</li> </ul>

Op Test No.:	<u>ILC-13 NRC</u>	Scenario #	<u>4</u>	Event #	<u>5-11</u>	Page	<u>21</u>	of	<u>21</u>
Event Description:		"A" S/G Tube Leak to Tube Rupture, Loss of SUT, V2-16s and V1-8s fail to Auto-Open, Feed Regulating Bypass Valves fail to close on Phase A.							
Time	Position	Applicant's Actions or Behavior							

	RO	Check PZR PORVs and Spray Valves: <ol style="list-style-type: none"> <li>PORVs – Closed (YES)</li> <li>Normal PZR spray valves – Closed (YES)</li> <li>Aux spray valve – Closed (YES)</li> </ol>
	RO	Check If RCPs should be stopped: <ol style="list-style-type: none"> <li>RCPs – Any Running (YES)</li> <li>SI pumps – At least one running and capable of delivering flow (YES)</li> <li>RCS subcooling based on core exit TCs – Less than 30°F (NO, go to step 14.)</li> </ol>
	BOP	Check if S/G Secondary Pressure Boundaries are Intact: <ol style="list-style-type: none"> <li>Check pressures in all S/Gs               <ol style="list-style-type: none"> <li>None lowering in an uncontrolled manner (YES)</li> <li>None Completely depressurized (YES)</li> </ol> </li> </ol>
	BOP	Check if S/G Tubes are Intact: <ul style="list-style-type: none"> <li>Secondary radiation monitors – Have Remained Normal (NO)               <ul style="list-style-type: none"> <li>R-15</li> <li>R-19s</li> <li>R-31s</li> </ul> </li> <li>S/G levels – None Rising in an Uncontrolled Manner. (YES)</li> </ul> RNO: Reset SPDS and initiate monitoring of Critical Safety Functions Status Trees. Go to EOP-E-3, S/G Tube Rupture, Step 1.
<b>Beginning of EOP-E-3</b>		
	SRO	NOTE <ul style="list-style-type: none"> <li>FOLDOUT for EOP-E-3 is in effect.</li> <li>Chemistry should be available for sampling during this procedure.</li> <li>Step 1 RCP trip criteria applies until an operator controlled RCS cooldown is initiated.</li> </ul>

Op Test No.:	ILC-13 NRC	Scenario #	4	Event #	5-11	Page	22	of	22
Event Description:		"A" S/G Tube Leak to Tube Rupture, Loss of SUT, V2-16s and V1-8s fail to Auto-Open, Feed Regulating Bypass Valves fail to close on Phase A.							
Time	Position	Applicant's Actions or Behavior							

	RO	<b>Continuous Action Step</b> Check If RCPs Should Be Stopped: a. RCPs - ANY RUNNING (YES) b. SI pumps - AT LEAST ONE RUNNING AND CAPABLE OF DELIVERING FLOW (YES) c. RCS subcooling based on core exit TCs - LESS THAN 30°F [50°F] (NO) RNO: Go to Step 2
	BOP	Identify Ruptured S/G(s): ("A" S/G is ruptured) <ul style="list-style-type: none"> <li>Unexpected rise in any S/G narrow range level <u>OR</u></li> <li>High radiation from any SG steamline (R-31s) <u>OR</u></li> <li>High radiation from any SG blowdown line (R-19s) <u>OR</u></li> <li>High radiation from any S/G sample:               <ul style="list-style-type: none"> <li>Contact Chemistry to sample all S/Gs for activity as necessary</li> </ul> </li> </ul>
	SRO	<u>CAUTION</u> <ul style="list-style-type: none"> <li>If the steam driven AFW pump is the only available source of feed flow, steam supply to the steam driven AFW pump should be maintained from at least one S/G.</li> <li>At least one S/G must be maintained available for RCS cooldown.</li> </ul>



