

Facility:	<u>Byron</u>	Scenario No.:	<u>06-1</u>	Op-Test No.:	<u>2006-301</u>
Examiners:	_____	Operators:	_____		<u>SRO</u>
	_____		_____		<u>RO</u>
	_____		_____		<u>BOP</u>
Initial Conditions:	IC-16; 56% power, MOL, equilibrium Xenon, steady state, 1B Diesel Generator OOS, 1C HD pump OOS.				
Turnover:	The plant is at 56% power, due to a forced down power from 100% 4 days ago to repair a seal leak on 1C FW pump, 595 Mwe, MOL, equilibrium Xenon, steady state, 6400 EFPH, 1025 ppm boron concentration. The Unit was previously at 100% power for 89 days. The repairs were completed on 1C FW pump and 1C FW pump was returned to service last shift. The 1B Diesel Generator is OOS for Turbo Charger work. The DG has been OOS for 18 hours and is expected to be returned to service by the end of the shift. LCOAR for Tech Spec 3.8.1 Condition B has been entered; 1BOSR 8.1.1-1 was performed 30 minutes prior to shift turnover. 1C HD Pump is OOS for seal replacement and is expected back by the end of shift. Power Team has notified Byron Unit 1 to raise power to 1235 MWe as soon as possible. 1BGP 100-3 is in use and currently at Step F.63. The Shift Manager has directed a maximum ramp rate of 3% power per hour to commence as soon as possible. On-line Risk is yellow.				

Event No.	Malf. No.	Event Type*	Event Description
Preload	MRF EG09 MAINT_O IOR ZDI1HSDG028 PTL IOR ZLO1HSDG0201 OFF IOR ZDI1HD01PC PTL IMF TC03 IMF SI01A MRF RP30 OUT IMF PN0680 (1 5:00) ON IMF PN1760 (1 4:50) ON IMF TH16D (1 5:00) IMF TH04D (2 1) 800		1B DG OOS ACB 1423 OOS 1B DG STOP Light 1C HD Pump OOS Turbine fails to Auto trip from reactor trip Prevent 1A SI pump start Fails K607 (Phase A) on Train A Indication of RCP 1D Lower Oil Reservoir Level Low Loose Parts Monitoring Impact Noise Level RCP 1D Trip Loop 1D Hot Leg Leak
1		R RO N BOP	Direct the Unit ramp to 1235 MWe power. Perform Reactivity calculation for ramp to 1235 MWe Ramp the Unit to 1235 MWe power Ramp the Unit to 1235 MWe power
2	IMF CV16 0	I RO	Volume Control Tank (VCT) level channel 1LT-CV112 fails low Demanding Auto Makeup to VCT.
3	IMF RX01K 0	I BOP US	Steam Generator 1D controlling Steam Pressure channel fails low requiring Manual control of 1D SG Main Feed Reg Valve. Enter Tech Spec 3.3.2 for actions.
4	ED11D	C ALL	Loss of Instrument Bus 114 due to a bus fault. Tech Spec 3.8.9 required shutdown within 8 hours.
5	IOR ZDIBKSEL AUTO IMF RX17 -4.25	C RO M ALL	Uncontrolled inward rod motion requiring a manual reactor trip per 1BOA ROD-1.
6	IMF TC03	C BOP	Turbine fails to Auto trip from reactor trip – Manual Turbine Trip required
7	IMF PN0680 (1 5:00) ON IMF PN1760 (1 4:50) ON IMF TH17D (1 5:00) IMF TH04D (2 1) 800	M ALL	Indication of RCP 1D Lower Oil Reservoir Level Low Loose Parts Monitoring Impact Noise Level RCP 1D Trip Loop 1D Hot Leg Leak

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

SCENARIO 2006-1 OVERVIEW

The scenario will begin at ~56% power, MOL, equilibrium Xenon, steady state. The 1B Diesel Generator is OOS for Turbo Charger work. The DG has been OOS for 18 hours and, is expected to be returned to service by the end of the shift. LCOAR for Tech Spec 3.8.1 Condition B has been entered; 1BOSR 8.1.1-1 has been completed in last 30 minutes. Power Team requires a Byron Unit 1 ramp to 1235 MWe power as soon as possible.

The RO will be required to perform a reactivity calculation and coordinate with the BOP and commence the ramp to 1235 MWe power.

After a Unit ramp is in progress, Volume Control Tank (VCT) level channel 1LT-CV112 will fail low resulting in Auto Makeup to the VCT. **The crew will batch the dilution in increments as desired and place VCT in AUTO makeup after each batch.** The failure will require placing makeup level control in Manual for the VCT. Tech Spec LCO 3.3.9 for BDPS includes this VCT level channel, however applicability is only for Modes 3, 4, 5. The SRO should place this on the Degraded Equipment List (DEL)

After the crew recognizes the repercussions of 1LT-CV112, the 1D SG controlling steam pressure channel, 1PT 545A, will fail low requiring manual control of the 1D SG feedwater regulating valve. The SRO will enter 1BOA INST-2, for the failed SG Steam pressure channel and direct actions to restore the 1D feedwater regulating valve to automatic control. Tech Spec 3.3.2, Conditions A and D apply.

Following the required actions for the SG pressure channel failure, a loss of Instrument Bus 114 will occur due to a fault on the Instrument Bus. This will require performance of 1BOA ELEC-2 to stabilize and recover the plant. The US will address Tech Spec 3.8.9, which requires a shutdown to Hot Standby within 8 Hours. Several actions will be required as a result of not being able to restore power to the Instrument Bus.

After actions have been taken to stabilize the plant, the rods will begin to insert requiring a manual Reactor Trip per 1BOA ROD-1. The Turbine will not trip from the Reactor Trip signal and will require manual action to trip.

Following immediate actions of 1BEP-0 and transition to 1BEP ES-0.1, an RCP oil problem develops for the 1D RCP leading to a trip of 1D RCP, and a small LOCA (800 gpm) on the 1D RCS Loop Hot Leg. This will require reentry into 1BEP-0 upon SI actuation. The 1A SI pump will fail to start and trip if manually started and the 1B SI pump will have to be manually started, as well as all other B Train equipment. Phase A Train A (K607) failure, along with the Instrument Bus 114 failure, will require manual valve operation of numerous B Train valves. The scenario will continue with 1BEP-0 and transition to 1BEP-1 to stabilize and recover the plant.

The scenario ends with entry into 1BEP-1, Loss of Reactor or Secondary Coolant.

ERG Based Critical Tasks:

1. **E-0—J:** Manually start 1B SI pump prior to transition out of 1BEP-0.
2. **E-0—O:** Manually close Phase A valves before transition out of 1BEP-0.

SCENARIO 06-1 SIMULATOR OPERATOR NOTES

Simulator Setup:

Reset to IC-16; 56% power, MOL, equilibrium Xenon, steady state, 1B DG OOS, 1C HD pump OOS.

Go to run.

Run batch file by typing bat a:/06-1

Align switches:

1B DG C/S PTL and OOS

ACB 1423 PTL and OOS

1C HD pump C/S PTL and OOS

Insure 1D SG selected to control from steam pressure channel 1PT545 (select 1FI-543)

Place LCOAR placards for: 1B DG LCO 3.8.1 Condition B

Place On-Line risk to YELLOW

Place Protected Equipment placards on 1A DG and ACB 1413 C/Ss

Provide copies of turnover sheets

Provide 1BGP 100-3 Flowchart to Step F63

Provide a copy of 1BOL 8.1 for 1B DG inoperability

Perform "Ready for Training" checklist.

Insert all PRELOAD Events from page 1

Set AB Pot to 4.0 for 1025 ppm boron

Event 1 Perform a reactivity calculation using 1BCB Figure 35 (Rod position will be assumed as ARO, 221 steps on CB D at completion of ramp). Commence a ramp up to 1235 MWe power as requested by the Power team.

Event 2 VCT level channel 1LT-CV112 fails low.

Initiate event after load ramp is in progress, **when a batch is completed and the VCT Makeup MODE SELECT switch has been placed in AUTO**, with the lead examiners concurrence.

Acknowledge all info passed to the SM, WEC, and maintenance.

SDG: CV3

IMF CV16 0

Event 3 Steam Generator 1D controlling Steam Pressure channel fails low (1PT545A).

Initiate event after event 2 actions completed

Acknowledge all info passed to the SM, WEC, and maintenance.

SDG: RX16

IMF RX01K 100

If requested to trip bistables, and lead examiner wants to see this action:

MRF RP21 OPEN/CLOSE

MRF RX 095 Trip

MRF RX 096 Trip

Event 4 Loss of Instrument Bus 114

Initiate event after event 3 actions are completed, with the lead examiners concurrence. Acknowledge info passed to SM, WEC, and maintenance. When asked, report the bus appears to be damaged and the Inverter 114 AC output breaker is tripped.

SDG: ED7

IMF ED11D

Event 5/6 Uncontrolled Rod Insertion requiring Manual Rx Trip and failure of the turbine to Auto Trip.

Initiate event after actions for the loss of Inst Bus 114 have been addressed, including Tech Spec 3.8.9, and with lead

examiner's concurrence. Acknowledge info passed to SM, WEC, maintenance, and in plant operators
SDG: RD1
IOR ZDIBKSEL AUTO
IMF RX17 -4.25; IMF TC03 (preloaded)

Event 7 Low 1D RCP Lower Oil reservoir Level Low and RCP 1D Trip followed by Loop 1D Hot Leg Break.

Malfunction actuates from the reactor trip and will occur 5 minutes following the reactor trip.

Acknowledge info passed to SM, WEC, and maintenance.

SDG: TH6

IMF PN0680 ON (1 5:00)

IMF TH17D (1 5:00)

IMF TH04D (2 1) 800

Scenario No.: 06-1		Event No.: 1
Event Description: Perform Reactivity calculation for ramp to 1235 Mwe and commence the ramp to 1235 Mwe.		
Time	Position	Applicant's Actions or Behavior
	CUES:	Directed to perform during turnover
	RO BOP	Performs reactivity calculation for Unit 1 ramp to 1235 Mwe power. (Should calculate ~2500-3000 gal dilution and setup to add 40-70%)
	US	Fill out Rx Change Briefing Sheet Direct actions for ramp to 1235 Mwe power. Monitor effects of dilution Direct how rods will be moved during the power change.
	RO	Initiate dilution (BOP CV-5) <ul style="list-style-type: none"> • Place MU MODE CONT SWITCH to STOP position. • Set MU MODE SELECT to DIL or ALT DIL position. • Set 1FK-111 PW/Total Flow Cont Pot to desired dilution rate. • Verify 1CV111A in AUTO • Set 1FY-0111 Primary Water Control Preset Counter to desired volume.(batch values) • Verify 1CV111B & 1CV110B in AUTO • Place MAKE-UP CONTROL Switch to START • Verify proper operation of valves & PW pump (1CV111A &111B OPEN, PW pump is running, (and 110B opens, if in ALT DIL) • Verify expected PW flow on recorder 1FR-110 • Monitor Dilution effects • Verify at least two B/U Heater groups ON and spray valves 1RY455B/C modulate OPEN. • Monitor for RCS Tave rise.
	BOP	Initiate turbine load ramp: Using graphic 5501(may use 1BGP 100-3 step or 100-3T4 load swing sheet) <ul style="list-style-type: none"> o Verify/Select Impulse Pressure IN • SELECT SETPOINT • ENTER 1120 (or 1125 from Load Swing Sheet) in the REF DEMAND window • SELECT ENTER • ENTER 5 MW/MIN rate in the RATE window Inform US/RO of pending rise in turbine load <ul style="list-style-type: none"> • SELECT GO (when RO reports expected Tave rise) Verify load rises as expected.
		NOTE: The next event may be entered at lead examiner's direction after 5-10% power change and VCT makeup MODE SELECT switch has been placed in AUTO.

Comments:

Scenario No.: 06-1		Event No.: 2
Event Description: VCT level channel 1LT-CV112 fails low.		
Time	Position	Applicant's Actions or Behavior
	CUES:	Annunciators: 1-9-A2 VCT LEVEL HIGH HIGH/LOW 1LI-112 VCT level indicator bottom of scale VCT Auto Makeup started
	RO/US	Identify/report failure of 1LT-CV112
	RO/US	<ul style="list-style-type: none"> • Refer to BAR 1-9-A2 for operator actions • Verify actual VCT level on 1LI-185
	RO	<ul style="list-style-type: none"> • Stop AUTO VCT makeup by: <ul style="list-style-type: none"> ○ Placing the VCT Makeup MODE SELECT switch in any position but AUTO, OR ○ Place the VCT Makeup Control switch to OFF, OR ○ Closing 1CV111A and 1CV11B ○ Verify/recognize placing VCT Makeup MODE SEL switch to AUTO will initiate auto Makeup ○ Identify/flag 1LI-112, 1CVLCV112A and VCT Makeup MODE SEL switch ○ Re-verify Dilution line-up
	ALL	<ul style="list-style-type: none"> • Identify loss of auto makeup capabilities to VCT ○ Identify loss of auto modulate VCT Divert to Holdup Tank on high level (1LY-185 will work)
	US	Identifies Tech Spec 3.3.9 for BDPS includes this channel <ul style="list-style-type: none"> ○ Places on Degraded Equipment List (DEL)
	BOP	Monitor plant for effects of power ramp and take any actions directed by the US
		NOTE: When actions have been completed to respond to failed VCT level channel and lead evaluators concurrence, Event 3 is entered.

Comments:

Scenario No.: 06-1		Event No.: 3
Event Description: Steam Generator 1D controlling steam pressure channel fails low (1PT545A)		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciators: 1-15-D1 S/G 1D LOW PRESS STEAMLIN ISOL ALERT 1-15-E1 MS PRESS RATE STM LINE ISOL ALERT 1-15-D3 S/G 1D FLOW MISMATCH STM FLOW LOW 1-15-D4 SG 1D FLOW MSMATCH FW FLOW LOW 1-15-D9 S/G 1D LEVEL DEVIATION HIGH LOW 1D SG steam pressure indication zero on 1PT545A 1D SG steam flow low 1D SG feedwater flow dropping 1B & 1C FW Pump Speed dropping 1D SG Level dropping
	BOP/US	<ul style="list-style-type: none"> • Identify/report failure of 1PT-545, 1D steam generator steam pressure channel. ○ Address 1-15-D9 Alarm response • Check 1D SG level, steam flow, feed flow, and determine cause. • Take Manual control feed flow to 1D SG.
	US	Enter and direct actions of 1BOA INST-2, "OPERATION WITH A FAILED INSTRUMENT CHANNEL" Attachment F <ul style="list-style-type: none"> • Notifies SM of BOA entry • Requests Emergency Plan evaluation ○ Orders ramp to HOLD
	BOP	Check affected SG level: <ul style="list-style-type: none"> ○ Determine SG level not normal • Take manual control of 1FW540 M/A station and restore SG level to normal • Take manual control of 1SK-509A M/A station to maintain MFPs speed to maintain MFRV D/P • Select an operable steam flow channel • Restore Automatic level control • Restore Automatic MFP speed control
	ALL	<ul style="list-style-type: none"> • Identify/flag TSLB lites associated with failed channel ○ Identify/flag failed channel • Request operator to locally trip bistables for the affected channel
	US	Performs administrative requirements <ul style="list-style-type: none"> • Determines Tech Spec for 3.3.2 ESFAS Instrumentation Condition A and D apply • Requests IR/WR/LCOAR ○ Considers recommencing ramp
	RO	Monitor plant response to FW transient and take actions directed by the US
		NOTE: When the above actions have been initiated for the failed SG steam pressure channel and with lead evaluator's concurrence, Event 4 is entered. (Bistables may be tripped at lead examiner's discretion)

Comments:

Scenario No.: 06-1		Event No.: 4
Event Description: Loss of Instrument Bus 114		
Time	Position	Applicant's Actions or Behavior
	CUES:	Annunciators: 1-3-D7 AF FLOW CONT VLV SETTING LOW 1-4- D5 BUS 114 INVERTER TROUBLE and numerous (6) others on this alarm module. 1-10-A3 PWR RNG HIGH STPT RX TRIP ALERT and numerous (7) others on this module. 1-12-C1 PZR PRESS CONT DEV LOW HTRS ON 1-13-A2 RCP BUS UNDERVOLTAGE RX TRIP ALERT 1-13-B2 RCP BUS UNDERFREQUENCY RX TRIP ALERT 1-13-D3 RCP 1D BRKR OPEN OR FLOW ALERT 1-18-A4 TURB STOP VLV CLOSED ALERT 1-18-E16 C-16 STPT EXCEEDED The right side of 1PM07J (NIs) is DARK including PR N44 1PM05J CRTs Dark
	RO/US	Identify/report failure of Instrument Bus 114.
	US	Refer to IBOA ELEC-2 for operator actions <ul style="list-style-type: none"> o Place ramp on HOLD
	RO/ BOP	Verify control channels are operable for <ul style="list-style-type: none"> • PZR pressure • PZR level • Tave • Delta-T • P Impulse • SG level • Steam flow • Feed flow
	US RO	<ul style="list-style-type: none"> • Prepare to energize Bus 114 from the CVT • Direct local operation to prepare CVT to bus 114 and report of local indications of bus condition • Contact EMD to investigate damage to bus 114. • Refer to Tech Specs 3.8.9 Condition B for action to shutdown within 8 hours • Direct local Inverter 114 shutdown. • Review Table D impacts for loss of Inst Bus 114 (Below is a portion of the list that will be an impact at this time. All are expected to be addressed) <ul style="list-style-type: none"> • Train B ESF loads will require manual actuation and no reset. • Rods will not withdraw in Manual • PORV 1RY455A will not open in Auto • VCT Auto makeup will not occur. • 1AF005E-H will close as soon as flow starts and cannot be controlled from the MCR. • 1SD054A-D, SD Blowdown failed closed • RCPs 1D and 1B Seal Leakoff Flow Recorders are inoperable • 1PR-403, RC WR Pressure recorder is inoperable • PR N44 is lost • SR audio counts are lost • 1LL-SI075B, CNMT Sump level lights are lost • Several TSLBs lit and 1PM05J CRTs are lost

Comments:

	US	Request maintenance to troubleshoot. Notify SM for IR/WR o Consider recommencing the ramp.
		NOTE: Actions in 1BOA INST-1(IF evaluator deems this action is necessary). These can be deferred to a request for additional NSOs to assist and the actions in this procedure will be given as a JPM during this exam. With the bus damaged, this is not directed action as part of this BOA action.
	BOP	Monitor plant for effects, address BARs, and take any actions directed by the US
		NOTE: When actions have been completed to respond to loss of Inst Bus 114 and lead evaluator's concurrence, Event 5 is entered. (recommend continuing as soon as 1BOA ELEC-2 Table D and Tech Spec 3.8.9 have been addressed)

Comments:

Scenario No.: 06-1		Event No.: 5
Event Description: Uncontrolled Rod Insertion		
Time	Position	Applicant's Actions or Behavior
	CUE:	Rods begin stepping in with no demand signal.
	RO US	Identify/report Rods stepping in with no demand signal. Direct actions in 1BOA ROD-1, Uncontrolled Rod Motion
	RO	<ul style="list-style-type: none"> ○ Refer to 1BOA ROD-1 ● Check turbine power – stable ● Check/place Rod control in MANUAL ● Check if Rods are still MOVING ○ Place Rods in AUTO, if NOT previously ● Place ROD BANK SELECT switch in Shutdown Bank D ● Check if Rods are still moving ● Manually trip the Reactor ● Go to 1BEP-0

Comments:

Scenario No.: 06-1		Event No.: 6
Event Description: Turbine fails to Auto trip from reactor trip – Manual Turbine trip required		
Time	Position	Applicant's Actions or Behavior
	CUE:	Turbine Throttle and Governor Valves are open after the reactor is tripped
	US	Implement 1BEP-0 "REACTOR TRIP OR SAFETY INJECTION" and directs operator actions. <ul style="list-style-type: none"> • Notifies SM of EP entry • Requests Emergency Plan evaluation
	RO	Verify reactor trip <ul style="list-style-type: none"> • Rod bottom lights LIT • Reactor trip & Bypass breakers open • Neutron flux dropping
	BOP	Verify Turbine Trip prior to performing step 3 of 1BEP-0 <ul style="list-style-type: none"> • Turbine throttle valves NOT closed • Turbine governor valves NOT closed • Manually Trip the turbine
	BOP	Verify power to 4KV busses <ul style="list-style-type: none"> • Bus 141 alive light lit • Bus 142 alive light lit
	ALL RO	Check SI status <ul style="list-style-type: none"> • NO SI actuated • SI First OUT annunciator is NOT lit (1-11-B1, 1-11-C1, 1-11-D1, 1-11-E1) • SI ACTUATED is NOT lit (1-BP-4.1) • SI Equipment is NOT running (SI pumps running, CV Cold leg injection SI8801A/B open) Check if SI is required <ul style="list-style-type: none"> • PZR pressure is NOT < 1829 psig • Steamline pressure is NOT < 640 psig • CNMT pressure is < 3.4 psig • PZR level can be maintained > 4%
	BOP US	<ul style="list-style-type: none"> • Ops expectation is to manually start AF Pumps, since LO-2 will occur. Transition to 1BEP ES-0.1, Reactor Trip Response Request STA for monitoring BSTs Notify SM to evaluate for E-plan

Comments:

		Actions for 1BEP ES-0.1
	BOP	Verify Generator tripped <ul style="list-style-type: none"> • Unit 1 Main Transformer breakers open (GCB 3-4 & OCB 4-5) • PMG output breaker open
	RO	Maintain RCS Temperature Control <ul style="list-style-type: none"> • Check RCPs running • RCS temp stable or trending to 557 °F Determine if Boration required <ul style="list-style-type: none"> • RCPs –any running <ul style="list-style-type: none"> • Determine NO boration required
	BOP	Check FW status <ul style="list-style-type: none"> • FW isolation valves lit • Trip all HD pumps • Total feed flow to SGs- > 500 gpm • SG Blowdown isolation valves closed – 1SD002A-H (8)
		Event 7 was initiated on a 5 minute time delay from the reactor trip and should be actuated during the steps above.