Op Test No.:	ILC-13 NRC	Scenario #	4	Event #	5-11	Page	23	of	23
Event Description:		"A" S/G Tube Leak to Tube Rupture, Loss of SUT, V2-16s and V1-8s fail to Auto-Open, Feed Regulating Bypass Valves fail to close on Phase A.							
Time	Position	Applicant's Actions or Behavior							

	BOP	<p>Isolate Flow From Ruptured S/G(s):</p> <ol style="list-style-type: none"> <li>Adjust ruptured S/G(s) steam line PORV controller setpoint to 1060 psig</li> <li>Check ruptured S/G PORV – (RV1-1) CLOSED (YES)</li> <li>Close steam driven AFW pump steam shutoff valve for ruptured S/G: (V1-8A)</li> <li>Locally close the following valve for ruptured S/G(s) while continuing with this procedure: <ul style="list-style-type: none"> <li>MS-20, SG "A" BYPASS DRN &amp; WARM-UP LINE TO AFW PUMP (pipe jungle above/right of V1-8B)</li> </ul> </li> <li>Check S/G blow down and blow down sample valves from ruptured S/G(s) – Closed (YES) <ul style="list-style-type: none"> <li>SG1 Blowdown</li> <li>FCV-1930 A &amp; B</li> <li>FCV-1933 A &amp; B SHUT</li> </ul> </li> <li>Check MSIV above and below seat drain valves for ruptured S/G – CLOSED (YES)</li> <li>Close ruptured S/G MSIV and MSIV bypass valve – V1-3A and MS-353A.</li> </ol>
<b>BOOTH OPERATOR: When requested, wait 3 minutes and then close MS-20 IAW SCN file.</b>		
	SRO	<p style="text-align: center;"><b>CAUTION</b></p> <ul style="list-style-type: none"> <li>If any ruptured S/G is faulted, feed flow to that S/G should remain isolated during subsequent recovery actions unless needed for RCS cooldown.</li> <li><b>If offsite power is lost after SI reset, manual action may be required to restart safeguards equipment.</b></li> </ul>
<b>Critical Task</b>	BOP	<p><b>Continuous Action Step</b></p> <p>Check Ruptured S/G Level:</p> <ol style="list-style-type: none"> <li>Narrow range level – Greater than 8%. (YES)</li> <li>Reset SI</li> <li>Stop feed flow to ruptured S/G: <ul style="list-style-type: none"> <li>Close steam driven AFW pump discharge valve: V2-14A</li> <li>Close AFW header discharge valve: V2-16A</li> </ul> </li> <li>Perform Att. 4, Deenergizing AFW Valves For Ruptured S/Gs</li> </ol>
<b>CRITICAL TASK – ISOLATE "A" STEAM GENERATOR</b>		

Op Test No.:	ILC-13 NRC	Scenario #	4	Event #	5-11	Page	24	of	24
Event Description:		"A" S/G Tube Leak to Tube Rupture, Loss of SUT, V2-16s and V1-8s fail to Auto-Open, Feed Regulating Bypass Valves fail to close on Phase A.							
Time	Position	Applicant's Actions or Behavior							