Comments:

Scenario No.: 06-1		Event No.: 7
Event Description: RCP 1D Trip and Loop 1D Hot leg break		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciators: 1-13-D6 RCP 1D LOWER OIL RSRVR LVL HIGH LOW 1-13-E9 LOOSE PARTS MONITORING SYSTEM TROUBLE 1-1-A2 CNMT DRAIN LEAK DETECT FLOW HIGH RM-11 1PR011J, CNMT ATMOS PZR pressure dropping PZR level dropping
	ALL US	Determine Safety Injection required and manually actuate. <ul style="list-style-type: none"> Announce Transition back to 1BEP-0, REACTOR TRIP OR SAFETY INJECTION. And for operators to perform their immediate actions. Implement 1BEP-0 "REACTOR TRIP OR SAFETY INJECTION" and directs operator actions. <ul style="list-style-type: none"> Notifies SM of EP entry Requests Emergency Plan evaluation
	RO	Verify reactor trip <ul style="list-style-type: none"> Rod bottom lights LIT Reactor trip & Bypass breakers open Neutron flux dropping
	BOP	Verify Turbine Trip prior to performing step 3 of 1BEP-0 <ul style="list-style-type: none"> Turbine throttle valves closed Turbine governor valves closed
	BOP	Verify power to 4KV busses <ul style="list-style-type: none"> Bus 141 alive light lit Bus 142 alive light lit
	ALL RO	Check SI status <ul style="list-style-type: none"> SI actuated <ul style="list-style-type: none"> SI First OUT annunciator lit (1-11-B1, 1-11-C1, 1-11-D1, 1-11-E1) SI ACTUATED lit (1-BP-4.1) SI Equipment running (SI pumps running, CV Cold leg injection SI8801A/B open) (1A SI pump did not and will not start. 1SI8801B did not open. 1B RH and CV will require manual start) Actuate SI by taking either SI switch to ACTUATE (1PM05J or 1PM06J)
	BOP	Verify FW isolated <ul style="list-style-type: none"> FW pumps tripped Isolation monitor lights lit FW pumps discharge valves closed 1FW002A-C

Comments:

RO [CT] [E-0-J]	Verify ECCS pumps running <ul style="list-style-type: none"> • CENT CHG pumps – both running – Manually start 1B when directed • RH pumps – both running – Manually start 1B when directed • SI pumps – both running – Manually start 1B, 1A SI pump did not and will not start.
BOP [CT] [E-0-O]	<ul style="list-style-type: none"> • Verify RCFCs Accident Mode lights lit <ul style="list-style-type: none"> • Stop 1B RCFC running in High speed • Verify proper SX valve alignment for RCFCs to run in low speed • Start 1B and 1D RCFC in low speed. • Verify Phase A isolation - Group 3 monitor lights lit <ul style="list-style-type: none"> • Manually actuate Phase A, • Then close all B Train Phase A valves that are NOT LIT (Numerous) • Verify CNMT Ventilation isolation - Group 6 CNMT Vent Isol monitor lights lit
RO	<p>Note: With the combination of the inventory loss from the LOCA, RCP trip criteria may be reached prior to the CNMT HI-3/Phase B. In this case, the following should be performed:</p> <ul style="list-style-type: none"> • Any RCP's running • Check if trip criteria satisfied: • HH SI flow >100 gpm OR SI pump discharge flow >200 gpm AND • RCS pressure < 1425 psig <p>Trip RCP's if controlled cooldown NOT in progress and above criteria satisfied</p>
US/BOP	Verify AF system: <ul style="list-style-type: none"> • AF pumps running • AF isolation valves open 1AF13A-H • AF flow control valves throttled 1AF005A-H (E-H will fail closed) Verify CC Pumps running <ul style="list-style-type: none"> o Start 1B CC pump Verify SX Pump running <ul style="list-style-type: none"> o Start 1B SX pump Check if Main Steamline Isolation required <ul style="list-style-type: none"> • Check SG pressure > 640 psig • Check CNMT pressure < 8.2 psig o If either condition NOT met then verify MSIVs and MSIV Bypass valves closed <ul style="list-style-type: none"> • Announce Adverse Cnmt conditions when > 5 psig

Comments:

	BOP	<p>Check if CNMT Spray is required</p> <ul style="list-style-type: none"> • Check CNMT pressure has NOT increased to greater than 20 psig
	BOP	<p>Verify Total AF flow:</p> <ul style="list-style-type: none"> • AF flow > 500 gpm – Only A train AF005s will be open • SG levels maintained between 10% (31% Adverse) and 50% • SG NR levels NOT increasing in an uncontrolled manner
	BOP	<p>Verify ECCS valve alignment</p> <ul style="list-style-type: none"> • Group 2 Cold Leg Injection monitor lights lit <ul style="list-style-type: none"> • Verify B train valves are properly aligned
	BOP	<p>Verify ECCS flow</p> <ul style="list-style-type: none"> • HHSI flow >100 gpm • RCS pressure <1700 psig • SI pump discharge flow > 200 gpm • RCS pressure > 325 psig
	RO	<p>Check at least one PZR PORV relief path is available</p> <ul style="list-style-type: none"> • PORV isol valve – both ENERGIZED (1RY8000A/B) • PORV relief path – only one AVAILABLE (1RY456) <ul style="list-style-type: none"> • PORVs in AUTO (1RY455A will not open in auto due to loss of Inst Bus 114) • Isolation valves open
	BOP/US	<p>Verify Generator Trip</p> <ul style="list-style-type: none"> • GCB 3-4 and OCB 4-5 open • PMG output breaker open
	BOP	<p>Verify 1A DG running, 1B DG OOS</p> <ul style="list-style-type: none"> • SX valve open 1SX169A • Dispatch operator locally to check operation
		<p>Examiners note: US and RO will likely continue in 1BEP-0 while BOP is performing the next 3 ventilation steps:</p>

Comments:

BOP		<p>Verify Control Room ventilation aligned for emergency operations:</p> <ul style="list-style-type: none"> • Dispatch NLO to trip VV supply fans • Operating VC train equipment running Train A <ul style="list-style-type: none"> • Supply fan • Return fan • M/U fan • Chilled water pump • MCR chiller 0A • Operating VC train dampers <ul style="list-style-type: none"> • M/U fan outlet damper NOT full closed 0VC24Y • VC train M/U filter light LIT • Operating VC train Charcoal Adsorber aligned for train A <ul style="list-style-type: none"> • 0VC43Y closed • 0VC21Y open • 0VC22Y open • Control Room pressure greater than +0.125 inches water on 0PDI-VC038
BOP		<p>Verify Auxiliary Building ventilation aligned</p> <ul style="list-style-type: none"> • Two inaccessible filter plenums aligned <ul style="list-style-type: none"> • Plenum A fan 0VA03CA running <ul style="list-style-type: none"> • Damper 0VA022Y open • Damper 0VA020Y closed • Plenum C fan 0VA03CF running <ul style="list-style-type: none"> • Damper 0VA072Y open • Damper 0VA438Y closed
BOP		<p>Verify FHB ventilation aligned</p> <ul style="list-style-type: none"> • Train A fan 0VA04CA running • 0VA060Y open • 0VA057Y open • 0VA051Y closed
RO		<p>Check PZR sprays & PORVs closed</p> <ul style="list-style-type: none"> • Normal spray valves closed 1RY455B and 1RY455C (NOTE: valves are failed closed due to loss of IA due to Cnmt Phase A) • PORVs closed (1RY455A/456)
RO/BOP		<p>Maintain RCS temperature control</p> <ul style="list-style-type: none"> • Determine RCPs running <ul style="list-style-type: none"> • RCS Tave < 557°F and NOT trending to 557°F <ul style="list-style-type: none"> ○ Stop dumping steam • Throttle AFW flow to SGs maintaining > 10% (ADVERSE >31%) in at least 1 SG. (Except the faulted SG) • Verify steam dumps closed • Verify 1MS009A thru D and 1MS067A thru D are closed (MSR RHTR shutoff and purge vlvs) • MFP turbine HP stop Vlvs closed ○ Close all MSIV and MSIV bypass Vlvs

Comments:

	RO	<p>Check if RCP's should be stopped</p> <ul style="list-style-type: none"> No RCP's running
	RO	<p>Check status of RCPs</p> <ul style="list-style-type: none"> None running
	US/BOP	<p>Check if SG Secondary Pressure Boundaries are Intact.</p> <p>Check pressure in all SGs:</p> <ul style="list-style-type: none"> No SG Pressure dropping in a Uncontrolled manner No SG completely depressurized <p>Check if SG tubes are Intact: (RM-11 Grid 1)</p> <ul style="list-style-type: none"> SJAE/GS Exh Gas rad < 1PR27J Alert stpt SG Bldn rad < 1PR08J Alert stpt Main Steamline rad < 1RT-AR022 and 23 stpts

Comments:

Scenario No.: 06-1		Event No.: 7
Event Description: 1D RCP locked rotor and 1D Hot leg break		
Time	Position	Applicant's Actions or Behavior
	BOP	Check if RCS is Intact: <ul style="list-style-type: none"> • CNMT rads < 1RT-AR011/12/14/20/21 stpts • CNMT pressure < 3.4 psig • CNMT sump level lights NOT LIT • GO TO 1BEP-1, Loss of Reactor or Secondary Coolant
	ALL US	Transition to 1BEP-1, Loss of Reactor or Secondary Coolant <ul style="list-style-type: none"> • Request the STA to monitor BSTs
	US	Enter and direct actions of 1BEP-1 <ul style="list-style-type: none"> • Notifies SM of BEP entry • Requests Emergency Plan evaluation
		At lead examiners discretion, the scenario can be terminated. Perform EAL classification. (EAL FA1)

Comments:

Unit Supervisor Turnover –FOR TRAINING ONLY

PLANT STATUS				
Grid Status: Green	"B" Train Week	WWM: R. Freidel	Shift: 95 to 96	Date: TODAY
Unit 1			Unit 2	
Mode: 1	% Pwr: 56	MW: 595	OLR: Yellow	
Mode: 1	% Pwr: 99.9	MW: 1229	OLR: Green	
CB: 1025	Xenon: Steady State	Rod Height: 138	CB: 1168	Xenon: Steady State Rod Height: 221
IN PROGRESS			IN PROGRESS	
-1B DG Turbo Charger work -1C HD pump seal replacement -1BOSR 8.1.1-1 is required every 8 hours (completed 30 minutes ago)			-2HD099 contingency plan to Furmanite. -SAT 242-2 bank 4 deenergized with EST tag (cooling fan 2 missing)	
LCOAR	C/O / T/L / RTS		LCOAR	C/O / T/L / RTS
-1BOL 8.1	1B DG ACB 1423 1C HD pump			2HD0099B
LCOAR's Exited:			LCOAR's Exited:	
MAINTENANCE			MAINTENANCE	
-1B DG -1C HD pump			-SAT 242 bk 4 fans	
MAJOR PROC.			MAJOR PROC.	
PENDING			PENDING	
NO LIQ REL w/o permission from Ops Dir & SVP -U1/U2 Cnmt Release Package prep -Power Team has requested power ascension to 1235 Mwe as soon as the Unit is capable. - SM directed power ascension at 3% power per hour.			-U2 EH sample	



Unit Supervisor Turnover – FOR TRAINING ONLY

<u>ADMINISTRATIVE</u>		<u>COMMENTS</u>
Temporary Alterations	X	
Unit 0 Logbook	X	
Unit 1 Logbook	X	
Unit 2 Logbook	X	
Train Inop Status Board	X	
Degraded Equipment Log	X	
Daily Orders	X	
* CRs	X	
Abnormal Component Posit.	X	

<u>TURNOVER ITEMS</u>	<u>Normal</u> <u>YES/NO</u>	<u>COMMENTS</u>
NSO Shiftly and Daily Surv	Yes	-1C HD pump OOS; RTS by end of shift today -1B DG OOS; RTS by end of shift today
SYS - Primary	Yes	
SYS – Balance of Plant	No	
Nuclear Instrumentation	Yes	
MCB Instrumentation	Yes	
MCB Controllers	Yes	
Electrical Distribution - AC	No	
Electrical Distribution - DC	Yes	
Electric Operations	Yes	
Blowdown (CW/SD)	Yes	
Alarms (MCB)	Yes	
Chemistry	Yes	
Radiation Precautions	Yes	
FME Issues	Yes	

UNIT 1 TURNOVER EFPH: 6400

U-1 Reactivity: Dilute 38 gals=.3°F **Nuke Engineer:** K. Elam **Boron to ramp to 780 MW:** 525 **700 MW:** 360 gals

BAT = 7581, BA Pot = 4.0 Equals 16 gpm @ Steady State FUEL DEPLETION:120 gallons/shift
 RWST = 2383 ppm 1A CV pp Cb = 1025 ppm

U-2 Reactivity: Dilute 20 gal=.2°F **Nuke Engineer:** F. Funke **Boron to ramp to 780 MW:** 480 **700 MW:** 290 gals

BAT = 7579, BA Pot = 4.61 Equals 18.4 gpm @ Steady State FUEL DEPLETION: 40 gallons PW/shift
 RWST = 2350 ppm 2B CV pp Cb = 1188 ppm

Exceptional OOS's Requiring Special Plant Conditions

--

MISCELLANEOUS

Review BA Pot settings on turnover
 2HD099B steam leak (~120 drops/min) Monitor 2X/shift

Post Reviews: FS, US, Unit NSO, Turnovers Logs, MCR Tour, Daily Orders and Standing Orders

OFF-GOING		ON-COMING	
<i>Unit 1 Unit Supervisor</i>		U-1 Unit Supervisor	
<i>Unit 2 Unit Supervisor</i>		U-2 Unit Supervisor	
		STA	

Center Desk Operator Turnover- FOR TRAINING ONLY

PLANT	U1 Mode: 1	% Pwr: 56	MW: 595	IN PROGRESS	
STATUS	U2 Mode: 1	% Pwr: 100	MW: 1229	CW Warming line is OFF	
MUDS					
BOILER		IA DRYERS ON LINE			
0A: Standby	U1: Wet L/U		U1/U2		
0B: Exhausted	U2: Wet L/U		AS	U1 ES	
ADMINISTRATIVE					
1. Temporary Procedures			X		
2. Temporary Alterations			X		
3. ESTs			X		
4. Unit 0 Logbook			X		
5. Center Desk Routine			X		
6. Daily Orders			X		
7. SM Notes			X		
8. Switching Orders / Electric Ops / Division LD			X		
9. Control Board Walkdown			X		
10. 1 st Shift Annun Check Completed			NA		
LCOAR		C/O / RTS		Surveillances	Maint / WR
TURNOVER ITEMS		Normal			
1. HVAC		Yes	OCB's 12-13, 4-5, & 11-12 have temporary Cabinet Htrs 1B DG OOS for Turbo Charger work 2HD099B has a steam leak - needs Furmanite		
2. 345 KV Systems, Relay House		No			
3. Air Systems (IA, SA)		Yes			
4. Fire Protection		Yes			
5. Blowdown		Yes			
6. Radiation Releases		Yes			
7. MCB Instrumentation		Yes			
8. MCB Controllers		Yes			
9. Tank Capacity		Yes			
10. Chemistry		Yes			
11. Radiation Protection		Yes			
12. Alarms – MCB Annun		Yes			
13. Alarms – FP / Other		Yes			
14. SYS – Safeguards		No/14			
15. SYS - Primary		Yes			
16. SYS – Balance of Plant		No/16			
17. MDCT		Yes			
18. NDCT, Flume		Yes			
19. FME Issues		Yes			
TIME	DATE	SHIFT	OFF-GOING		ON-COMING
Now	TODAY	95 to 96	<i>Center Desk</i>		

Unit 1 Nuclear Station Operator Turnover – FOR TRAINING ONLY

PLANT	Mode: 1	% Pwr: 56	MW: 595	ADMINISTRATIVE					
STATUS	Grp: CBD 138	Cb: 1025 ppm	Xe: Steady State	1. <u>Temporary Procedures</u>	X				
TURNOVER				2. <u>TCCP's</u>	X				
EFPH = 6400				3. <u>EST's</u>	X				
LCOAR	C/O / RTS	Surveillances	Maint / WR	4. <u>Unit 1 Logbook</u>	X				
1B DG (1BOL 8.1)	1B DG C/S ACB 1423 C/S 1C HD pp C/S	1BOSR 8.1.1-1		5. <u>Unit Routine</u>	X				
				6. <u>Aux Elec Equip Rm General Inspection</u>	X				
				7. <u>Daily Orders</u>	X				
				8. <u>SM Notes</u>	X				
				9. <u>Control Board Walkdown</u>	X				
				10. <u>Abnormal Component Positions</u>	X				
				11. <u>1st Shift Annun Check Completed</u>	NA				
				IN PROGRESS				PENDING	
				1B DG Turbo Charger work/1A DG Protected 1C HD pp seal replacement				Load Ramp to 100% power (1235 Mwe) at 3%/hr BA Pot = 4.0 Equals 16 gpm @ Steady State FUEL DEPLETION:120 gallons/shift Dilute 38 gals =.3°F	
				Exceptional C/O's Req Plant Cond:					
				TURNOVER ITEMS		Normal			
1. No Major Procedures in Progress		Yes	1B DG OOS 1C HD pp OOS						
2. NSO Shiftly and Daily Surveillance		Yes							
3. SSPS Channels / Bistables		Yes							
4. ALARMS – SER / Annunciators		Yes							
5. ALARMS – Process / RM-11		Yes							
6. SER / Alarm Typer / Trend Typer		Yes							
7. Alarms – FP / Other		Yes							
8. Tank Capacity		Yes							
9. Chemistry		Yes							
10. Radiation Precautions		Yes							
11. Nuclear Instrumentation		Yes							
12. MCB Instrumentation		Yes							
13. MCB Controllers		Yes							
14. Electrical Distribution - AC		Yes							
15. Electrical Distribution - DC		Yes							
16. SYS - Safeguards		No/16							
17. SYS - Primary		Yes							
18. SYS – Balance of Plant		No/18							
19. FME Issues									
20.									
21.									
TIME	DATE	SHIFT	OFF-GOING	ON-COMING					
NOW	TODAY	95 to 96	U-1 NSO						

BORATION / DILUTION CALCULATIONS

Purpose: The purpose of this power change reactivity worksheet is to establish a boundary for the amount of boration / dilution that may be required and to assist in meeting industry expectations for reactivity control during a power ramp. The worksheet assumes steady state reactor power prior to the ramp and DOES NOT consider Xenon effects. Since the worksheet establishes a boundary, the operator experience plays an equal if not more important role in ensuring proper reactivity controls. 40% to 70% of the boration / dilution amount will normally be added.

CALCULATION:

1. Basis: Approx Cycle Burnup: 6400 EFPH Initial Cb: 1025 ppm
Initial Reactor Power: 56 % Initial CBD: 138 steps
Final Reactor Power: 100 % Final CBD: 221 steps (est)

2. Determine the change in power defect:
Use BCB-1 Figure 17A, pages 1-4 or Table 2-1:

$$\frac{(-) 1800}{\text{final power defect}} - \frac{(-) 1050}{\text{present power defect}} = \frac{-550}{\text{Change in power defect}} \text{ pcm}$$

3. Determine the amount of reactivity change due to control rod repositioning:
Use BCB-1 Figure 2C, pages 1-4 or Table 1-7 (Ensure correct curve w/respect to core life):

$$\frac{260}{\text{present inserted rod worth}} - \frac{10}{\text{final inserted rod worth}} = \frac{+250}{\text{Change in control rod worth}} \text{ pcm}$$

4. Determine the reactivity the boration / dilution will compensate for:

$$\frac{-550}{\text{step 2 result}} + \frac{250}{\text{step 3 result}} = \frac{-300}{\text{Reactivity to compensate for}}$$

5. Determine the Differential Boron Worth (DBW):
Use BCB-1 Figure 10B, pages 1-4 or Table 2-4: 7.36 pcm/ppm (Avg of 2 values)
(Use the DBW absolute value, i.e., positive)-> 7.36 differential boron worth

6. Determine the ppm change in RCS boron concentration:
(NOTE: + number indicates boration; - number indicates dilution)

$$\frac{(\text{step 4 result})}{(\text{step 5 result})} = \frac{-300/7.36}{-40.76} = \text{ppm change in RCS boron conc.}$$

7. Determine the amount of boration / dilution required: (Data taken using 570°F)
Use Table 3-1 → ~ 2720 gallons PW BORATION or DILUTION required
(circle one) **(BOLDED)**

(Final)

Facility:	<u>Byron</u>	Scenario No.:	<u>06-2</u>	Op-Test No.:	<u>2006-301</u>
Examiners:	_____	Operators:	_____	<u>SRO</u>	
	_____		_____	<u>RO</u>	
	_____		_____	<u>BOP</u>	
Initial Conditions: IC-18; ~75% power, ~865 Mwe, MOL, equilibrium Xenon, steady state, 1B Diesel Generator OOS, 1C HD pump OOS, and 1A FW pump OOS.					
Turnover: The plant is at 75% power, as requested by the Power Team to support a grid outage, MOL, equilibrium Xenon, steady state, 6900 EFPH, and 1000 ppm boron concentration. The Unit has been at 75% power for 3 days and was previously at 100% power for 96 days. The 1B DG is OOS for Turbo Charger work. The 1B DG has been OOS for 18 hours and is expected to be returned to service by the end of the shift. LCOAR for Tech Spec 3.8.1 Condition B has been entered; 1BOSR 8.1.1-1 was performed 30 minutes prior to shift turnover. 1A FW pump is OOS for work on the speed increaser and not expected back for 2 more days. 1C HD Pump is OOS for seal replacement and is expected back by the end of shift. On-line Risk is yellow.					
Event No.	Malf. No.	Event Type*	Event Description		
Preload	MRF EG09 MAINT_O IOR ZDI1HSDG028 PTL IOR ZLO1HSDG0201 OFF MRF FW024 0 MRF FW027 0 MRF ED091C OPEN IOR ZDI1FW01PA PTL IOR ZDIFW01PAB PTL IOR ZDI1HD01PC PTL		1B DG OOS ACB 1423 OOS 1B DG STOP Lite 1A FW Pump suction isol valve 1A FW Pump recirc isol valve Deenergize 1FW002A, 1A FW Pump discharge valve 1A FW Pump OOS 1A FW Pump Aux Oil Pump OOS 1C HD pp OOS		
1	IMF TH03C 30 100	C ALL US RO R RO N BOP	SG Tube Leak in 1C SG at 30 gpm requiring plant shutdown per 1BOA SEC-8 and Tech Spec 3.4.13 application. Direct the Unit ramp down to 50% power Perform Reactivity calculation for ramp to 50% power Ramp the Unit to 50% power Ramp the Unit to 50% power		
2	IMF RX13A 0 10	I RO US	Controlling PZR level channel 1LT-459 fails to 0 causing a loss of Letdown. This requires use of 1BOA INST-2 and addressing Tech Spec 3.3.1 for actions.		
3	IMF RX05 0	I BOP	MS Header PT, 1PT-507, fails low requiring manual FW pump speed control to stabilize the secondary plant.		
4	IMF CV05 600	C RO	PCV-131 controller fails closed in AUTO. This will require Manual control to maintain Letdown backpressure.		
5, 6	IMF FW02A IMF FW06B IMF FW08B	C BOP M ALL	1B FW Pump trips, followed shortly (~20 seconds) by 1C FW Pump speed ramping to minimum, resulting in no FW flow requiring a manual reactor trip.		
7	MMF TH03C 350 60	M ALL	Increases 1C SG Tube Leak to a 350 gpm SGTR.		

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

SCENARIO 06-2 OVERVIEW

The scenario will begin at 75% power, MOL, equilibrium Xenon, steady state. The 1B DG is OOS for Turbo Charger work. The 1B DG has been OOS for 18 hours and is expected to be returned to service by the end of the shift. LCOAR for Tech Spec 3.8.1 Condition B has been entered; 1BOSR 8.1.1-1 was completed 30 minutes ago. 1A FW pump is OOS for work on the speed increaser and not expected back for 2 days. 1C HD pump is OOS for seal replacement and is not expected back until the end of shift.

After a board walk down and turnover, a 30 gpm tube leak will be initiated in the 1C SG. The crew must identify primary to secondary leakage based on SJAE/GS condenser and main steam line Radiation Monitors. This will require actions in 1BOA SEC-8 requiring plant power reduction to 50% power within 1 hour and shutdown to Hot Standby within 2 hours after reaching 50%. Tech Spec 3.4.13 actions are addressed also requiring shut down to MODE 3 within 8 hours.

After the crew has taken actions for the SG tube leak and commenced the down power to 50%, the controlling channel for PZR level, 1LT-459, will fail low requiring manual control to maintain PZR level and restoration of Letdown. The US will enter 1BOA INST-2, for the failed PZR level channel and direct actions to restore control to Auto including restore Letdown flow and return PZR level to program. Tech Spec 3.3.1, Condition K applies. The crew will take actions to place the bistable in trip for the failed channel and notify maintenance for repairs.

Following the required actions for the PZR level channel failure, the Main Steam Pressure transmitter, 1PT-507, fails low causing the Master Feed Pump Speed controller to lower FW Pump's speed, which results in loss of FW flow to all SGs. Action is required to take Manual control of FW pump speed to restore and maintain SG levels at program level for the remainder of the scenario. This failure is not addressed in a BOA or in Tech Specs. Maintenance should be notified and specific directions should be given to the BOP for controlling FW pump speed in Manual to maintain SG levels and proper FW discharge pressure to SG delta pressure.

While the BOP is stabilizing the MFP speed control, PCV-131, L/D backpressure control valve, will fail closed. This will require manual control to restore backpressure and prevent the L/D line relief to lifting, if left in Auto. This failure is not addressed in a BOA or in Tech Specs. Maintenance should be notified and specific directions should be given to the RO for controlling letdown backpressure.

Once SG level control, FW Pump ΔP , and PCV-131 manual controls have been directed, the 1B FW pump will trip requiring actions in 1BOA SEC-1 to runback the turbine, since the 1A FW pump is OOS, to maintain SG levels with only 1 FW pump running. Once the initial actions for the runback have been taken and turbine load is dropping, boration is commenced and/or rod insertion, the 1C FW pump speed control will fail to minimum speed resulting in no feed to the SGs resulting in a Reactor trip and entry into 1BEP-0. The crew may transition to 1BEP ES-0.1.

Following the reactor trip, a Steam Generator Tube Rupture (350 gpm in 1C SG) will occur requiring a Safety Injection and continuation in or reentry into 1BEP-0. The crew will diagnose the SGTR and transition to 1BEP-3.

The scenario ends with termination of high head ECCS and establishing charging flow per 1BEP-3.

ERG Based Critical Tasks:

1. **E-3—A:** Identify the 1C Steam Generator as the ruptured SG and isolate prior to transition to 1BCA-3.1.
2. **E-3----B:** Cooldown to establish RCS subcooling margin, but prevent entry into 1BFR-P.1.
3. **E-3----C:** Depressurize RCS to restore RCS inventory prior to 1C SG PORV or Safety valve water release.

SCENARIO 06-2
SIMULATOR OPERATOR NOTES

Simulator Setup:

Reset to IC-18; 75% power, MOL, equilibrium Xenon, steady state.

Go to run.

Run batch file & CAEP by typing bat a:/06-2

Align switches:

1B DG C/S PTL and OOS

ACB 1423 PTL and OOS

1A FW Pp Aux Oil Pp OOS

1A FW Pp OOS

1FW002A OOS

1C HD pump C/S PTL and OOS

Place LCOAR placards for: 1B DG LCO 3.8.1 Condition B

Place On-Line risk to YELLOW

Place Protected Equipment placards on 1A DG and ACB 1413 C/S's

Provide copies of turnover sheets

Provide 1BGP 100-3 Flowchart to Step F63

Provide a copy of 1BOL 8.1 for 1B DG inoperability

Perform "Ready for Training" checklist.

Insert all PRELOAD Events from page 1

Set AB Pot to 3.91 for 1000 ppm boron

Event 1 SG Tube leak in 1C SG at 30 gpm.

Initiate event after board walkdown and turnover, with lead examiner's concurrence.

Acknowledge info to SM, WEC, and maintenance.

SDG: TH5

IMF TH03C 30 100

Event 2 PZR level channel 1LT-459 fails to 0, causing loss of Letdown.

Initiate event after actions of 1BOA SEC-8 are taken and the down power to 50% power is commenced, with lead examiner's concurrence. Acknowledge info to SM, WEC, and maintenance. Trip bistable If requested by lead examiner.

SDG: TH7

IMF RX13A 0 10

MRF RP20 OPEN/CLOSE

MRF RX029 Trip

Event 3 Main Steam header PT, 1PT-507, fails low.

Initiate event after actions are taken for PZR LT failure are taken, Letdown is restored, and Tech Spec actions of 3.3.1 are taken, with the lead examiners concurrence. Acknowledge info to SM, WEC, maintenance.

SDG: RX22

IMF RX05 0

Event 4 Letdown Line Back Pressure Control valve 1CV-131 (1PK-131) fails closed.

Initiate event after BOP has gained control of MFP speed in manual and is restoring SG levels to normal and with the lead examiners concurrence. Acknowledge info to SM, WEC, and maintenance.

SDG: CV2

IMF CV05 600

Event 5/6 1B FW Pp trips (5) followed by 1C FW Pp ramping to minimum speed (6), after a Manual Runback is initiated, causing a loss of all feedwater flow, resulting a Reactor Trip.

Initiate malfunction after actions are completed to stabilize the secondary plant and letdown backpressure, with the lead examiners concurrence. Acknowledge info to SM, WEC, and maintenance.

SDG: FW7

IMF FW02A

IMF FW06B

IMF FW08B

Event 7 1C SGTR on Reactor trip.

Malfunction occurs upon reactor trip to cause a SGTR at 350 gpm in 1C SG.

Acknowledge info to SM, WEC, and request for STA.

SDG: TH5

MMF TH03C 350 60

Scenario No.: 06-2		Event No.: 1
Event Description: SG 1C tube leak		
Time	Position	Applicant's Actions or Behavior
	CUES:	Annunciators: 1-16-A5 SG Leakage Exceeded RM-11 Secondary rad monitor alarms/levels rising SG BLDN RAD HIGH – 1PR08J SJAE/GLAND STEAM EXHAUSTER HIGH – 1PR027J MAIN STEAM LINE RAD HIGH – 1AR022J/23J PZR level dropping PZR pressure dropping Charging/letdown mismatch
	RO/US	Refer to BAR 1-16-A5 for operator actions Implement 1BOA SEC-8, Steam Generator Tube Leak
	RO/US BOP	Maintain PZR level: <ul style="list-style-type: none"> ○ Throttle 1CV121 & 1CV182 as necessary ● Check PZR level stable or rising Monitor VCT level <ul style="list-style-type: none"> ● Verify makeup is adequate to maintain VCT level Minimize Secondary Contamination <ul style="list-style-type: none"> ● Perform BOP MS-11, Operation with SG Tube Leakage ● Notify RP to monitor and initiate 0BCSR 11.i.1-1, Gaseous RW Treatment Eff Dose Calc Monthly. Identify leaking SG <ul style="list-style-type: none"> ○ Trend Main Steam Line monitors ○ Dropping Feed Flow with stable SG level ○ Unexpected rise in any NR SG level ○ Chemistry reports high activity via sample or N-16 monitor Determine SG Tube leak rate <ul style="list-style-type: none"> ● Estimate leak rate <ul style="list-style-type: none"> ○ Computer point on HMI display ○ Charging/letdown/RCP leakoff flow balance ○ Change in VCT level ○ Grab sample ○ 1BOSR SG-1 SG Pri to Sec Leakage Estimation ● Estimate leak rate > 10 gpm – GO TO STEP 9
	US/ BOP	Confirm SG leak rate <ul style="list-style-type: none"> ● At least 2 independent indications – TREND in the same direction. <ul style="list-style-type: none"> ○ Main steam line radiation monitors ○ SJAE/GS Exh radiation monitors ○ SG Bldn radiation monitors ○ N-16 radiation monitors ○ Grab sample

Comments:

ALL	<p>Initiate Unit Shutdown</p> <ul style="list-style-type: none"> • Check leak rate rising at < 30 gpd/hour <ul style="list-style-type: none"> ○ If this is assessed to be > 30 gpd/hour actions of the RNO apply ○ Reduce power to < 50% within 1 hour (Rapid Shutdown using 1BGP 100-4T1.1) ○ Shutdown Unit to MODE 3 within 2 hours of reaching 50% power. Proceed to continuing shutdown step using 1BGP 100-4 and 5. • SJAE rad monitor 1PR08J – operable • SG leak rate > 150 gpd since leak initiation – perform RNO • Shutdown Unit to MODE 3 within 6 hours <ul style="list-style-type: none"> • Continue in this procedure while performing Unit shutdown per 1BGP 100-4 • Refer to Tech Spec 3.4.13 (4 hours to stop leak, 6 hours to MODE 3, 36 hours to MODE 5)
RO	Performs reactivity calculation for Unit 1 ramp down to 50% power. (Should calculate ~420- 470 gal Boration and setup to add 40-70%)
US	<ul style="list-style-type: none"> • Direct a ramp rate to achieve 50% within 1 hour (MWe/minute)
US	<p>Direct actions for ramp down to ~600 Mwe (50% power). Monitor effects of boration</p>
RO	<p>Initiate boration (BOP CV-6)</p> <ul style="list-style-type: none"> • Place MU MODE CONT SWITCH to STOP position. • Set MU MODE SELECT to BOR position. • Set 1FK-110 Boric Acid Flow Cont Pot to desired boration rate. • Verify/enter gallons for batch into the Boric Acid Totalizer • Verify 1CV110A in AUTO • Verify 1CV110B in AUTO • Ensure Boric Acid Transfer Pump Control Switch is NOT in PULL OUT • Place MAKE-UP CONTROL Switch to START <ul style="list-style-type: none"> • Verify proper operation of valves & BA Transfer pump (1CV110A, modulates OPEN, and 110B open, BA Xfer pump is running) • Verify expected BA flow on recorder 1FR-110 • Monitor Boration effects <p>Verify at least two B/U Heater groups ON and spray valves 1RY455B/C modulate OPEN.</p>
BOP	<p>Initiate turbine load ramp down: Using graphic 5501</p> <ul style="list-style-type: none"> • SELECT SETPOINT • ENTER 5 MW/MIN rate into the RATE window • SELECT ENTER • ENTER 1000 MW in the REF DEMAND window • SELECT ENTER • SELECT EXIT <p>Inform US/RO of pending drop in turbine load</p> <ul style="list-style-type: none"> • SELECT GO <p>Verify load dropping as expected.</p>
	NOTE: The next malfunctions may be entered at lead examiner's direction after required power change.

Comments:

Scenario No.: 06-2		Event No.: 2
Event Description: PZR Level Channel 1LT-459 fails Low (Controlling Channel).		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciators: 1-12-A4 PZR LVL LOW HTRS OFF LTDWN SECURED 1-12-A5 PZR HTR TRIP PZR Heaters off
	RO/US	Identify/report failure of 1LT-459, PZR level channel.
	US	Enter and direct actions of 1BOA INST-2, "OPERATION WITH A FAILED INSTRUMENT CHANNEL" Attachment C <ul style="list-style-type: none"> • Notifies SM of BOA entry • Requests Emergency Plan evaluation
	RO	Check PZR level: <ul style="list-style-type: none"> • Determine PZR level normal <ul style="list-style-type: none"> ○ Take manual control and restore PZR level to normal • Select an operable PZR level control channel • Select an operable PZR level control channel to the recorder Check Letdown and PZR Heaters <ul style="list-style-type: none"> • PZR level > 17% • Establish letdown per 1BOA ESP-2, Re-establishing Letdown (Refer to the next page for these actions) • Restore PZR heaters to normal Check PZR level control is in AUTO <ul style="list-style-type: none"> • Restore Master PZR level controller to AUTO • Restore 1CV121 controller to AUTO Locally trip bistable for the failed LT-459 – <ul style="list-style-type: none"> • Request an extra NSO to come to the control room for a briefing. • Refer to Tech Specs 3.3.1, 3.3.4, and 3.3.3 – 6 hour action in 3.3.1 to have bistable tripped.

Comments:

RO/ BOP	<p>PERFORM 1BOA ESP-2 to Re-establish Letdown Flow:</p> <p>Check Letdown isolated:</p> <ul style="list-style-type: none"> • 1CV8149A/B/C (Letdown Orifice Isol Vlvs) are closed. • 1CV459/460 (Letdown line Isol Vlvs) are closed. <p>Check Letdown Flowpath</p> <ul style="list-style-type: none"> • Letdown Hx Isol Vlv open (1CV8401A for 1A Hx or 1CV8401B for 1B Hx) • Regen Hx Isol Vlvs open (1CV8324A/8389A for 1A Hx or 1CV8324B/8389B for 1B Hx) • Letdown CNMT Isol Vlvs open (1CV8152 and 1CV8160) • BTRS MODE Select Switch in OFF <p>Align Letdown Controllers:</p> <ul style="list-style-type: none"> • Place 1CV131 in Manual with 40% demand • Place 1CC130 in Manual with 60% demand <p>Verify Charging Flow is established:</p> <ul style="list-style-type: none"> • Check Charging Line CNMT Isol Vlvs open (1CV8105 and 1CV8106) • Throttle 1CV182 to maintain PCP Seal Injection 8-13 gpm per RCP • Throttle 1CV121 to establish at least 100 gpm Charging Flow. <p>Establish Letdown Flow:</p> <ul style="list-style-type: none"> • Open Letdown Line Isol Vlvs (1CV459 and 1CV460) • Open Letdown Orifice Isol Vlvs to obtain desired flow (1CV8149A and/or B and/or C) • Adjust 1CV131 to control letdown pressure at ~ 360 psig • Adjust 1CC130 to control letdown temperature between 90 and 115 degrees F. • If desired, place the controllers for 1CV131 and 1CC130 in AUTO. • Verify 1PR06J In Service on the RM-11
	<p>NOTE: If bistable tripping is not required to be observed, when the above actions have been initiated for the PZR level channel and lead evaluator's concurrence, Event 2 can be initiated.</p>

Comments:

Scenario No.: 06-2		Event No.: 3
Event Description: Main Steam Header Pressure Transmitter (1PT-507) fails Low		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciators: 1-15-A4 thru D4, SG 1A/B/C/D FLOW MISMATCH FW FLOW LOW 1-15-A9 thru D9, SG 1A/B/C/D LEVEL DEVIATION HIGH LOW Steam flow/feed flow mismatch on all SGs All Feed Regulating Vlvs opening 1B/1C FW Pump's speed dropping Master and 1B/1C FW Pump's speed controller demand rising All SG levels dropping
		NOTE: Examiner needs to prevent RO from diagnosing this event.
	BOP US	<ul style="list-style-type: none"> • Identify/report feedwater control system indications • Direct stabilizing SG levels <ul style="list-style-type: none"> • Take Manual control of Master or 1B and 1C speed control • Manually adjust FW Pump's speed to restore Delta-P and SG levels ○ Inform SM/Maintenance to investigate ○ Identify/flag components ○ Review impact of failure on Steam Dumps in Steam Pressure MODE

Scenario No.: 06-2		Event No.: 4
Event Description: PCV-131 (1PK-131), Letdown Line Backpressure Controller fails closed in AUTO, while restoring SG level from event 4		
Time	Position	Applicant's Actions or Behavior
	CUES:	Annunciators: 1-8-B5 LTDWN HX OUTLT PRESS HIGH Letdown flow rate drop < 120 gpm on 1PM05J – 1FI-132 Letdown line pressure ~ 600 psig on 1PM05J – 1PI-131
	RO/US	Identify/report failure of 1PK-131 when letdown is restored. <ul style="list-style-type: none"> • Direct Manual operation of PCV-131
	RO	<ul style="list-style-type: none"> • Take Manual control of 1PK-131 and adjust letdown backpressure to ~ 370 psig ○ Identify/flag the controller to remain in Manual control.
	US	<ul style="list-style-type: none"> ○ Discuss how letdown backpressure will be maintained with the RO ○ Notify SM/Maintenance to investigate cause of failure
		NOTE: When actions have been completed for the 1PT-507 failure and PCV-131, with lead evaluator's concurrence, Event 5 and 6 are entered.