<b>BOOTH OPERATOR:</b> When dispatched to perform Att. 4, wait 3 minutes and then open the breakers for AFW valves as specified in Att. 4 IAW the SCN file. <b>NOTE:</b> A command to cause a loss of the Startup Transformer is built into the steps to open the AFW Valve breakers.		
<b>EXAMINER'S NOTE:</b> A loss of Startup Transformer will occur while the breakers are being opened for the AFW valves.		
	SRO	<u>CAUTION</u> Major steam flow paths from the ruptured S/G(s) should be isolated before initiating RCS cooldown. This includes MSIVs and MSIV bypass valves, steam line PORV, and AFW pump steam shutoff valve.
	BOP	Check Ruptured S/G Pressure – Greater than 370 psig. (YES)
	SRO	<u>CAUTION</u> IF RCPs are not running, the following steps may cause a false CSF-4, Integrity Status Tree, indication for the ruptured loop. Disregard the ruptured loop T-cold indication until after performing Step 28.
	SRO	<u>NOTE</u> Main steamline isolation may occur if the high steam flow setpoint is exceeded. The cooldown should be continued using the steam line PORV(s) if MSIV closure occurs.
	CREW	Identifies the loss of Start-up Transformer. Takes actions per previous notes to restart safeguards equipment after a loss of off-site power.
<b>Critical Task</b>	RO	Verifies that the SI and RHR pumps are running. (Starting of RHR Pumps is not a Critical Task.)
<b>Critical Task</b>	BOP	Verifies that the MDAFW Pumps and SDAFW Pump are running. Verifies all available SW Pumps and SWBP are running. Verifies that both EDGs are running with appropriate voltage. (Critical Task is to verify that at least 300 gpm AFW flow is available to support subsequent cooldown.)
<b>CRITICAL TASK – RESTART ECCS EQUIPMENT AFTER LOSS OF OFF-SITER POWER</b>		

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Event Description: "A" S/G Tube Leak to Tube Rupture, Loss of SUT, V2-16s and V1-8s fail to Auto-Open, Feed Regulating Bypass Valves fail to close on Phase A.

Time	Position	Applicant's Actions or Behavior
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		<p>Initiate RCS Cooldown:</p> <p>a. Determine required core exit temperature:</p> <table border="1"> <thead> <tr> <th>Ruptured SG Pressure (PSIG)</th> <th>Required Core Exit Temperature (°F)</th> </tr> </thead> <tbody> <tr><td>1150 and above</td><td>508 [488]</td></tr> <tr><td>1100 to 1149</td><td>503 [483]</td></tr> <tr><td>1050 to 1099</td><td>497 [477]</td></tr> <tr><td>1000 to 1049</td><td>491 [471]</td></tr> <tr><td>950 to 999</td><td>485 [465]</td></tr> <tr><td>900 to 949</td><td>478 [458]</td></tr> <tr><td>850 to 899</td><td>472 [452]</td></tr> <tr><td>800 to 849</td><td>465 [445]</td></tr> <tr><td>750 to 799</td><td>458 [438]</td></tr> <tr><td>700 to 749</td><td>450 [430]</td></tr> <tr><td>650 to 699</td><td>442 [422]</td></tr> <tr><td>600 to 649</td><td>433 [413]</td></tr> <tr><td>550 to 599</td><td>424 [404]</td></tr> <tr><td>500 to 549</td><td>415 [395]</td></tr> <tr><td>450 to 499</td><td>404 [384]</td></tr> <tr><td>400 to 449</td><td>393 [373]</td></tr> <tr><td>370 to 399</td><td>385 [365]</td></tr> </tbody> </table> <p>b. Dump steam to condenser from intact S/G(s) at maximum rate: maximum rate from intact 1) Check condenser - AVAILABLE FROM INTACT S/G(s) (NO) RNO: Manually dump steam at maximum rate from intact S/G using steam line PORVs.</p> <p>c. Core exit TCs – Less Than Required Temperature (NO, continue cooldown until less than required temperature. Continue with step 7.)</p> <p>d. Stop RCS cooldown</p> <p>e. Maintain core exit TCs – LESS THAN REQUIRED TEMPERATURE</p>	Ruptured SG Pressure (PSIG)	Required Core Exit Temperature (°F)	1150 and above	508 [488]	1100 to 1149	503 [483]	1050 to 1099	497 [477]	1000 to 1049	491 [471]	950 to 999	485 [465]	900 to 949	478 [458]	850 to 899	472 [452]	800 to 849	465 [445]	750 to 799	458 [438]	700 to 749	450 [430]	650 to 699	442 [422]	600 to 649	433 [413]	550 to 599	424 [404]	500 to 549	415 [395]	450 to 499	404 [384]	400 to 449	393 [373]	370 to 399	385 [365]
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	RO	<p><b>Continuous Action Step</b> Check Intact S/G Levels</p> <p>a. Narrow range levels – Greater than 8% (YES)</p> <p>b. Control feed flow to maintain narrow range levels – BETWEEN 21% and 50%.</p>																																				

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Event Description: "A" S/G Tube Leak to Tube Rupture, Loss of SUT, V2-16s and V1-8s fail to Auto-Open, Feed Regulating Bypass Valves fail to close on Phase A.