Comments:

Scenario No.: 06-2		Event No.: 5 and 6
Event Description: 1B FW Pump trips requiring a turbine runback (5). 1C FW Pump speed runs to minimum after the runback is initiated causing a loss of feedwater requiring a Manual Reactor Trip(6)		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciators: 1-16-B1 FW PUMP 1B TRIP 1-16-D2 FW PUMP DSCH FLOW LOW Feed flow dropping
	ALL	<ul style="list-style-type: none"> Identify/report loss of 1B FW Pump
	US/BOP RO	Direct implementation of 1BOA SEC-1, Secondary Pump Trip <ul style="list-style-type: none"> Close 1B FW pump recirc valve – 1FW012B Check turbine load > 700 MW Verify 1C FW Pump is running – recognize 1A FW Pump is not available Initiate turbine runback – pushbutton or mouse selection on OWS panel G-5512 Check turbine load is dropping Verify Rod Control is in AUTO Initiate Boration as necessary – per REMA plaque (Use judgement since starting at lower power)
	ALL	<ul style="list-style-type: none"> Recognize 1C FW Pump speed is dropping and SG levels are dropping
	US	<ul style="list-style-type: none"> Direct a Manual Reactor Trip and operators to perform immediate actions of 1BEP-0, reactor Trip or Safety Injection. Notify SM to evaluate for E Plan
		NOTE: Event 7 will initiate with the reactor trip
	RO	Verify reactor trip <ul style="list-style-type: none"> Rod bottom lights LIT Reactor trip & Bypass breakers open Neutron flux lowering
	BOP	Verify Turbine Trip <ul style="list-style-type: none"> Turbine throttle valves closed Turbine governor valves closed
	BOP	Verify power to 4KV busses <ul style="list-style-type: none"> Bus 141 alive light lit Bus 142 alive light lit

Comments:

RO		Perform immediate operator actions of 1BEP-0: Check SI status <ul style="list-style-type: none"> • SI actuated <ul style="list-style-type: none"> ○ SI First OUT annunciator NOT lit (1-11-B1, 1-11-C1, 1-11-D1, 1-11-E1) ○ SI ACTUATED NOT lit (1-BP-4.1) ○ SI Equipment NOT running (SI pumps running, CV Cold leg injection SI8801A/B open) • Check if SI required <ul style="list-style-type: none"> • PZR pressure is NOT <1829 psig • Steamline pressure is NOT <640 psig • CNMT pressure is > 3.4 psig • PZR level can be maintained > 4%
		NOTE: The crew may not recognize the SGTR at this point and may transition to 1BEP ES-0.1. If they elect to stay in 1BEP-0, then the actions expected will continue on page 13 at the ****.
US		Transition to 1BEP ES-0.1, Reactor Trip Response Request STA to monitor BSTs Notify SM to evaluate for E-plan
BOP		Verify Generator Tripped <ul style="list-style-type: none"> • Unit 1 Main Transformer output breakers open (GCB 3-4 and OCB 4-5) • PMG output breaker open

Comments:

Scenario No.: 06-2		Event No.: 7
Event Description: 1C SGTR occurs after transition to 1BEP ES-0.1 Reactor Trip Response		
Time	Position	Applicant's Actions or Behavior
	CUE:	PZR level dropping PZR pressure dropping SG 1C level rising faster than the other 3 with same feed flow rate Possible RM-11 alarms on 1C SG Bldn or 1C Main steamline
	ALL US	<ul style="list-style-type: none"> • Direct a Manual Safety Injection and return to 1BEP-0, Reactor Trip or Safety Injection • Direct operators to perform the immediate actions.
	US	Enter and direct actions of 1BEP-0 <ul style="list-style-type: none"> • Notifies SM of entry • Requests Emergency Plan evaluation
	RO	Verify reactor trip <ul style="list-style-type: none"> • Rod bottom lights LIT • Reactor trip & Bypass breakers open • Neutron flux lowering
	BOP	Verify Turbine Trip <ul style="list-style-type: none"> • Turbine throttle valves closed • Turbine governor valves closed
	BOP	Perform immediate operator actions of 1BEP-0: Verify power to 4KV busses <ul style="list-style-type: none"> • Bus 141 alive light lit • Bus 142 alive light lit
	ALL RO	Perform immediate operator actions of 1BEP-0: Check SI status <ul style="list-style-type: none"> • SI actuated <ul style="list-style-type: none"> • SI First OUT annunciator lit (1-11-B1, 1-11-C1, 1-11-D1, 1-11-E1) • SI ACTUATED lit (1-BP-4.1) • SI Equipment running (SI pumps running, CV Cold leg injection SI8801A/B open) Determine SI actuated <ul style="list-style-type: none"> • Actuate SI by taking either SI switch to ACTUATE (1PM05J or 1PM06J)

Comments:

****	BOP	Verify FW isolated <ul style="list-style-type: none"> • FW pumps tripped • Isolation monitor lights lit • FW pumps discharge valves closed 1FW002A-C
	RO	Verify ECCS pumps running <ul style="list-style-type: none"> • CENT CHG pumps • RH pumps • SI pumps
	BOP	<ul style="list-style-type: none"> • Verify RCFCs Accident Mode lights lit • Verify Phase A isolation - Group 3 monitor lights lit • Verify CNMT Ventilation isolation - Group 6 CNMT Vent Isol monitor lights lit
	RO	<ul style="list-style-type: none"> • Any RCP's running • Check if trip criteria satisfied: • HH SI flow >100 gpm OR SI pump discharge flow >200 gpm AND • RCS pressure is NOT < 1425 psig
	BOP	Verify AF system: <ul style="list-style-type: none"> • AF pumps running • AF isolation valves open 1AF13A-H • AF flow control valves throttled 1AF005A-H Verify CC Pumps running Verify SX Pump running Check if Main Steamline Isolation required <ul style="list-style-type: none"> • Check SG pressure > 640 psig • Check CNMT pressure <8.2 psig
	BOP	Check CNMT Spray is NOT required <ul style="list-style-type: none"> • Verify CNMT pressure has NOT been > 20 psig
	BOP [CT] [E-3-A]	Verify Total AF flow: <ul style="list-style-type: none"> • AF flow > 500 gpm • SG levels maintained between 10% (31% Adverse) and 50% • SG levels NOT increasing in an uncontrolled manner <ul style="list-style-type: none"> • Isolate 1AF013C and 1AF013 G to 1C SG

Comments:

	BOP	Verify ECCS valve alignment <ul style="list-style-type: none"> • Group 2 Cold Leg Injection monitor lights lit • Align SVAG Valve power switches and dispatch NLO to energize breakers
	BOP	Verify ECCS flow <ul style="list-style-type: none"> • HHSI flow >100 gpm • RCS pressure NOT <1700 psig
	RO	Check at least one PZR PORV relief path is available <ul style="list-style-type: none"> • PORV isol valve – both ENERGIZED (1RY8000A/B) • PORV relief path – both AVAILABLE (1RY455A/456) <ul style="list-style-type: none"> • PORVs in AUTO • Isolation valves open
	BOP/US	Verify Generator Trip <ul style="list-style-type: none"> • GCB 3-4 and OCB 4-5 open • PMG output breaker open
	BOP	Verify 1A DG running, 1B DG OOS <ul style="list-style-type: none"> • SX valve open 1SX169A • Dispatch operator locally to check operation
		Examiners note: US and RO will likely continue in 1BEP-0 while BOP is performing the next 3 ventilation steps:
	BOP	Verify Control Room ventilation aligned for emergency operations: <ul style="list-style-type: none"> • Dispatch NLO to trip VV supply fans • Operating VC train equipment running Train A <ul style="list-style-type: none"> • Supply fan • Return fan • M/U fan • Chilled water pump • MCR chiller 0A • Operating VC train dampers <ul style="list-style-type: none"> • M/U fan outlet damper NOT full closed 0VC24Y • VC train M/U filter light LIT • Operating VC train Charcoal Adsorber aligned for train A <ul style="list-style-type: none"> • 0VC43Y closed • 0VC21Y open • 0VC22Y open • Control Room pressure greater than +0.125 inches water on 0PDI-VC038

Comments:

BOP	<p>Verify Auxiliary Building ventilation aligned</p> <ul style="list-style-type: none"> • Two inaccessible filter plenums aligned <ul style="list-style-type: none"> • Plenum A fan 0VA03CB running <ul style="list-style-type: none"> • Damper 0VA023Y open • Damper 0VA436Y closed • Plenum C fan 0VA03CF running <ul style="list-style-type: none"> • Damper 0VA072Y open • Damper 0VA438Y closed
BOP	<p>Verify FHB ventilation aligned</p> <ul style="list-style-type: none"> • Train B fan 0VA04CB running • 0VA055Y open • 0VA062Y open • 0VA435Y closed
RO	<p>Check PZR sprays & PORVs closed</p> <ul style="list-style-type: none"> • Normal spray valves closed 1RY455B and 1RY455C (NOTE: valves are failed closed due to loss of IA due to Cnmt Phase A) • PORVs closed (1RY455A/456)
RO/BOP	<p>Maintain RCS temperature control</p> <ul style="list-style-type: none"> • Determine RCPs running <ul style="list-style-type: none"> • Throttle AFW flow to SGs maintaining > 10% (ADVERSE >31%) in at least 1 SG.
RO	<p>Check if RCP's should be stopped</p> <ul style="list-style-type: none"> • Any RCP's running • Check if trip criteria satisfied • HHSI flow >100 gpm OR SI pump discharge flow >200 gpm <ul style="list-style-type: none"> AND ○ RCS pressure < 1425 psig ○ Trip RCP's if controlled cooldown NOT in progress and above criteria satisfied (performed earlier)
BOP	<p>Check if SG Secondary Boundaries are Intact</p> <ul style="list-style-type: none"> • No SG Pressure dropping in an Uncontrolled manner • No SG Completely Depressurized
BOP/US	<p>Check secondary radiation trends normal for plant conditions:</p> <ul style="list-style-type: none"> • RM11 Grid 1 indications for: <ul style="list-style-type: none"> • SJAE/ gland steam exhaust gas • SG blowdown liquid radiation • Main steamline MSIV rooms

Comments:

	ALL	Diagnose SGTR on 1C SG <ul style="list-style-type: none"> o Secondary area rad monitors levels increasing or in ALARM
	ALL	Transition to 1BEP-3 "STEAM GENERATOR TUBE RUPTURE"
	US	Implement 1BEP-3 "STEAM GENERATOR TUBE RUPTURE" and direct operator actions. <ul style="list-style-type: none"> • Notifies SM of BEP entry • Requests Emergency Plan evaluation
	RO/US	Check status of RCPs and determine none running <ul style="list-style-type: none"> o If any running, Check trip criteria satisfied <ul style="list-style-type: none"> • HHSI flow >100 gpm OR SI flow > 200 gpm AND o RCS pressure > 1425 psig o Controlled cooldown NOT in progress or previously initiated o Stop all RCPs
	ALL	Identify ruptured SG <ul style="list-style-type: none"> o Unexpected rise in NR level, OR o Main steamline rad monitor, OR <ul style="list-style-type: none"> o 1RT-AR022 Grid 1 4AC422 o 1RT-AR023 Grid 1 4AC423 o High activity for any SG sample <ul style="list-style-type: none"> o Reset CNMT isol Phase A o Notify Chem to locally sample o Open SG blowdown sample valves at Chem request
	ALL	Identify/report 1C SG as ruptured
	BOP	Isolate flow from ruptured SG by verifying <ul style="list-style-type: none"> • SG PORV MS018C in AUTO • Check SG PORV MS018C closed <ul style="list-style-type: none"> • Verify closed when SG pressure < 1115 psig • Verify SG blowdown valves closed unless open for sampling <ul style="list-style-type: none"> • 1SD002G • 1SD002H • MSIV and MSIV bypass valves closed for 1C SG • Check PORVs on intact SGs available for RCS cooldown
	BOP	Check ruptured SG level <ul style="list-style-type: none"> • Narrow Range >10% • Verify/Close AF isol valves (should have been closed earlier) <ul style="list-style-type: none"> • 1AF013C • 1AF013G

Comments:

	BOP US	Check ruptured SG pressure <ul style="list-style-type: none"> Ruptured SG pressure greater than 320 psig
	US/RO BOP	Initiate RCS Cooldown <ul style="list-style-type: none"> Determine required CETC from Table (516 degrees F) Block Main Steamline SI when PZR pressure is < 1930 psig Dump steam from the Intact SGs at MAXIMUM rate using Steam Dumps <ul style="list-style-type: none"> Place MS header pressure controller in Manual at 0 Place steam dump MODE select to Steam Press This will have to be opened in Manual since AUTO was lost due to 1PT-507 failure.
	US/BOP [CT] [E-3-B]	<ul style="list-style-type: none"> Cooldown to < 516 degrees Stop cooldown Maintain CETC < 516 degrees F <ul style="list-style-type: none"> Establish a range of control (i.e. 500 - 515°F)
	BOP	Check Intact SG levels <ul style="list-style-type: none"> NR levels > 10% Maintain 18-50% NR Verify none rising in an uncontrolled manner.
	BOP/US	Check PZR PORVs and Isolation Valves <ul style="list-style-type: none"> PORV Isol Valves Energized – 1RY8000A and B PORVs Closed – 1RY455A and 456 At least 1 PORV Isol Valve open – 1RY8000A or B
	US/BOP	Reset SI <ul style="list-style-type: none"> Depress both SI reset pushbuttons Verify SI ACTUATED permissive light is NOT LIT Verify AUTO SI BLOCKED permissive light is LIT
	US/BOP	Reset CNMT Isolation <ul style="list-style-type: none"> Reset CNMT Phase A Check SACs running Open IA CNMT Isol Valves (1IA065 and 066 on 1PM011J)
	US/BOP	Verify all AC Buses energized by offsite power: <ul style="list-style-type: none"> Check 4KV ESF Buses 141 and 142 energized from offsite power. Check 4KV Non-ESF buses 143 and 144 energized by offsite power. Check 6.9KV buses 156, 157, 158, and 159 energized from offsite power.
	US/RO	Check if RH pumps should be stopped: <ul style="list-style-type: none"> Check suction aligned to the RWST RCS pressure > 325 psig Stop RH pump

Comments:

	US/RO	<ul style="list-style-type: none"> • Verify RCS temp < CETCs target of 516 degrees F and cooldown is stopped
	US/BOP	<ul style="list-style-type: none"> • Check ruptured SG pressure stable or rising
	US	<ul style="list-style-type: none"> • Check RCS subcooling adequate per ATT A and Figure 1BEP 3-2
	US/RO [CT] [E-3-C]	<ul style="list-style-type: none"> • Depressurize RCS using PZR Sprays (PORVs are optional) to minimize break flow and refill the PZR <ul style="list-style-type: none"> • Spray with Max spray available (or PORVs) until: <ul style="list-style-type: none"> ○ Both RCS pressure is < 1C SG press AND PZR level is > 12%, OR ○ PZR level is >69%, OR ○ RCS subcooling is NOT acceptable • Close spray valves when criteria is met
		<p>NOTE: With lead examiner's concurrence, this scenario can be terminated. Evaluate the SRO for EAL classification (EAL FA1)</p>

Comments:

Unit Supervisor Turnover –FOR TRAINING ONLY

PLANT STATUS			
Grid Status: Green	"B" Train Week	WWM: R. Freidel	Shift: 95 to 96 Date: TODAY
Unit 1		Unit 2	
Mode: 1	% Pwr: 75	MW: 865	OLR: Yellow
CB: 1000	Xenon: Steady State	Rod Height: 171	
IN PROGRESS		IN PROGRESS	
-1B DG Turbo Charger work -1C HD pump seal replacement -1A FW pump speed increaser work		-2HD099 contingency plan to Furmanite. -SAT 242-2 bank 4 deenergized with EST tag (cooling fan 2 missing)	
LCOAR	C/O / T/L / RTS		
-1BOL 8.1	1B DG ACB 1423 1C HD pump 1A FW pump 1A FW pp Aux Oil pp		
LCOAR's Exited:			
MAINTENANCE			
-1B DG -1C HD pump -1A FW pump		-SAT 242 bk 4 fans	
MAJOR PROC.			
PENDING			
NO LIQ REL w/o permission from Ops Dir & SVP -U1/U2 Cnmt Release Package prep		-U2 EH sample	

Unit Supervisor Turnover – FOR TRAINING ONLY

<u>ADMINISTRATIVE</u>		<u>COMMENTS</u>
Temporary Alterations	X	
Unit 0 Logbook	X	
Unit 1 Logbook	X	
Unit 2 Logbook	X	
Train Inop Status Board	X	
Degraded Equipment Log	X	
Daily Orders	X	
* CRs	X	
Abnormal Component Posit.	X	

<u>TURNOVER ITEMS</u>	<u>Normal YES/NO</u>	<u>COMMENTS</u>
NSO Shiftly and Daily Surv	Yes	-1C HD pump OOS, 1A FW pump OOS -1B DG OOS; RTS by end of shift today
SYS - Primary	Yes	
SYS – Balance of Plant	No	
Nuclear Instrumentation	Yes	
MCB Instrumentation	Yes	
MCB Controllers	Yes	
Electrical Distribution - AC	No	
Electrical Distribution - DC	Yes	
Electric Operations	Yes	
Blowdown (CW/SD)	Yes	
Alarms (MCB)	Yes	
Chemistry	Yes	
Radiation Precautions	Yes	
FME Issues	Yes	

UNIT 1 TURNOVER EFPH: 6900

U-1 Reactivity: Dilute 42 gals=.3 °F **Nuke Engineer:** K. Elam **Boron to ramp to 780 MW:** 525 **700 MW:** 360 gals

BAT = 7581, BA Pot = 3.91 Equals 15.6 gpm @ Steady State FUEL DEPLETION: 130 gallons/shift

RWST = 2383 ppm 1A CV pp Cb = 1000 ppm

U-2 Reactivity: Dilute 20 gal=.2°F **Nuke Engineer:** F. Funke **Boron to ramp to 780 MW:** 480 **700 MW:** 290 gals

BAT = 7579, BA Pot = 4.61 Equals 18.4 gpm @ Steady State FUEL DEPLETION: 40 gallons PW/shift

RWST = 2350 ppm 2B CV pp Cb = 1188 ppm

Exceptional OOS's Requiring Special Plant Conditions

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MISCELLANEOUS

Review BA Pot settings on turnover
2HD099B steam leak (~120 drops/min) Monitor 2X/shift

Post Reviews: FS, US, Unit NSO, Turnovers Logs, MCR Tour, Daily Orders and Standing Orders

OFF-GOING		ON-COMING	
<i>Unit 1 Supervisor</i>		U-1 Unit Supervisor	
<i>Unit 2 Supervisor</i>		U-2 Unit Supervisor	
<i>STA</i>		STA	

Center Desk Operator Turnover- FOR TRAINING ONLY

PLANT	<u>U1 Mode:</u> 1	<u>% Pwr:</u> 75	<u>MW:</u> 865	IN PROGRESS	
STATUS	<u>U2 Mode:</u> 1	<u>% Pwr:</u> 100	<u>MW:</u> 1229	CW Warming line is OFF	
MUDS					
BOILER		IA DRYERS ON LINE			
0A: Standby	U1: Wet L/U	U1/U2			
0B: Exhausted	U2: Wet L/U	AS	U1 ES		
ADMINISTRATIVE					
1. Temporary Procedures			X		
2. Temporary Alterations			X		
3. ESTs			X		PENDING
4. Unit 0 Logbook			X		
5. Center Desk Routine			X		
6. Daily Orders			X		
7. SM Notes			X		
8. Switching Orders / Electric Ops / Division LD			X		
9. Control Board Walkdown			X		
10. 1 st Shift Annun Check Completed			NA		
LCOAR		C/O / RTS		Surveillances	Maint / WR
TURNOVER ITEMS		Normal			
1. HVAC		Yes	OCB's 12-13, 4-5, & 11-12 have temporary Cabinet Htrs		
2. 345 KV Systems, Relay House		No			
3. Air Systems (IA, SA)		Yes			
4. Fire Protection		Yes			
5. Blowdown		Yes			
6. Radiation Releases		Yes			
7. MCB Instrumentation		Yes			
8. MCB Controllers		Yes			
9. Tank Capacity		Yes			
10. Chemistry		Yes			
11. Radiation Protection		Yes			
12. Alarms – MCB Annun		Yes			
13. Alarms – FP / Other		Yes			
14. SYS – Safeguards		No/14	1B DG OOS for Turbo Charger work		
15. SYS - Primary		Yes			
16. SYS – Balance of Plant		No/16			
17. MDCT		Yes			
18. NDCT, Flume		Yes			
19. FME Issues		Yes			
			2HD099B steam leak, 1C HD pp, 1A FW pp		
TIME	DATE	SHIFT	OFF-GOING		ON-COMING
Now	TODAY	95 to 96	Center Desk		

Unit 1 Nuclear Station Operator Turnover – FOR TRAINING ONLY

PLANT	Mode: 1	% Pwr: 75	MW: 865	ADMINISTRATIVE				
STATUS	Grp: CBD 171	C _B : 1000 ppm	Xe: Steady State	1. <u>Temporary Procedures</u>	X			
TURNOVER				2. <u>TCCP's</u>	X			
EFPH: 6900				3. <u>EST's</u>	X			
LCOAR	C/O / RTS	Surveillances	Maint / WR	4. <u>Unit 1 Logbook</u>	X			
1B DG (IBOL 8.1)	1B DG C/S	1BOSR 8.1.1-1		5. <u>Unit Routine</u>	X			
	ACB 1423 C/S			6. <u>Aux Elec Equip Rm General Inspection</u>	X			
	1C HD pp C/S			7. <u>Daily Orders</u>	X			
	1A FW pp C/S			8. <u>SM Notes</u>	X			
	1A FW pp Aux			9. <u>Control Board Walkdown</u>	X			
	Oil pp C/S			10. <u>Abnormal Component Positions</u>	X			
				11. <u>1st Shift Annun Check Completed</u>	NA			
	IN PROGRESS				PENDING			
	1B DG Turbo Charger work/1A DG Protected 1C HD pp seal replacement 1A FW pp speed increaser				BA Pot = 3.91 Equals 15.6 gpm @ Steady State FUEL DEPLETION: 130 gallons/shift Dilute 42 gals =.3 °F			
	Exceptional C/O's Req Plant Cond:							
	TURNOVER ITEMS			Normal				
1. No Major Procedures in Progress		Yes						
2. NSO Shiftly and Daily Surveillance		Yes						
3. SSPS Channels / Bistables		Yes						
4. ALARMS – SER / Annunciators		Yes						
5. ALARMS – Process / RM-11		Yes						
6. SER / Alarm Typer / Trend Typer		Yes						
7. Alarms – FP / Other		Yes						
8. Tank Capacity		Yes						
9. Chemistry		Yes						
10. Radiation Precautions		Yes						
11. Nuclear Instrumentation		Yes						
12. MCB Instrumentation		Yes						
13. MCB Controllers		Yes						
14. Electrical Distribution - AC		No/14						
15. Electrical Distribution - DC		Yes						
16. SYS - Safeguards		No/16						
17. SYS - Primary		Yes						
18. SYS – Balance of Plant		No/18						
19. FME Issues								
20.								
21.								
TIME	DATE	SHIFT	OFF-GOING	ON-COMING				
NOW	TODAY	95 to 96	<i>Unit 1 NSO</i>					

BORATION / DILUTION CALCULATIONS

Purpose: The purpose of this power change reactivity worksheet is to establish a boundary for the amount of boration / dilution that may be required and to assist in meeting industry expectations for reactivity control during a power ramp. The worksheet assumes steady state reactor power prior to the ramp and DOES NOT consider Xenon effects. Since the worksheet establishes a boundary, the operator experience plays an equal if not more important role in ensuring proper reactivity controls. 40% to 70% of the boration / dilution amount will normally be added.

CALCULATION:

1. Basis: Approx Cycle Burnup: 6900 EFPH Initial Cb: 1000 ppm
Initial Reactor Power: 75 % Initial CBD: 171 steps
Final Reactor Power: 50 % Final CBD: 130 steps (est)

2. Determine the change in power defect:
Use BCB-1 Figure 17A, pages 1-4 or Table 2-1:

$$\frac{(-) \ 950}{\text{final power defect}} - \frac{(-) \ 1375}{\text{present power defect}} = \frac{+425}{\text{Change in power defect}} \text{ pcm}$$

3. Determine the amount of reactivity change due to control rod repositioning:
Use BCB-1 Figure 2C, pages 1-4 or Table 1-7 (Ensure correct curve w/respect to core life):

$$\frac{140}{\text{present inserted rod worth}} - \frac{250}{\text{final inserted rod worth}} = \frac{-110}{\text{Change in control rod worth}} \text{ pcm}$$

4. Determine the reactivity the boration / dilution will compensate for:
 $\frac{425}{\text{step 2 result}} + \frac{-110}{\text{step 3 result}} = \frac{+315}{\text{Reactivity to compensate for}}$

5. Determine the Differential Boron Worth (DBW):
Use BCB-1 Figure 10B, pages 1-4 or Table 2-4: 7.42 pcm/ppm (Avg of 2 values)
(Use the DBW absolute value, i.e., positive)-> 7.42 differential boron worth

6. Determine the ppm change in RCS boron concentration:
(NOTE: + number indicates boration; - number indicates dilution)
 $\frac{(\text{step 4 result}) \ +315}{(\text{step 5 result}) \ 7.42} = \frac{+42.5}{\text{ppm change in RCS boron conc.}}$

7. Determine the amount of boration / dilution required: **(Data taken using 570°F)**
Use Table 3-1 → ~ 455 gallons BA **BORATION** or DILUTION required
(circle one) **(BOLDED)**

(Final)

Facility:	<u>Byron</u>	Scenario No.:	<u>06-3</u>	Op-Test No.:	<u>2006-301</u>
Examiners:	_____	Operators:	_____		<u>SRO</u>
	_____		_____		<u>RO</u>
	_____		_____		<u>BOP</u>
Initial Conditions: IC-21; 100% power, 1235 Mwe, BOL, equilibrium Xenon, steady state, 1B CS Pump has been removed from service for one hour due to high vibration. Engineering is investigating. 1C HD Pump OOS for seal replacement and not expected back until the end of shift.					
Turnover: The plant is at 100% power, BOL, equilibrium Xenon, steady state, 600 EFPH, 1000 ppm boron concentration. The 1B CS Pump has been OOS for 1 hour and Engineering is investigating. LCOAR for Tech Spec 3.6.6 Condition A has been entered. 1C Heater Drain Pump is OOS for mechanical seal replacement. Power Team has just notified Byron Unit 1 that power needs to be reduced to 1000 MWe as soon as possible and requests a 5 MW/Min ramp. The SM has given the direction to lower power at 5MW/Min and initiated 1BGP 100-4T.1 for Power descension. On-line Risk is yellow.					
Event No.	Malf. No.	Event Type*	Event Description		
Preload	IOR ZDI1CS01PB PTL IOR ZZDI1HD01PC PTL IMF RP02A IMF RP02B MRF RP49 OUT MRF RP75 OUT		1B CS Pump OOS 1C HD Pump OOS Reactor trip breaker RTA fails to open Reactor trip breaker RTB fails to open SI Train A K603 failure (1CV112B, 1CV112D) SI Train B K603 failure (1CV112C, 1CV112E)		
1		US R RO N BOP	Direct the Unit ramp to 1000 MWe power. Perform Reactivity calculation for ramp to 1000 MWe Ramp down the Unit to 1000 MWe power Ramp down the Unit to 1000 MWe power		
2	IMF RX21A 2500 30	I RO US	1PT-455 Controlling PZR Pressure Channel fails high over 30 seconds causing PORV and Sprays to open. Enter Tech Specs 3.3.1/2 for actions.		
3	IMF RX29A 0 30	I BOP US	Steam Generator 1A FW Reg Valve will fail closed in automatic requiring manual control and restoration of 1A SG level to program. Auto control will not be restored.		
4	IMF FW02A	C BOP	1B FW Pump trips requiring 1BOA SEC-1 action to recover and stabilize by starting the 1A FW Pump.		
5	IMF RP10A DMF RP10A after 5 seconds	C ALL	Inadvertent Phase A actuation on Train A causes L/D to be lost, IA to Cnmt, SG Bldn Isolation, and loss of Cnmt chillers. Requires 1BOA PRI-13 actions to recover and stabilize.		
6	IMF CV01A	C RO	Running CV pump trips before L/D restoration. This will require Tech Spec 3.5.2 action.		
7	IMF MS07A 4 IOR ZDIBKSEL AUTO IMF RD09 8	M ALL C RO M	1A SG Steamline Breaks at 4 Mlb/hr inside of Cnmt. This will generate a reactor trip signal. The reactor will not trip and requires entry into 1BFR-S.1 for ATWS. Rod insertion is failed in AUTO and rod insertion will fail to 8 steps/minute for max insertion rate.		

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

SCENARIO 06-3 OVERVIEW

The scenario will begin at 100% power, BOL, equilibrium Xenon, steady state. The 1B CS pump has been OOS for 1 hour due to failure of the monthly surveillance and is being investigated by Engineering for corrective actions. LCOAR for Tech Spec 3.6.6 Condition A has been entered. 1C Heater Drain Pump is OOS for mechanical seal replacement and is not expected back until the end of this shift. Power Team requires a Byron Unit 1 ramp down to 1000 MWe power as soon as possible and requests a 5 MW/Min ramp.

The RO will be required to perform a reactivity calculation and coordinate with the BOP and commence the ramp down to 1000 MWe power.

After Unit ramp down is commenced, 1PT-455, Controlling PZR Pressure Channel, fails high over 30 seconds causing PORV (1RY-455A) and PZR Spray valves to open, causing RCS pressure to drop. The RO will diagnose the malfunction from alarms, meter indications, and dropping PZR pressure. Manual action should be taken to close the PORV or PORV Block Valve prior to reaching 2185 psig and must be taken to close the PZR Spray valves to stop the pressure drop. The US will enter 1BOA INST-2 to ensure manual actions are taken, select an operable control channel, restore automatic PZR pressure control, trip bistables, and identify appropriate Tech Specs 3.3.1/2, 3.3.4, and 3.4.1 for applicable actions. The most limiting Tech Spec is 3.4.1, DNB Limits Condition A, 2 hours to restore pressure to at or above 2209 psig. The remainder of the Tech Specs most limiting action requires tripping bistables within 6 hours. US will notify the SM and WEC for maintenance support.

After the crew has taken actions for failure of 1PT-455, the 1A SG FW Reg Valve will fail closed in automatic requiring BOP to manually control the 1A SG main feedwater regulating valve to recover 1A SG level. The US will notify the SM and WEC for maintenance support. This will require manual level control of 1A SG for the remainder of this scenario.

Following actions for the 1A SG FRV failure, the 1B FW Pump will trip requiring BOP action to recognize the malfunction from alarms and pump speed indication and take action to close the recirc valve on the tripped FW Pump, start the 1A FW Pump and restore FW flow to all SGs. The US will enter 1BOA SEC-1 for these actions and actions to stabilize the FW system for continued operation. US will notify the SM and WEC for maintenance support.

Once the plant has stabilized, an Inadvertent Phase A on A Train will occur requiring entry into 1BOA PRI-13. The crew will recognize the event from alarms and valve closure indications. The RO will take manual control of charging and PZR pressure. Upon reset of the Phase A, IA will be restored to Cnmt, L/D and normal charging must be restored, normal PZR pressure control established, normal RCP seal return flow, restart of Cnmt chiller, and restoration of SG Bldn. The actuation will appear to be spurious. US will notify the SM and WEC for maintenance support. **During response to the Inadvertent Phase A, the 1A CV pump will trip** and will require a manual start of the 1B CV Pump for recovery. This will also require entry into Tech Spec 3.5.2 Condition A for ECCS Operability (7 Day action). US will notify the SM and WEC for maintenance support.

Once the plant has recovered from the Inadvertent Phase A and normal charging and L/D are restored, a Main Steam line break will occur inside Cnmt on the 1A SG. The reactor will not trip from the MCR and 1BFR-S.1 will be entered to locally trip the reactor. This will occur after the NLO is dispatched to open the reactor trip breakers locally and after the steam dumps are isolated in Step 7 of 1BFR-S.1. RO will have to Manually insert rods to ensure rods are being inserted at max rate, which will be failed to a maximum insertion rate of 8 steps/minute in AUTO, **emergency boration must be manually aligned**, PORVs are operating as required. BOP ensures turbine is tripped, AF Pumps are running, Cnmt Vent Isolation has occurred; Crew directs NLO to trip Rx locally. After Rx is tripped crew completes 1BFR-S.1 **including isolating the faulted 1A SG**, then enters 1BEP-0. US will transition to 1BEP-2, then to 1BEP-1. Transition will be made to 1BEP ES-1.1 to terminate SI.

The scenario ends after transition to 1BEP ES-1.1.

ERG Based Critical Tasks:

1. **FR-S.1—C:** Insert negative reactivity into the core by initiating emergency boration before completing step 4 of 1BFR-S.1.
2. **E-2—A:** Isolate the faulted S/G before transition out of 1BFR-S.1.

**SCENARIO 06-3
SIMULATOR OPERATOR NOTES**

Simulator Setup:

Reset to IC-21; 100% power, BOL, equilibrium Xenon, steady state.

Go to run.

Run batch file & CAEP by typing bat a:/06-3

Align switches:

1B CS pump C/S PTL and OOS

1C HD pump C/S PTL and OOS

Place LCOAR placards for: 1B CS LCO 3.6.6 Condition

Place On-Line risk to Yellow

Provide a copy of the LCOAR paperwork for the 1B CS pump OOS.

Provide copies of turnover sheets

Provide 1BGP 100-4T.1 for power decension

Perform "Ready for Training" checklist.

Insert all PRELOAD Events from page 1

Set AB Pot to 3.91 for 1000 ppm boron

Event 1 Perform a reactivity calculation using 1BCB Figure 35 (Rod insertion will be as necessary to control ΔI and per the REMA). Commence a ramp down to 1000 MWe power as requested by Electric Operations

Event 2 PZR Pressure control channel, 1PT-455, fails high.

Initiate event after load ramp down is commenced, with the lead examiners concurrence.

Acknowledge info to SM, WEC, and maintenance. To trip bistables perform the following Remote Functions:

SDG: RX8

IMF RX21A 2500 30

MRF RP20 OPEN/CLOSE

MRF RX Trip

MRF RX Trip

Event 3 1A SG FRV will fail closed in AUTO.

Initiate event after event 2 actions completed, including addressing Tech Specs for action requirements, with the concurrence of the lead examiner. Acknowledge info to SM, WEC, and maintenance.

SDG: RX20

IMF RX29A 0 30

Event 4 1B MFP trips requiring start of the 1A FW Pump.

Initiate event after event 3 actions are completed with the lead examiners concurrence.

Acknowledge info passed to the SM, WEC, maintenance, and in plant operators. No local indication of pp trip.

SDG: FW7

IMF FW02A

Event 5 Inadvertent Phase A on Train A.

Initiate event after actions for the tripped 1B FW Pump have been addressed.

Acknowledge info/requests passed to the SM, WEC, maintenance, and in plant operators.

SDG: RP13

IMF RP10A

DMF RP10A after 5 seconds

Event 6 1A CV pump trips during actions for Inadvertent Phase A.

Initiate malfunction while the BOP is taking actions to restore Train A, Phase A valves to ensure the RO responds to this failure, with lead examiners concurrence. Acknowledge info to the SM, WEC, and maintenance.

SDG: CV5

IMF CV01A

Event 7 1A SG Steamline breaks at 4 Mlb/hr inside CNMT.

Initiate malfunction after start of 1B CV Pump, letdown is restored, Tech Spec 3.5.2 actions are addressed, with lead examiner's concurrence. Acknowledge info to the SM, WEC, request for STA.

NOTE: The Rx trip breakers will open on a trigger when the Step 7 action in 1BFR-S.1 is taken to isolate the Steam Dumps by taking the Bypass Interlock switches to OFF.

SDG: MS1

IMF RD09 8

IMF MS07A 4

Scenario No.: 06-3		Event No.: 1
Event Description: Perform Reactivity calculation for power ramp to 1000 Mwe and commence the power ramp to 1000 Mwe.		
Time	Position	Applicant's Actions or Behavior
	CUES:	Directed to perform during turnover
	RO BOP	Performs reactivity calculation for Unit 1 ramp up to 1235 Mwe power. (Should calculate ~320-370 gal Boration and setup to borate 40-70%)
	US	Direct actions for ramp to 1000 Mwe power. Monitor effects of boration
	RO	Initiate boration (BOP CV-6) <ul style="list-style-type: none"> • Place MU MODE CONT SWITCH to STOP position. • Set MU MODE SELECT to BOR position. • Set 1FK-101 Boric Acid Flow Cont Pot to desired boration rate • Verify 1CV110A in AUTO • Verify 1CV110B in AUTO • Ensure Boric Acid Transfer Pump Control Switch is NOT in PULL OUT • Place MAKE-UP CONTROL Switch to START • Verify proper operation of valves & BA Transfer pump (1CV110A modulates OPEN, and 110B opens, BA Transfer Pump is running) • Verify expected BA flow on recorder 1FR-110 • Monitor Boration effects • Verify at least two B/U Heater groups ON and spray valves 1RY455B/C modulate OPEN. • Monitor for RCS Tave drop.
	BOP	Initiate turbine load ramp: Using graphic 5501 <ul style="list-style-type: none"> o Verify/Select Impulse Pressure IN • SELECT SETPOINT • ENTER 5 MW/MIN rate in the RATE window • SELECT ENTER • ENTER 1000 in the REF DEMAND window • SELECT ENTER • SELECT EXIT Inform US/RO of pending drop in turbine load <ul style="list-style-type: none"> • SELECT GO (when RO reports expected Tave drop) Verify load drops as expected.
		NOTE: The next malfunctions may be entered at lead examiner's direction after 5-10% power change.