Time	Position	Applicant's Actions or Behavior
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	SRO	<b>CAUTION</b> If any PZR PORV opens because of high PZR pressure, Step 8.b should be repeated after pressure lowers to less than 2335 psig.
	RO	<b>Continuous Action Step</b> Check PZR PORVs And Block Valves: a. Power to block valves – AVAILABLE (YES) b. PORVs – CLOSED (YES) c. Block valves – AT LEAST ON OPEN (YES)
	SRO	<b>CAUTION</b> If offsite power is lost after SI reset, manual action may be required to restart safeguards equipment.
	RO	Reset SI
	RO	Reset Containment Isolation Phase A
	RO	Establish Instrument Air To CV: a. Check APP-002-F7 – EXTINGUISHED (YES) b. Reset IA PCV-1716, instrument air isolation to CV c. Check IA PCV-1716 – OPEN (YES)
	SRO	<b>CAUTION</b> If RCS pressure lowers in an uncontrolled manner to less than 275 psig [350 psig], the RHR pumps must be manually restarted to supply water to the RCS.
	RO	Check If RHR Pumps Should Be Stopped: a. RCS pressure - GREATER THAN 275 PSIG [350 PSIG] (YES) b. Stop RHR pumps c. Monitor RCS pressure

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Event Description:		"A" S/G Tube Leak to Tube Rupture, Loss of SUT, V2-16s and V1-8s fail to Auto-Open, Feed Regulating Bypass Valves fail to close on Phase A.							
Time	Position	Applicant's Actions or Behavior							

	RO	<p>Establish Charging Flow:</p> <ol style="list-style-type: none"> <li>Charging pumps- AT LEAST ONE RUNNING (YES)</li> <li>Align charging pump suction to RWST <ol style="list-style-type: none"> <li>Open LCV-115B</li> <li>Close LCV-115C</li> <li>Place RCS makeup system switch to STOP</li> </ol> </li> <li>Establish charging flow: <ul style="list-style-type: none"> <li>Start charging pump(s) as necessary to establish at least one running</li> <li>Adjust charging pump speed controllers as necessary to establish maximum charging flow for running pump(s)</li> <li>Adjust HIC-121, charging flow control valve, as necessary to establish desired charging flow: <ul style="list-style-type: none"> <li>Maintain seal injection flow - BETWEEN 6 GPM AND 20 GPM PER RCP UNLESS SEAL INJECTION ISOLATED</li> </ul> </li> </ul> </li> </ol>
	RO/BOP	<p>Check If RCS Cooldown Should Be Stopped:</p> <ol style="list-style-type: none"> <li>Check core exit TCs - LESS THAN REQUIRED TEMPERATURE FROM STEP 6 (YES, if NO then hold at this step until YES)</li> <li>Stop RCS cooldown</li> <li>Maintain core exit TCs – LESS THAN REQUIRED TEMPERATURE</li> </ol>
	BOP	Check Ruptured S/G Pressure – Stable or Rising (YES)
	RO	Check RCS Subcooling Based on Core Exit TCs – Greater than 55°F (YES)
	RO	<p>Depressurize RCS to Minimize Break Flow and Refill the PZR:</p> <ol style="list-style-type: none"> <li>Normal PZR spray – AVAILABLE (NO, go to Step 18)</li> </ol>
	SRO	<p><b>CAUTION</b></p> <ul style="list-style-type: none"> <li>The PRT may rupture if a PZR PORV is used to depressurize the RCS. This may result in abnormal containment conditions.</li> <li>Cycling of the PZR PORV should be minimized.</li> </ul>
	SRO	<p><b>NOTE</b></p> <p>The upper head region may void during RCS depressurization if RCPs are NOT running. This will result in a rapidly rising PZR level.</p>