Comments:

Scenario No.: 06-3		Event No.: 2
Event Description: 1PT-455 Controlling PZR Pressure Channel fails high.		
Time	Position	Applicant's Actions or Behavior
	CUES:	<p>Annunciators:</p> <p>1-12-A2 PZR PRESS HIGH RX TRIP STPT ALERT</p> <p>1-12-B2 PZR PORV OR SAF VLV OPEN</p> <p>1-12-C1 PZR PRESS CONT DEV LOW HTRS ON</p> <p>1-12-D2 PZR PRESS CONT DEV HIGH</p> <p>1-12-C6 PZR PORV DSCH TEMP HIGH</p> <p>PZR pressure dropping</p> <p>PORVs open</p> <p>PZR sprays open</p> <p>Master Pressure Controller at 100%</p> <p>1PI-455 indicates 2500 psig</p>
	RO/US	<p>Identify/report failure of 1PT-455</p> <ul style="list-style-type: none"> • Take Manual control to stop the depressurization <ul style="list-style-type: none"> ○ PZR pressure Master Controller to Manual and lower output to close PORVs and sprays. ○ Manually close PORVs and sprays to stop depressurization. <p>Implement 1BOA INST-2, Operation With a Failed Instrument Channel</p> <ul style="list-style-type: none"> • Notify SM to evaluate for E-plan ○ Place ramp on HOLD
	BOP	<ul style="list-style-type: none"> ○ Refer to BARs on 1-12-A2/B2/C1/D2/C6 for operator actions ○ Check HMI for time line for exceeding DNB pressure limit
	US/RO	<p>Check PZR pressure:</p> <ul style="list-style-type: none"> • Restore pressure in manual – place Master pressure controller in Manual • Select an operable pressure control channel • Check PORVs closed – 1RY455A and 456 • Check sprays operating normally – 1RY455B and C • Check PZR heaters operating normally – Backups should be on until PZR pressure is > 2218 psig • Place PZR pressure control in AUTO • Select operable channels to PZR pressure recorder and Loop Delta-T ○ Identify/flag failed instrument ○ Request extra NSO to trip bistables for 1PT455 ○ Check RCS > 1930 psig for P-11 Interlock • Refer to Tech Specs for actions ; 3.4.1, 3.3.1, 3.3.2, and 3.3.4 – limiting LCO will require placing channels in trip within 6 hours – most limiting is 3.4.1, if pressure dropped to < 2209 psig – 2 hour action to restore. May also look at TRM 3.4.d. ○ Consider resuming ramp
	BOP	<p>Monitor plant for effects of power ramp and take any actions directed by the US</p> <ul style="list-style-type: none"> ○ Provide peer checks for RO switch manipulations
		NOTE: When actions have been completed to respond to failed PZR pressure channel and lead evaluators concurrence, Event 3 is entered.

Comments:

Scenario No.: 06-3		Event No.: 3
Event Description: Steam Generator 1A Feedwater Regulating Valve fails closed in AUTO		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciators: 1-15-A4 S/G 1A FLOW MISMATCH FW FLOW LOW 1-15-A9 S/G 1A LEVEL DEVIATION HIGH LOW 1A FW Flow dropping to 0 1A SG level dropping 1A FRV controller 1FW510 output drops to 0
	BOP/US	Identify/report failure of 1A FRV. o Place ramp on HOLD
	US/BOP	<ul style="list-style-type: none"> • Direct Manual control of 1FW510 to stabilize 1A FW flow to match steam flow • Restore 1A SG level to normal in Manual <ul style="list-style-type: none"> o Identify/flag the 1FW510 controller o Notify SM/Maintenance to investigate o Consider recommencing ramp
	RO	Monitor plant response to FW transient and take actions directed by the US
NOTE: When the above actions have been taken for the failed FRV and lead evaluators concurrence, Event 4 is entered.		

Comments:

Scenario No.: 06-3		Event No.: 4
Event Description: 1B MFP trips requiring entry into 1BOA SEC-1,		
Time	Position	Applicant's Actions or Behavior
	CUES:	Annunciators: 1-16-B1 FW PUMP 1B TRIP 1-16-D2 FW PUMP DSCH FLOW HIGH 1-15-A/B/C/D S/G 1A/B/C/D FLOW MISMATCH FW FLOW LOW 1C MFP speed rising All SG levels dropping
	BOP/ US	Identify/report trip of 1B MFP Implement actions in 1BOA SEC-1, Attachment A
	BOP	<ul style="list-style-type: none"> • Close 1B MFP recirc valve – 1FW012B • Check turbine load > 700 MW • Check 1C MFP running • Start the 1A MFP Aux Oil Pump • Verify 1FW016 controller in MANUAL at 20% demand • Start 1A MFP • Check 1A discharge flow > 3 MLB/HR – Adjust 1FW016, if necessary ○ Start standby CD/CB pump – start aux oil pump first, then the standby CD/CB pump • Check feed flow > steam flow – adjust 1FW016 as necessary ○ Raise FW Pumps suction pressure <ul style="list-style-type: none"> • Check FW Pump NPSH low alarm LIT (1-16-E1) • Check CP bypass valves open – 1CD210A/B • Check standby CD/CB pump running • Verify HD pump discharge valves responding as necessary – 1HD046A/B • Check CB pump recircs in AUTO – 1CB113A/B/C/D • Check CD pumps recirc valve closed – 1CD152 • Check Gland steam condenser bypass valves open – 1CD157A/B • Check Feed Flow greater than or equal to steam flow • Check SG levels stable or trending to normal • FW Pump Discharge Flow High alarm (1-16-D2) NOT LIT – balance flow as necessary
	US/RO/	Check Plant Status: <ul style="list-style-type: none"> • PDMS operable – PDMS INOPERABLE (1-10-E8) NOT LIT • PDMS LIMIT EXCEEDED alarm (1-10-D7) NOT LIT • Control Delta-I near target • ROD BANK LOW INSERTION LIMIT alarm (1-10-B6) NOT LIT • LOSS OF TURBINE LOAD INTLK alarm (1-BP-4.6) NOT LIT

Comments:

US/ BOP		Restore Plant Conditions <ul style="list-style-type: none"> • Balance MFP flows as necessary • Verify MFP recircs are in MODULATE • Verify all valve controls are in AUTO – HD pump discharge, CB recircs, CD recirc, GS cond bypasses. o Review 1A MFP startup procedure o Shut down unnecessary CD/CB pump per BOP CD/CB-2 o Complete shutdown of 1B MFP per BOP FW-2 o Adjust SG BLDN flows and calorimetric inputs as necessary o Verify DEHC feedback loop in service – Impulse/MW
US		Request maintenance to troubleshoot. Notify SM for IR/WR
RO		Monitor plant for effects, address BARs, and take any actions directed by the US
		NOTE: When actions have been completed to respond to 1B MFP trip and lead evaluator's concurrence, Event 5 and 6 are entered.

Comments:

Scenario No.: 06-3		Event No.: 5/6
Event Description: Inadvertent Phase A on the A Train; 1A CV pump trips prior to L/D restoration		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciators: 1-5-B7 CNMT PHASE A ISOLATION 1-7-C3 RCP SEAL LEAKOFF FLOW LOW 1-9-B1 LP LTDWN RLF TEMP HIGH Group 3 CNMT isol monitor lights LIT Phase A CNMT isol valves indication - CLOSED
	ALL US	Identify/report PHASE A CNMT ISOLATION Direct implementation of 1BOA PRI-13, Recovery From Inadvertent Phase A Containment Isolation. <ul style="list-style-type: none"> Notify SM to evaluate for E-plan
	RO/BOP	<ul style="list-style-type: none"> Manually control charging to minimize PZR level rise Turn off Backup Heaters Start available RCFCs in High Speed Determine Train A by verifying 1CV8100, 1WO006A, and 1WO020A are closed. Check ATT. A to verify Train A valves are closed. Reset CNMT Isolation: <ul style="list-style-type: none"> Reset Phase A Place PZR spray controllers in MANUAL – for 1RY455B and C Open IA to CNMT – 1IA065 and 66 Restore PZR Pressure control to normal – heaters and sprays Restore letdown per 1BOA ESP-2, Re-establishing Letdown <p>Check Letdown isolated:</p> <ul style="list-style-type: none"> 1CV8149A/B/C (Letdown Orifice Isol Vlvs) are closed. 1CV459/460 (Letdown line Isol Vlvs) are closed. <p>Check Letdown Flowpath</p> <ul style="list-style-type: none"> Letdown Hx Isol Vlv open (1CV8401A for 1A Hx or 1CV8401B for 1B Hx) Regen Hx Isol Vlvs open (1CV8324A/8389A for 1A Hx or 1CV8324B/8389B for 1B Hx) Letdown CNMT Isol Vlvs open (1CV8152 and 1CV8160) BTRS MODE Select Switch in OFF <p>Align Letdown Controllers:</p> <ul style="list-style-type: none"> Place 1CV131 in Manual with 40% demand Place 1CC130 in Manual with 60% demand <p>Verify Charging Flow is established:</p> <ul style="list-style-type: none"> Check Charging Line CNMT Isol Vlvs open (1CV8105 and 1CV8106) Throttle 1CV182 to maintain PCP Seal Injection 8-13 gpm per RCP Throttle 1CV121 to establish at least 100 gpm Charging Flow.
		NOTE: Event 6 can be entered when the BOP is taking 1BOA PRI-13 actions to ensure the RO takes the action for the 1A CV pump trip, with lead examiner's concurrence. 1A CV pump trip event actions are on the next page.

Comments:

	CUE:	Annunciator: 1-9-A3 CHG PUMP TRIP 1-9-D3 CHG LINE FLOW HIGH LOW 1-7-B2 RCP SEAL WTR INJ FLOW LOW Trip indication on 1B CV pump C/S
	US/RO BOP	Identify / report 1B CV pump trip Notify SM/Maintenance and dispatch NLO to investigate <ul style="list-style-type: none"> • Address actions in BAR 1-9-A3 <ul style="list-style-type: none"> • Verify Letdown isolated – 1CV9149A/B/C are closed • Check 1CV459 and 460 are closed • Ensure a borated water source is available to the 1A CV pump (VCT or RWST) • Discuss gas binding to eliminate as cause • Verify miniflow recirc path for 1A CV pump (1CV8111 and 8114 open) • Place 1CV121 in Manual at 10% open demand • Start 1A CV pump – monitor amps and flow for indications of gas binding. • Throttle charging flow to establish 70 gpm • Address going to BOP CV-17 to re-establish letdown – 1BOA ESP-2 already in use. • Determine cause of the 1B CV pump trip • Refer to Tech Spec 3.5.2/3 and TRM 3.1.a/b/c/d • Initiate corrective action <p>Exit BAR and continue with 1BOA ESP-2</p>
	RO/ BOP	Establish Letdown Flow: <ul style="list-style-type: none"> • Open Letdown Line Isol Vlvs (1CV459 and 1CV460) • Open Letdown Orifice Isol Vlvs to obtain desired flow (1CV8149A and/or B and/or C) • Adjust 1CV131 to control letdown pressure at ~ 360 psig • Adjust ICC130 to control letdown temperature between 90 and 115 degrees F. <ul style="list-style-type: none"> • Place the controllers for 1CV131 and ICC130 in AUTO. • Throttle 1CV121 and 182 to maintain PZR level program and 8-13 gpm RCP seal injection per RCP • Re-establish RCP seal leakoff to the VCT <ul style="list-style-type: none"> • SEAL WATER HX CC FLOW (1-2-A7) NOT LIT • RCS pressure > 100 psig • VCT pressure 15-65 psig • Open seal water return CNMT isol valve – 1CV8100 • Check No. 1 seal leakoff isol valves open – 1CV8141A/B/C/D

Comments:

BOP	<ul style="list-style-type: none"> • Restore CNMT cooling – open 1WO006A/B, 1WO020A/B, and 1WO056A/B, and start CNMT chiller per BOP VP-1 (Detailed procedure below) • Restore CNMT ATMOS monitor: <ul style="list-style-type: none"> • Verify 1PR001A/B (CNMT isol vlvs) are open • Verify 1PR066 (PR return to CNMT) is open • Start 1PR11J – CNMT ATMOS monitor per BAR RM-2-1PR11J ○ Restore SG Bldn per BOP SD-101 and update calorimetric • Restore normal valve lineups per ATT A for Train A valves. • Refer to Tech Specs – condition will be cleared, no actions will be required
RO/ US	<ul style="list-style-type: none"> • Monitor plant for effects and take any action directed by the US <p>NOTE: When actions have been completed for the Inadvertent Phase A and 1A CV pump trip and lead evaluators concurrence, Event 7 is entered.</p> <p>NOTE: Recommend providing a CUE to the crew that BOP VP-1 will be performed by a Unit 2 NSO. This is lengthy and no real value added since most actions are performed outside of the MCR.</p>
BOP	<ul style="list-style-type: none"> • Start CNMT chiller per BOP VP-1 <ul style="list-style-type: none"> • Verify/open 1SX016A/B, 27A/B, (on 1PM06J) 112A/B and 114A/B (on 0PM02J) • Verify 1WO006A/B, 20A/B, and 56A/B are open on 1PM06J. • Verify at least 10 psig suction to chilled water pump – 1WO01PA/B • Start either 1WO01PA or B <ul style="list-style-type: none"> ○ Verify flow on 1FI-WO026/27 is > 2700 gpm (throttle to 2700-3000 gpm) ○ Verify oil in chiller sight glass and oil reservoir temp 135-150 degrees F ○ Place local Capacity Control Switch in AUTO ○ Place electrical demand switch locally to 60% ○ Place local control switch in STOP ○ Place LOCAL/REMOTE switch in REMOTE • Place remote control switch on 0PM02J to CLOSE <ul style="list-style-type: none"> ○ Push reset button for safety indicators locally and release ○ Verify program timer light comes ON locally ○ Verify oil pump starts locally (~25 sec) ○ Verify compressor starts in ~ 30 seconds after oil pump ○ Check that program timer light goes OFF • Verify VP chiller condenser pressure will automatically control <ul style="list-style-type: none"> • Momentarily close 1SX147A/B from 0PM02J until dual indication is present. • Verify 1SX112A, 1A VP chiller SX Sup Valve, is open on 0PM02J. • Verify 1SX147A C/S in AUTO <ul style="list-style-type: none"> ○ Verify oil DP on 1PI-WO040/64 remains 6-40 psig ○ Verify oil reservoir temp stabilizes 135-160 degrees F ○ Verify bearing oil temp stabilizes 140-170 degrees F ○ Set electric demand at 60% and hold for at least 5 minutes ○ Raise electric demand to 80% and hold for at least 5 minutes ○ Ensure load demand is set for 100% ○ Ensure thermostat set to maintain chilled water outlet temp 42-48 degrees F

Comments:

Scenario No.: 06-3		Event No.: 7
Event Description: 1A SG Steamline breaks inside CNMT with a failure of the Reactor to trip (ATWS) and AUTO and MANUAL rod insertion will fail to 8 steps/minute.		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciators: 1-15-E2 MS PRESS LOW 1-15-A/B/C/D4 SG 1A/B/C/D MISMATCH FW FLOW LOW 1-12-C1 PZR PRESS CONT DEV LOW HTRS ON 1-11-E1 CNMT PRESS HIGH SI/RX TRIP first out PZR pressure dropping rapidly CNMT pressure rising rapidly
	ALL US	Identify/report indications and failure of the reactor to trip. Direct a Manual reactor trip. Direct implementation of 1BFR-S.1, Response to Nuclear Power Generation/ATWS <ul style="list-style-type: none"> • Direct operators to take immediate actions • Notify SM to evaluate for E-plan • Announce Adverse Cnmt conditions when > 5 psig
	RO	<ul style="list-style-type: none"> • Verify reactor tripped <ul style="list-style-type: none"> • Rod bottom lights are NOT LIT, Reactor trip breakers are CLOSED • Attempt to Manually trip Reactor at both 1PM06J and 1PM05J • Rods inserted at maximum rate –Manual or AUTO is only 8 steps/min
	BOP	<ul style="list-style-type: none"> • Verify turbine tripped <ul style="list-style-type: none"> • All turbine throttle valves closed • All turbine Governor valves closed • Check AF pumps running – AF pump run lights LIT
		NOTE: The SI Train relays did not function to shift CV pump suction to the RWST and tied to these relays, also, are the 1SI8801A and 1SI8801B valves that need to be manually opened during this event.
	RO [CT] [FR-S.1-C]	<ul style="list-style-type: none"> • Initiate Emergency Boration <ul style="list-style-type: none"> • Check at least 1 CV pump running • Verify RWST suction valve OPEN – 1CV112D or 112E • Close 1CV112B or 112C • Maximize charging flow (report boration flow rate is > 30 gpm) • Check PZR pressure < 2335 psig
	BOP/ RO	Verify CNMT Vent Isol <ul style="list-style-type: none"> • Group 6 CNMT Vent Isol monitor lights LIT Verify Reactor is Subcritical <ul style="list-style-type: none"> • PR channels > 5% - Go to step 7 Isolate Steam Dumps <ul style="list-style-type: none"> • Place steam dump BYPASS INTERLOCK switches (A and B train) to OFF RESET • Check if reactor has tripped • Dispatch an operator to locally open reactor trip and bypass breakers – May have been done

Comments:

		<p>NOTE: RCPs are required to be tripped after Rx is < 5% AND IR SUR is negative AND CNMT PHASE B has occurred.</p> <p>NOTE: SI equipment actuation can be verified via the OAS page in this procedure and should be done as time permits.</p>
	BOP	<p>Check SG levels:</p> <ul style="list-style-type: none"> • NR in at least 1 SG > 10% (31% ADVERSE) <ul style="list-style-type: none"> ◦ Verify AF flow > 900 gpm <ul style="list-style-type: none"> • Maintain > 900 gpm until at least 1 SG is > 10% (31% ADVERSE) • Control SG NR levels 10% (31%) to 50% • Check SG BLDN isol valves CLOSED – 1SD002A-H
	RO	<p>Verify all dilution paths isolated</p> <ul style="list-style-type: none"> • Check reactor makeup dilution valves closed – 1CV111A and B • Verify BTRS MODE SELECT switch in OFF • Dispatch an NLO to verify dilution paths identified in 1BFR-S.1, Step 10. c. are closed
	ALL	<p>Stop Reactivity Insertion from RCS Cooldown</p> <ul style="list-style-type: none"> • RCS NOT DROPPING in an UNCONTROLLED manner – go to step 12 • SG pressure , NONE dropping in an UNCONTROLLED manner –go to step 12 • Check all MSIVs and MSIV Bypasses CLOSED • Identify 1A SG as FAULTED – pressure dropping in an UNCONTROLLED manner OR completely DRY.
	US/ BOP [CT] [E-2-A]	<p>ISOLATE FAULTED SG</p> <ul style="list-style-type: none"> • Check FW to faulted SG ISOLATED – associated ROW on FW Isol Monitor Lights Panel LIT. • Isolate AF to 1A SG by closing 1AF013A and E • Check 1MS018A closed (1A SG PORV) • Verify 1SD002A and B closed (1A SG BLDN valves) • Verify 1SD005A closed (SG BLDN sample valve)
	US/RO	<ul style="list-style-type: none"> • Check CETCs < 1200 degrees F • Verify reactor is subcritical <ul style="list-style-type: none"> • PR channels < 5% • IR channels – negative startup rate
	US	<ul style="list-style-type: none"> • Transition to 1BEP-0 and direct operators to perform their immediate actions. • Notify SM to evaluate for E-plan • Notify STA to evaluate BSTs

Comments:

	US	Implement 1BEP-0 "REACTOR TRIP OR SAFETY INJECTION" and directs operator actions. <ul style="list-style-type: none"> • Notifies SM of EP entry • Requests Emergency Plan evaluation • Announce Adverse Cnmt conditions when > 5 psig
	RO	Verify reactor trip <ul style="list-style-type: none"> • Rod bottom lights LIT • Reactor trip & Bypass breakers open • Neutron flux lowering
	BOP	Verify Turbine Trip prior to performing step 3 of 1BEP-0 <ul style="list-style-type: none"> • Turbine throttle valves closed • Turbine governor valves closed
	BOP	Verify power to 4KV busses <ul style="list-style-type: none"> • Bus 141 alive light lit • Bus 142 alive light lit
	ALL RO	Perform immediate operator actions of 1BEP-0: Check SI status <ul style="list-style-type: none"> • SI actuated <ul style="list-style-type: none"> • SI First OUT annunciator lit (1-11-B1, 1-11-C1, 1-11-D1, 1-11-E1) • SI ACTUATED lit (1-BP-4.1) • SI Equipment running (SI pumps running, CV Cold leg injection SI8801A/B open) Determine SI actuated <ul style="list-style-type: none"> • Actuate SI by taking either SI switch to ACTUATE (1PM05J or 1PM06J)
	BOP	Verify FW isolated <ul style="list-style-type: none"> • FW pumps tripped • Isolation monitor lights lit • FW pumps discharge valves closed 1FW002A-C

Comments:

	RO	<p>Verify ECCS pumps running</p> <ul style="list-style-type: none"> • CENT CHG pumps • RH pumps • SI pumps
	BOP	<ul style="list-style-type: none"> • Verify RCFCs Accident Mode lights lit • Verify Phase A isolation - Group 3 monitor lights lit • Verify CNMT Ventilation isolation - Group 6 CNMT Vent Isol monitor lights lit
	BOP	<p>Verify AF system:</p> <ul style="list-style-type: none"> • AF pumps running • AF isolation valves open 1AF13A-H, except A and E • AF flow control valves throttled 1AF005A-H, except A and E <p>Verify CC Pumps running Verify SX Pump running Check if Main Steamline Isolation required</p> <ul style="list-style-type: none"> • Check SG pressure > 640 psig, 1A SG will NOT be • Check CNMT pressure > 8.2 psig <ul style="list-style-type: none"> • Verify MSIVs and MSIV Bypass valves closed
	BOP	<p>Check if CNMT Spray is required</p> <ul style="list-style-type: none"> • Check if CNMT pressure has increased to greater than 20 psig • Check Group 6 CS monitor lights LIT – NOT 1B CS pump • Check Group 6 Phase B isol monitor lights LIT o Stop ALL RCPs - verification • Check CS eductor suction flow on running pumps greater than 15 gpm • Check CS eductor additive flow on running pumps greater than 5 gpm • Align SX Cooling towers: <ul style="list-style-type: none"> • All 8 riser valves open 0SX163A thru H • All 4 Hot Water Bypass valves closed 0SX162A thru D • All 8 SX Cooling Tower hi speed fans running
	BOP	<p>Verify Total AF flow:</p> <ul style="list-style-type: none"> • AF flow > 500 gpm • SG levels maintained between 10% (31% Adverse) and 50% • SG levels NOT increasing in an uncontrolled manner
	BOP	<p>Verify ECCS valve alignment</p> <ul style="list-style-type: none"> • Group 2 Cold Leg Injection monitor lights lit • Verify 1SI8801A and 1SI8801B are OPEN

Comments:

	BOP	Verify ECCS flow <ul style="list-style-type: none"> • HHSI flow >100 gpm • RCS pressure NOT <1700 psig
	RO	Check at least one PZR PORV relief path is available <ul style="list-style-type: none"> • PORV isol valve – both ENERGIZED (1RY8000A/B) • PORV relief path – both AVAILABLE (1RY455A/456) <ul style="list-style-type: none"> • PORVs in AUTO • Isolation valves open
	BOP/US	Verify Generator Trip <ul style="list-style-type: none"> • GCB 3-4 and OCB 4-5 open • PMG output breaker open
	BOP	Verify DGs running, <ul style="list-style-type: none"> • SX valves open 1SX169A/B • Dispatch operator locally to check operation
		Examiners note: US and RO will likely continue in 1BEP-0 while BOP is performing the next 3 ventilation steps:
	BOP	Verify Control Room ventilation aligned for emergency operations: <ul style="list-style-type: none"> • Dispatch NLO to trip VV supply fans • Operating VC train equipment running Train A <ul style="list-style-type: none"> • Supply fan • Return fan • M/U fan • Chilled water pump • MCR chiller 0A • Operating VC train dampers <ul style="list-style-type: none"> • M/U fan outlet damper NOT full closed 0VC24Y • VC train M/U filter light LIT • Operating VC train Charcoal Adsorber aligned for train A <ul style="list-style-type: none"> • 0VC43Y closed • 0VC21Y open • 0VC22Y open • Control Room pressure greater than +0.125 inches water on 0PDI-VC038

Comments:

	BOP	<p>Verify Auxiliary Building ventilation aligned</p> <ul style="list-style-type: none"> • Two inaccessible filter plenums aligned <ul style="list-style-type: none"> • Plenum A fan 0VA03CB running <ul style="list-style-type: none"> • Damper 0VA023Y open • Damper 0VA436Y closed • Plenum C fan 0VA03CF running <ul style="list-style-type: none"> • Damper 0VA072Y open • Damper 0VA438Y closed
	BOP	<p>Verify FHB ventilation aligned</p> <ul style="list-style-type: none"> • Train B fan 0VA04CB running • 0VA055Y open • 0VA062Y open • 0VA435Y closed
	RO	<p>Check PZR sprays & PORVs closed</p> <ul style="list-style-type: none"> • Normal spray valves closed 1RY455B and 1RY455C (NOTE: valves are failed closed due to loss of IA due to Cnmt Phase A) • PORVs closed (1RY455A/456) – identify that PORVs are cycling to maintain PZR pressure
	RO/BOP	<p>Maintain RCS temperature control</p> <ul style="list-style-type: none"> • Determine no RCPs running <ul style="list-style-type: none"> • Throttle AFW flow to SGs maintaining > 10% (ADVERSE >31%) in at least 1 SG. (Except the faulted SG)
	RO	<p>Check if RCP's should be stopped</p> <ul style="list-style-type: none"> • NO RCP's running
	BOP	<p>Check if SG secondary pressure boundaries are intact:</p> <ul style="list-style-type: none"> • Check pressure in all SGs: <ul style="list-style-type: none"> • None decreasing in an uncontrolled manner • None completely depressurized – 1A SG is DRY – GO TO 1BEP-2

Comments:

Scenario No.: 06-3		Event No.: 7
Event Description: 1A SG Steamline breaks inside CNMT with a failure of the Reactor to trip (ATWS)		
Time	Position	Applicant's Actions or Behavior
	ALL US	Transition to 1BEP-2 "FAULTED STEAM GENERATOR ISOLATION UNIT 1"
	US	Enter and direct actions of 1BEP-2 "FAULTED STEAM GENERATOR ISOLATION UNIT 1" <ul style="list-style-type: none"> • Notifies SM of BEP entry • Requests Emergency Plan evaluation
	BOP	Check main steamline isolation: <ul style="list-style-type: none"> • All MSIVs and MSIV Bypass valves closed
	BOP	Check if any SG secondary pressure boundary is intact: <ul style="list-style-type: none"> • Check all steam generators for any SG pressure stable or increasing.
	BOP/US	Identify Faulted SG <ul style="list-style-type: none"> • Check pressure in all SGs • Any decreasing in an uncontrolled manner <ul style="list-style-type: none"> • Identify/report 1A steam generator is faulted.
	BOP	Isolate 1A S/G: <ul style="list-style-type: none"> o Close 1AF013A & E • Check FW to faulted SG isolated (should have performed in 1BEP-0) <ul style="list-style-type: none"> o Associated row on FW isolation monitor lights panel LIT for faulted SG. • Verify 1A S/G PORV closed (1MS018A) • Verify 1A S/G Blowdown valves closed (1SD002A and B) • Verify 1A S/G Blowdown sample isolation valves closed (1SD005A)
	BOP	Monitor AF pump suction pressure: <ul style="list-style-type: none"> • AF PUMP SX SUCT VLVS ARMED alarm 1-3-E7 NOT lit
	US/BOP	Check secondary radiation trends normal for plant conditions: <ul style="list-style-type: none"> • RM11 Grid 1 indications for: (May elect to use HMI for trends) <ul style="list-style-type: none"> • SJAE/ gland steam exhaust gas • SG blowdown liquid radiation • Main steamline MSIV rooms • Reset CNMT isol Phase A • Request chemistry to sample all SGs
	US	GO TO 1BEP-1, Loss of Reactor or Secondary Coolant

Comments:

	ALL	Transition to 1BEP-1
	US	Implement 1BEP-1 and direct operator actions. <ul style="list-style-type: none"> • Notifies SM of BEP entry • Requests E-plan evaluation
	RO/US	<ul style="list-style-type: none"> • Check status of RCPs and determine none running
	BOP/US	<ul style="list-style-type: none"> • Identify faulted 1A SG and that 1BEP-2 has been completed • Check Intact SG levels > 10% (31% ADVERSE), controlled 10% (31%) to 50% NR and NONE rising in an UNCONTROLLED manner • Check Secondary rad levels NORMAL
	US/RO	<ul style="list-style-type: none"> • Check PZR PORVs and Isol Valves <ul style="list-style-type: none"> ○ PORVs isol vlvs energized ○ PORVs closed – identify cycling to maintain pressure ○ PORV isol vlvs – at least 1 open
	ALL	<ul style="list-style-type: none"> • Check if ECCS can be reduced <ul style="list-style-type: none"> • RCS subcooling adequate – iconic display or ATT A • Secondary heat sink established – at least 1 SG > 10% (31%) OR > 500 gpm AF flow • RCS pressure stable or rising • PZR level > 12% (28% ADVERSE) • GO TO 1BEP ES-1.1, SI Termination
		NOTE: With lead examiner's concurrence, terminate this scenario. Evaluate SRO for EAL (MS3)

Comments:

Unit Supervisor Turnover –FOR TRAINING ONLY

PLANT STATUS				
Grid Status: Green	"B" Train Week	WWM: R. Freidel	Shift: 95 to 96	Date: TODAY
Unit 1			Unit 2	
Mode: 1	% Pwr: 100	MW: 1235	OLR: Yellow	
CB: 1000	Xenon: Steady State	Rod Height: 221	CB: 1168	Xenon: Steady State Rod Height: 221
IN PROGRESS			IN PROGRESS	
-1B CS Trouble shooting -1C HD pump seal replacement			-2HD099 contingency plan to Furmanite. -SAT 242-2 bank 4 deenergized with EST tag (cooling fan 2 missing)	
LCOAR	C/O / T/L / RTS		LCOAR	C/O / T/L / RTS
-1BOL 6.6	1B CS pump 1C HD pump			2HD0099B
LCOAR's Exited:			LCOAR's Exited:	
MAINTENANCE			MAINTENANCE	
-1B CS pump -1C HD pump			-SAT 242 bk 4 fans	
MAJOR PROC.			MAJOR PROC.	
PENDING			PENDING	
NO LIQ REL w/o permission from Ops Dir & SVP -U1/U2 Cnmt Release Package prep			-U2 EH sample	

Unit Supervisor Turnover – FOR TRAINING ONLY

<u>ADMINISTRATIVE</u>		<u>COMMENTS</u>
Temporary Alterations	X	
Unit 0 Logbook	X	
Unit 1 Logbook	X	
Unit 2 Logbook	X	
Train Inop Status Board	X	
Degraded Equipment Log	X	
Daily Orders	X	
* CRs	X	
Abnormal Component Posit.	X	

<u>TURNOVER ITEMS</u>		<u>COMMENTS</u>
	Normal YES/NO	
NSO Shiftly and Daily Surv	Yes	-1C HD pump OOS; RTS by end of shift today -1B CS OOS; RTS by end of shift today
SYS - Primary	Yes	
SYS – Balance of Plant	No	
Nuclear Instrumentation	Yes	
MCB Instrumentation	Yes	
MCB Controllers	Yes	
Electrical Distribution - AC	No	
Electrical Distribution - DC	Yes	
Electric Operations	Yes	
Blowdown (CW/SD)	Yes	
Alarms (MCB)	Yes	
Chemistry	Yes	
Radiation Precautions	Yes	
FME Issues	Yes	

U-1 Turnover EFPH: 600

U-1 Reactivity: Borate 10gals=.3 °F **Nuke Engineer:** K. Elam **Boron to ramp to 780 MW:** 555 **700 MW:** 400 gals

BAT = 7581, BA Pot = 3.91 Equals 15.6 gpm @ Steady State FUEL DEPLETION: 11 gallons/shift
 RWST = 2383 ppm 1A CV pp Cb = 1000 ppm

U-2 Reactivity: Dilute 20 gal=.2°F **Nuke Engineer:** F. Funke **Boron to ramp to 780 MW:** 480 **700 MW:** 290 gals

BAT = 7579, BA Pot = 4.61 Equals 18.4 gpm @ Steady State FUEL DEPLETION: 40 gallons PW/shift
 RWST = 2350 ppm 2B CV pp Cb = 1188 ppm

Exceptional OOS's Requiring Special Plant Conditions

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MISCELLANEOUS

Review BA Pot settings on turnover
 2HD099B steam leak (~120 drops/min) Monitor 2X/shift

Post Reviews: FS, US, Unit NSO, Turnovers Logs, MCR Tour, Daily Orders and Standing Orders

OFF-GOING		ON-COMING	
<i>UNIT 1 Supervisor</i>		U-1 Unit Supervisor	
<i>UNIT 2 Supervisor</i>		U-2 Unit Supervisor	
<i>STA</i>		STA	

Center Desk Operator Turnover- FOR TRAINING ONLY

PLANT	U1 Mode: 1	% Pwr: 100	MW: 1235	IN PROGRESS	
STATUS	U2 Mode: 1	% Pwr: 100	MW: 1229	CW Warming line is OFF	
MUDS					
BOILER		IA DRYERS ON LINE			
0A: Standby	U1: Wet L/U		U1/U2		
0B: Exhausted	U2: Wet L/U		AS	U1 ES	
ADMINISTRATIVE					
1. Temporary Procedures			X		
2. Temporary Alterations			X		
3. ESTs			X		
4. Unit 0 Logbook			X		
5. Center Desk Routine			X		
6. Daily Orders			X		
7. SM Notes			X		
8. Switching Orders / Electric Ops / Division LD			X		
9. Control Board Walkdown			X		
10. 1 st Shift Annun Check Completed			NA		
LCOAR		C/O / RTS		Surveillances	Maint / WR
TURNOVER ITEMS		Normal			
1. HVAC		Yes	OCB's 12-13, 4-5, & 11-12 have temporary Cabinet Htrs 1B CS OOS for Trouble shooting 2HD099B steam leak, 1C HD pp		
2. 345 KV Systems, Relay House		No			
3. Air Systems (IA, SA)		Yes			
4. Fire Protection		Yes			
5. Blowdown		Yes			
6. Radiation Releases		Yes			
7. MCB Instrumentation		Yes			
8. MCB Controllers		Yes			
9. Tank Capacity		Yes			
10. Chemistry		Yes			
11. Radiation Protection		Yes			
12. Alarms – MCB Annun		Yes			
13. Alarms – FP / Other		Yes			
14. SYS – Safeguards		No/14			
15. SYS - Primary		Yes			
16. SYS – Balance of Plant		No/16			
17. MDCT		Yes			
18. NDCT, Flume		Yes			
19. FME Issues		Yes			
TIME	DATE	SHIFT	OFF-GOING	ON-COMING	
Now	TODAY	95 to 96	Center Desk		

Unit 1 Nuclear Station Operator Turnover – FOR TRAINING ONLY

PLANT	Mode: 1	% Pwr: 100	MW: 1235	ADMINISTRATIVE	
STATUS	Grp: CBD 221	Cb: 1000 ppm	Xe: Steady State	1. <u>Temporary Procedures</u>	X
TURNOVER				2. <u>TCCP's</u>	X
EFPH = 600				3. <u>EST's</u>	X
LCOAR	C/O / RTS	Surveillances	Maint / WR	4. <u>Unit 1 Logbook</u>	X
1B CS pp (1BOL 6.6)	1B CS C/S 1C HD pp C/S			5. <u>Unit Routine</u>	X
				6. <u>Aux Elec Equip Rm General Inspection</u>	X
				7. <u>Daily Orders</u>	X
				8. <u>SM Notes</u>	X
				9. <u>Control Board Walkdown</u>	X
				10. <u>Abnormal Component Positions</u>	X
				11. <u>1st Shift Annun Check Completed</u>	NA
IN PROGRESS				PENDING	
1B cs Trouble shooting 1C HD pp seal replacement				Load ramp down to 1000Mwe at 5Mwe/minute BA Pot = 3.91 Equals 15.6 gpm @ Steady State FUEL DEPLETION: 11 gallons BA/shift Borate 10 gals =.3 °F	
Exceptional C/O's Req Plant Cond:					
TURNOVER ITEMS		Normal			
1. No Major Procedures in Progress		Yes			
2. NSO Shiftly and Daily Surveillance		Yes			
3. SSPS Channels / Bistables		Yes			
4. ALARMS – SER / Annunciators		Yes			
5. ALARMS – Process / RM-11		Yes			
6. SER / Alarm Typer / Trend Typer		Yes			
7. Alarms – FP / Other		Yes			
8. Tank Capacity		Yes			
9. Chemistry		Yes			
10. Radiation Precautions		Yes			
11. Nuclear Instrumentation		Yes			
12. MCB Instrumentation		Yes			
13. MCB Controllers		Yes			
14. Electrical Distribution - AC		Yes			
15. Electrical Distribution - DC		Yes			
16. SYS - Safeguards		No/16	1B CS pp OOS		
17. SYS - Primary		Yes			
18. SYS – Balance of Plant		No/18	1C HD pp OOS		
19. FME Issues					
20.					
21.					
TIME	DATE	SHIFT	OFF-GOING	ON-COMING	
NOW	TODAY	95 to 96	<i>Center Desk</i>		

BORATION / DILUTION CALCULATIONS

Purpose: The purpose of this power change reactivity worksheet is to establish a boundary for the amount of boration / dilution that may be required and to assist in meeting industry expectations for reactivity control during a power ramp. The worksheet assumes steady state reactor power prior to the ramp and DOES NOT consider Xenon effects. Since the worksheet establishes a boundary, the operator experience plays an equal if not more important role in ensuring proper reactivity controls. 40% to 70% of the boration / dilution amount will normally be added.

CALCULATION:

1. Basis: Approx Cycle Burnup: 600 EFPH Initial Cb: 1000 ppm
Initial Reactor Power: 100 % Initial CBD: 221 steps
Final Reactor Power: 80 % Final CBD: 175 steps (est)

2. Determine the change in power defect:

Use BCB-1 Figure 17A, pages 1-4 or Table 2-1:

$$\frac{(-) 1300}{\text{final power defect}} - \frac{(-) 1600}{\text{present power defect}} = \frac{+300}{\text{Change in power defect}} \text{ pcm}$$

3. Determine the amount of reactivity change due to control rod repositioning:

Use BCB-1 Figure 2C, pages 1-4 or Table 1-7 (Ensure correct curve w/respect to core life):

$$\frac{10}{\text{present inserted rod worth}} - \frac{105}{\text{final inserted rod worth}} = \frac{-95}{\text{Change in control rod worth}} \text{ pcm}$$

4. Determine the reactivity the boration / dilution will compensate for:

$$\frac{+300}{\text{step 2 result}} + \frac{-95}{\text{step 3 result}} = \frac{+205}{\text{Reactivity to compensate for}}$$

5. Determine the Differential Boron Worth (DBW):

Use BCB-1 Figure 10B, pages 1-4 or Table 2-4: 6.68 pcm/ppm (Avg of 2 values)
(Use the DBW absolute value, i.e., positive)-> 6.68 differential boron worth

6. Determine the ppm change in RCS boron concentration:
(NOTE: + number indicates boration; - number indicates dilution)

$$\frac{(\text{step 4 result})}{(\text{step 5 result})} \frac{+205}{6.68} = \frac{+30.7}{\text{ppm change in RCS boron conc.}}$$

7. Determine the amount of boration / dilution required: (Data taken using 575°F)

Use Table 3-1 → ~ 345 gallons BA **BORATION** or DILUTION required
(circle one) **(BOLDED)**

(Final)

Facility:	<u>Byron</u>	Scenario No.:	<u>06-4</u>	Op-Test No.:	<u>2006-301</u>
Examiners:	_____	Operators:	_____		<u>SRO</u>
	_____		_____		<u>RO</u>
	_____		_____		<u>BOP</u>
<p>Initial Conditions: IC-18; 75% power, 864 Mwe, MOL, equilibrium Xenon, steady state, following maintenance activities on 1C low pressure heater string. 1B SX Pump has been removed for 6 hours to replace the aux oil pump and is expected back in service by the end of this shift. LCOAR 1BOL 7.8 has been initiated. 1C HD Pump OOS for seal replacement and not expected back until the end of shift.</p> <p>Turnover: The plant down powered 3 days ago from 106 days at 100% power to make repairs on the 1C LP Heater string and is currently at 75% power, MOL, equilibrium Xenon, steady state, 7500 EFPH, and 780 ppm boron concentration. Repairs are complete on 1C LP Heater string. 1B SX Pump has been removed for 6 hours to replace the aux oil pump and is expected back in service by the end of this shift. LCOAR 1BOL 7.8 has been initiated. 1C Heater Drain Pump is OOS for mechanical seal replacement. Power Team has been notified Byron Unit 1 is ready to return to 1235 Mwe. The SM has given the direction to raise power at 3%/hr to 1235 Mwe. Power Team requests Unit 1 return to 1235 Mwe power as soon as possible. 1BGP 100-3 is in use and currently at Step F.63. On-line Risk is Yellow.</p>					
Event No.	Malf. No.	Event Type*	Event Description		
Preload	IOR ZDI1SX01PB PTL IOR ZLO1SX01PBC OFF IOR ZDI1HD01PC PTL IMF FW44 MRF SI24 OVER MRF SI25 OVER		1B SX Pump OOS 1B SX aux oil pump OOS 1C HD Pump OOS 1B AFW Pump fails to start/trips 1SI8801A fails to open on SI signal 1SI8801B fails to open on SI signal		
1		US R RO N BOP	Direct the Unit ramp to 1235 MWe power. Perform Reactivity calculation for ramp to 1235 MWE Ramp up the Unit to 1235 MWE power Ramp up the Unit to 1235 MWE power		
2	IMF RX18M 650	I RO US	RCS Loop 1A Thot RTD (1TD411) fails high. This will require entry into 1BOA INST-2 for stabilization and recovery. Tech Spec 3.3.1/2 actions.		
3	IMF RX06H 0 120	I BOP US	Steam Generator 1B controlling level channel fails low (0%, 120 seconds). Enter 1BOA INST-2 for actions and Tech Specs 3.3.1/2 for actions.		
4	IMF MS04B 100	C BOP US	1MS018B, 1B SG PORV fails open which requires action to close or isolate. Tech Spec 3.7.4 may be addressed.		
5	IMF TH11A 50	C RO US	PZR PORV 1RY455A fails open at 50% requiring the block valve 1RY 8000A to be closed to limit RCS depressurization. Tech Spec 3.4.11 will be addressed.		
6	IOR ZDI1FW009B CLS	M ALL	1FW009B fails closed requiring a manual Reactor trip.		
7, 8	IMF TH03B 450 60 Preloaded	M ALL C RO	Upon reactor trip, 1B SGTR at 450 gpm, ramped over 60 seconds. Following SI actuation, 1SI8801A and 1SI8801B must be manually opened to initiate High Head ECCS flow		
9	IMF MS03B 100 IMF MS03B 100 Preloaded	M ALL	Upon reactor trip, the pressure surge in the 1B SG causes 2 safeties to open and stick open.		