Op Test No.:	ILC-13 NRC	Scenario #	4	Event #	5-11	Page	28	of	28
Event Description:		"A" S/G Tube Leak to Tube Rupture, Loss of SUT, V2-16s and V1-8s fail to Auto-Open, Feed Regulating Bypass Valves fail to close on Phase A.							
Time	Position	Applicant's Actions or Behavior							

	RO	<p>Depressurize RCS using PZR PORV to minimize break flow and refill the PZR:</p> <ol style="list-style-type: none"> <li>At least one PZR PORV – Available (YES)</li> <li>Open one PZR PORV until any of the following conditions are satisfied: <ul style="list-style-type: none"> <li>Both of the following: <ol style="list-style-type: none"> <li>RCS pressure – LESS THAN RUPTURED S/G PRESSURE</li> <li>PZR level – GREATER THAN 14% <u>OR</u></li> </ol> </li> <li>PZR level – GREATER THAN 73% <u>OR</u></li> <li>RCS subcooling based on core exit TCs – LESS THAN 35°F</li> </ul> </li> <li>Close PZR PORV when any condition in Step 18.b satisfied (conditions listed above)</li> </ol>
	RO	Check RCS Pressure – Rising (YES)
	SRO	<p style="text-align: center;"><u>CAUTION</u></p> <p>SI must be terminated when termination criteria are satisfied to prevent overfilling the ruptured S/G(s).</p>
	RO	<p>Check if SI Flow Should be Terminated:</p> <ol style="list-style-type: none"> <li>RCS subcooling based on core exit TCs – GREATER THAN 35°F (YES)</li> <li>Secondary heat sink: <ul style="list-style-type: none"> <li>Total feed flow to S/Gs – AT LEAST 300 GPM AVAILABLE (YES) <u>OR</u></li> <li>Narrow range level in at least one intact S/G – GREATER THAN 8% (YES)</li> </ul> </li> <li>RCS pressure – STABLE OR RISING (YES)</li> <li>PZR level – GREATER THAN 14% (YES)</li> </ol>
	RO	Stop Both SI Pumps.
<p><b>The Chief Examiner may terminate the scenario at his discretion or anytime after the SI pumps have been secured IAW EOP-E-3.</b></p>		

## **ILC-13 NRC SCENARIO 4 TURNOVER SHEET**

### **1. INITIAL CONDITIONS**

- a) Time in Core Life: EOL
- b) Reactor Power: 10E-8 amps
- c) Turbine Load: 0 MWe
- d) Boron Concentration: 513 ppm
- e) Rod Height: 95 CBD
- f) RCS Pressure: 2235 psig
- g) RCS Level: 53.2 %
- h) Xenon: Equilibrium

### **2. TECHNICAL SPECIFICATION LCO ACTIONS STATEMENTS IN EFFECT**

<u>T.S. #</u>	<u>Description</u>
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### **3. CLEARANCES IN EFFECT**

- a) None

### **4. CAUTION CAPS IN EFFECT**

- a) None

### **5. PROTECTED EQUIPMENT**

- a) None

### **6. DEGRADED EQUIPMENT**

- a) None

### **7. SWITCHYARD ACCESS**

- a) Unrestricted

### **8. PLANNED EVOLUTIONS**

- a) Continue with plant startup in accordance with GP-003 and raise reactor power to the POAH. Once at the POAH, stabilize power and hold until the on-coming crew that is performing Just-In-Time training for the Turbine startup relieves the shift.

### **9. TURNOVER INFORMATION**

- a) No additional information.

### **10. REACTIVITY INFORMATION**

- a) Power Trax Information.

### **11. RISK**

- a) GREEN