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

SCENARIO 06-4 OVERVIEW

The scenario will begin at 75% power, MOL, equilibrium Xenon, steady state, following maintenance on 1C low pressure heater string. The 1B SX Pump has been removed from service for 6 hours to replace the aux oil pump and is expected back in service by the end of the shift. LCOAR 1BOL 7.8 has been initiated. 1C Heater Drain Pump is OOS for seal replacement and not expected back until the end of shift. Power Team requests a Byron Unit 1 ramp up to 1235 MWe power as soon as possible. SM has directed the ramp to 1235Mwe at 3%/hr.

The RO will perform a reactivity calculation and coordinate with the BOP and commence the ramp up to 1235 MWe power.

After Unit ramp is commenced, RCS Loop 1A Thot RTD fails high requiring entry into 1BOA INST-2, which directs ensuring rod control in manual, possibly restoring Tave to Tref, addressing Tech Spec 3.3.1/2 actions and tripping failed channel bistables. US will direct restoration for plant conditions, notify the SM of conditions and the WEC for maintenance support.

After the crew has taken actions for the failed Loop 1A RTD, the 1B SG level control channel fails low requiring manual control to stabilize and control 1B SG level. The US will enter 1BOA INST-2 to verify actions and select a new controlling channel to restore 1B SG level control to automatic. The US will address Tech Specs 3.3.1, 3.3.2, and 3.3.3, for tripping the appropriate bistables within 6 hours. The US will notify the SM of conditions and the WEC for maintenance support.

Following the required actions for the SG level channel failure, the 1B SG PORV, 1MS018B fails open causing a small reactivity transient requiring manual action to close or isolate the PORV. Operability should be addressed in Tech Spec 3.7.4 with no action required. The US will notify the SM of conditions and the WEC for maintenance support.

Once the SG PORV is closed or isolated, the PZR PORV 1RY455A fails to 50% open requiring RO action to close the PORV block valve, 1RY8000A, to stop the RCS depressurization. Tech Spec 3.4.11 will be addressed for operability with action required to deenergize 1RY8000A to maintain operability of the PORV. If RCS pressure falls below 2209 psig, a 2 hour action will be required to restore RCS pressure per Tech Spec 3.4.1. The US will notify the SM of conditions and the WEC for maintenance support.

Following actions for PZR PORV 1RY455A failure, 1FW009B will close causing FW to be lost to the 1B SG requiring a manual reactor trip and entry into 1BEP-0. Immediately following the trip, a SGTR will occur in the 1B SG at 450 gpm with 2 stuck open safeties resulting in an SI actuation. The SI may be manually initiated upon recognition of the SI being required. The RO will be expected to recognize 1SI8801A and 1SI8801B did not open as required on the SI and is expected to manually open them for high head injection flow. The crew will take required actions in 1BEP-0, and will transition to 1BEP-2 to isolate the faulted 1B SG, then to 1BEP-3 to take action for the ruptured 1B SG and isolate the ruptured 1B SG. Then transition to 1BCA-3.1 to cooldown the RCS and depressurize the RCS to equalize RCS pressure with the ruptured SG to control RCS inventory loss.

The scenario ends with the transition to 1BCA-3.1.

ERG Based Critical Tasks:

1. **E-0—I:** Manually initiate high head injection via 1SI8801A/B before exiting 1BEP-0.
2. **E-3—A:** Identify the 1B SG as the ruptured SG and isolate prior to transition to 1BCA-3.1.

SCENARIO 06-4

SIMULATOR OPERATOR NOTES

Simulator Setup:

Reset to IC-18; 75% power, MOL, equilibrium Xenon, steady state.

Go to run.

Run batch file & caep by typing bat a:/06-4

Align switches:

1B SX C/S PTL and OOS

1B SX aux oil pump OOS

1C HD pump C/S PTL and OOS

Place LCOAR placards for: 1B SX LCO 3.7.8 Condition A

Place On-Line risk to YELLOW

Place Protected Equipment placard on 1A SX Pump C/S

Provide a copy of the 1BGP 100-3 Flowchart at Step F63

Provide 1BOL 7.8 for the US to review if desired

Provide copies of turnover sheets

Perform "Ready for Training" checklist.

Insert all PRELOAD Events from page 1

Set AB Pot to 3.05 for 780 ppm boron

Event 1 Perform a reactivity calculation using 1BCB Figure 35 (Rod withdrawal will be to ARO position from 171 steps). Commence a ramp up to 1235 MWe power as requested by Electric Operations

Event 2 RCS Loop 1A Thot RTD (1TD411) fails high.

Initiate event after load ramp down is commenced with the lead examiners concurrence.

Acknowledge info to SM, WEC, and maintenance.

Reminder to place TO402 back in scan on PDMS, if removed by the crew.

SDG: RX2

IMF RX18M 650

MRF RP20 OPEN/CLOSE

MRF RX Trip

MRF RX Trip

Event 3 Steam Generator 1B controlling level channel fails low (0% 120 seconds).

SDG: RX18

IMF RX06H 0 120

Initiate event after event 2 actions completed, including Tech Spec actions of 3.3.1/2, with lead examiner's concurrence. Acknowledge info to SM, WEC, and maintenance. **If requested to trip bistables and lead examiner concurs:**

MRF RP20 OPEN/CLOSE

MRF RX057 Trip

MRF RX058 Trip

Event 4 1MS018B, 1B SG PORV fails open.

Initiate event after event 3 actions are completed, including Tech Spec 3.3.1/2 action, with the lead examiners concurrence. Acknowledge info to SM, WEC, and maintenance.

SDG: MS4

IMF MS04B 100 MRF MS52 0 to close 1MS019B

Event 5 PZR PORV 1RY455A fails open to 50%

Initiate event after actions for the failed SG PORV have been addressed including Tech Spec actions in 3.7.4, with lead examiner's concurrence. Acknowledge info to SM, WEC, maintenance, and in plant operators.

SDG: TH7

IMF TH11A 50

MRF ED058C OPEN to deenergize 1RY8000A

Event 6 1FW009B fails closed resulting in a reactor trip

Initiate malfunction after actions are taken for 1RY455A failure, including Tech Spec actions of 3.4.11, with the lead examiners concurrence. Acknowledge info to SM, WEC, and maintenance.

SDG: FW9

IOR ZDI1FW009B CLS

Event 7/8 1B SGTR at 450 gpm post-trip with failure of 1SI8801A/B to open on SI actuation

Malfunction is initiated upon reactor trip to cause a SGTR on 1B SG.

Acknowledge info to the SM, WEC, request for STA.

SDG: TH4

IMF TH03B 450 – triggered from Rx trip

SI preloaded

Event 9 1B SG Safety will open and stay open after the MSIV is closed in 1BEP-3

Malfunction initiated from Rx trip to cause two safeties to open and stick open on the 1B SG.

Acknowledge info to SM, WEC, and maintenance.

SDG: MS4

IMF MS03B 100 – triggered on Rx trip

IMF MS03F 100 – triggered on Rx trip

Scenario No.: 06-4		Event No.: 1
Event Description: Perform Reactivity calculation for up power to 1235 Mwe and commence the ramp up to 1235 Mwe.		
Time	Position	Applicant's Actions or Behavior
	CUES:	Directed to perform during turnover
	RO BOP	Performs reactivity calculation for Unit 1 ramp up to 1235 Mwe power. (Should calculate ~3300 - 3700 gal dilution and setup to add 40-70%)
	US	Direct actions for ramp up to 1235 Mwe power. Monitor effects of dilution
	RO	Initiate dilution (BOP CV-5) <ul style="list-style-type: none"> • Place MU MODE CONT SWITCH to STOP position. • Set MU MODE SELECT to DIL or ALT DIL position. • Set 1FK-111 PW/Total Flow Cont Pot to desired dilution rate (Batches desired) <ul style="list-style-type: none"> o Flag the controller • Verify 1CV111A in AUTO • Set 1FY-0111 Primary Water Control Preset Counter to desired volume. • Verify 1CV111B & 1CV110B in AUTO • Place MAKE-UP CONTROL Switch to START • Verify proper operation of valves & PW pump (1CV111A & 111B OPEN, PW pump is running, (and 110B opens, if in ALT DIL) • Verify expected PW flow on recorder 1FR-110 • Monitor Dilution effects • Verify at least two B/U Heater groups ON and spray valves 1RY455B/C modulate OPEN. • Monitor for RCS Tave rise.
	BOP	Initiate turbine load ramp: Using graphic 5501(may use 1BGP 100-3 step or 100-3T4 load swing sheet) <ul style="list-style-type: none"> o Verify/Select Impulse Pressure IN • SELECT SETPOINT • ENTER 1120 (or 1125 from Load Swing Sheet) in the REF DEMAND window • SELECT ENTER • ENTER 5 MW/MIN rate in the RATE window Inform US/RO of pending rise in turbine load <ul style="list-style-type: none"> • SELECT GO (when RO reports expected Tave rise) • Verify load rises as expected.
		NOTE: The next malfunction may be entered at lead examiner's direction after 5-10% power change.

Comments:

Scenario No.: 06-4		Event No.: 2
Event Description: RCS Loop 1A Thot (1TD411) fails high.		
Time	Position	Applicant's Actions or Behavior
	CUES:	<p>Annunciators:</p> <p>1-9-D3 CHG LINE FLOW HIGH LOW</p> <p>1-10-A5 OP DELTA-T HIGH ROD STOP ALERT C-4</p> <p>1-10-C5 OT DELTA-T HIGH ROD STOP ALERT C-3</p> <p>1-12-B4 PZR LEVEL CONT DEV LOW</p> <p>1-14-A1/B1/B3/B5/C3/C5/D1/D3/D5 – RX TRIP ALERTS/TAVE DELTA-T DEV HIGH/LOW</p> <p>Loop 1A Tave indication higher than the other 3 loops</p> <p>Rods stepping in, if in AUTO</p>
	RO/US	<p>Identify/report failure of Loop 1A Tave/Thot</p> <p>Implement 1BOA INST-2, Operation With a Failed Instrument Channel</p> <ul style="list-style-type: none"> • Notify SM to evaluate for E-plan ○ Place ramp on HOLD
	RO/US	<ul style="list-style-type: none"> ○ Place Rod Bank Select switch in Manual • Manually Defeat failed RTD channel by selecting Loop 1A Tave channel with TAVE DEFEAT switch • Manually Defeat Delta-T channel by selecting Loop 1A Delta-T channel with Delta-T DEFEAT switch • Select an operable RTD channel to the Delta-T recorder. ○ Check if Rods can be placed in AUTO <ul style="list-style-type: none"> • TURBINE LOW POWER INTLK C5 (1-BP-5.7) NOT LIT • Tave-Tref stable and within 1 degree F – restore if not • Check PZR level normal and stable – manually restore if not. • Request extra NSO to brief for tripping bistables ○ Identify/flag TSLBs for the Loop A trip functions ○ Check P12 Interlock for Tave > 550 degrees F – LO-2 TAVE STM DUMP INTLK P12 (1-BP-4.5) NOT LIT ○ Defeat Loop 1A channel input to PDMS by placing T0402 (Loop A Tcold) IN TEST • Refer to Tech Specs 3.3.1/2 and TRM 3.3.h – 6 hour action to place bistables in trip. ○ Consider reestablishing ramp
	BOP	<p>Monitor plant for effects of power ramp and take any actions directed by the US</p> <ul style="list-style-type: none"> ○ Provide peer checks for RO switch manipulations.
<p>NOTE: When actions have been completed to respond to failed RTD channel and lead evaluator's concurrence, Event 3 is entered.</p>		

Comments:

Scenario No.: 06-4		Event No.: 3
Event Description: Steam Generator 1B controlling level channel fails low (0%, 120 sec)		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciators: 1-15-B9 SG LEVEL DEVIATION HIGH LOW 1-15-B5 SG 1B LVL LO-2 RX TRIP ALERT 1B FRV opening Feedwater flow > steam flow on 1B SG
	BOP/US	Identify/report failure of 1LI-557, 1B steam generator level channel. <ul style="list-style-type: none"> • Direct/take Manual control of 1B FRV 1FW520 and match F/F with S/F o Place the ramp on HOLD
	US	Enter and direct actions of 1BOA INST-2, "OPERATION WITH A FAILED INSTRUMENT CHANNEL" Attachment E <ul style="list-style-type: none"> • Notifies SM of BOA entry • Requests Emergency Plan evaluation
	BOP	Check affected SG level: <ul style="list-style-type: none"> • Determine SG level not normal • Take manual control of 1FW520 M/A station and restore SG level to normal • Select an operable steam level channel • Restore Automatic level control
	ALL	<ul style="list-style-type: none"> • Identify/flag TSLB lites associated with failed channel o Identify/flag failed channel • Request operator to locally trip bistables for the affected channel: • Request operator to locally align AMS for the failed channel
	US	Performs administrative requirements <ul style="list-style-type: none"> • Determines Tech Spec for 3.3.1/2/3 RPS/ESFAS/PAM Instrumentation applies – 6 hours to trip bistables • Requests IR/WR/LCOAR o Consider reestablishing the ramp
	RO	Monitor plant response to FW transient and take actions directed by the US
NOTE: When the above actions have been initiated for the failed SG level channel, with lead examiner's concurrence, initiate Event 4.		

Comments:

Scenario No.: 06-4		Event No.: 4
Event Description: 1MS018B, 1B SG PORV fails open		
Time	Position	Applicant's Actions or Behavior
	CUES:	Open indication on 1PM04J 2-3% rise in NI power. Small drop in Tave
	BOP/ US	Identify/report 1MS018B open indication <ul style="list-style-type: none"> • Direct actions to close 1MS018B using the C/S on 1PM04J to close and/or dispatch an operator to verify that it is open and locally isolate 1MS018B by closing 1MS019B in the Safety Valve room. • Address the Tech Spec issue in 3.7.4 and 3.6.3 to ensure the PORV is still considered operable.
	US BOP	Acknowledge and direct where and how 1MS018B is to be controlled <ul style="list-style-type: none"> o Identify/flag 1MS018B as a failed valve
	US	Request maintenance to troubleshoot. Notify SM for IR/WR
	RO	Monitor plant for effects and take any actions directed by the US
		NOTE: When actions have been completed for failed 1MS018B, with lead examiner's concurrence, initiate Event 5.

Comments:

Scenario No.: 06-4		Event No.: 5
Event Description: PZR PORV 1RY455A fails open at 50%		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciators: 1-12-B2 PZR PORV OR SAF VLV OPEN 1-12-C6 PZR PORV DSCH TEMP HIGH Open indication on 1RY455A on 1PM05J PZR pressure dropping on 1PM05J
	RO/ US	Identify/report 1RY455A open below PZR pressure setpoint. <ul style="list-style-type: none"> • Direct closing 1RY455A. • If it does not close, close 1RY8000A, PORV Block valve to stop depressurization ○ Place the ramp on HOLD
	RO/ US	Refer to BAR 1-12-B2, PZR PORV OR SAF VLV OPEN and address operator follow up actions: <ul style="list-style-type: none"> • Place 1RY455A C/S in Close, verify closed, if not, close PORV Block valve 1RY8000A ○ Declare entry into Tech Spec 3.4.1 for PZR pressure < 2209 psig and take actions to restore pressure normal control band. • Address Tech Spec 3.4.11 and TRM 3.4.d to determine the PORV is still operable • Dispatch an operator to de-energize 1RY8000A • Notify SM/maintenance to investigate repairs and an IR/WR ○ Consider resuming ramp
	BOP	Monitor plant for effects and take any action directed by the US
		NOTE: When actions have been completed for the PORV failure, with lead examiner's concurrence, initiate Event 6.

Comments:

Scenario No.: 06-4		Event No.: 6/7/8/9
Event Description: 1FW009B fails closed resulting in a reactor trip. A SGTR in 1B SG and stuck open safety occurs upon reactor trip and SI High Head Injection valves 1SI8801A and 1SI8801B will not Auto upon SI Actuation.		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciators: 1-15-E7 FWIV NOT FULL OPEN 1-15-B4 S/G 1B FLOW MISMATCH FW FLOW LOW 1-15-B9 S/G 1B LEVEL DEVIATION HIGH LOW 1B SG level dropping 1FW009B closed indication FW flow/Steam flow mismatch for 1B SG
	ALL/ US	<ul style="list-style-type: none"> Identify/report 1FW009B closed and 1B SG level dropping Direct a manual reactor trip and operators perform immediate actions of 1BEP-0, REACTOR TRIP OR SAFETY INJECTION.
	RO	<ul style="list-style-type: none"> Manually trips reactor
NOTE: Rx trip triggers the 1B SGTR and stuck open safeties.		
	US	Implement 1BEP-0, REACTOR TRIP OR SAFETY INJECTION, and directs operator actions. <ul style="list-style-type: none"> Notifies SM of EP entry Requests Emergency Plan evaluation
	RO	Verify reactor trip <ul style="list-style-type: none"> Rod bottom lights LIT Reactor trip & Bypass breakers open Neutron flux lowering
	BOP	Verify Turbine Trip prior to performing step 3 of 1BEP-0 <ul style="list-style-type: none"> Turbine throttle valves closed Turbine governor valves closed
	BOP	Verify power to 4KV busses <ul style="list-style-type: none"> Bus 141 alive light lit Bus 142 alive light lit
	ALL RO	Check SI status <ul style="list-style-type: none"> SI actuated <ul style="list-style-type: none"> SI First OUT annunciator lit (1-11-B1, 1-11-C1, 1-11-D1, 1-11-E1) SI ACTUATED lit (1-BP-4.1) SI Equipment running (SI pumps running, CV Cold leg injection SI8801A/B open) Determine if SI required: <ul style="list-style-type: none"> Check PZR pressure < 1829 psig Check Steamline pressure < 640 psig Check CNMT pressure > 3.4 psig Check PZR level can not be maintained > 4% If SI is determined to be required: <ul style="list-style-type: none"> Actuate SI by taking either SI switch to ACTUATE (1PM05J or 1PM06J) and continue in 1BEP-0

Comments:

		NOTE: If the crew does not wait to establish trends post trip they may transition to 1BEP ES-0.1, Reactor Trip Response
	US	Request STA for monitoring BSTs and Notify SM to evaluate for E-plan
		<i>These are 1BEP ES-0.1 steps, if entered</i>
	BOP	Verify Generator tripped <ul style="list-style-type: none"> • Unit 1 Main Transformer breakers open (GCB 3-4 & OCB 4-5) • PMG output breaker open
	RO	Maintain RCS Temperature Control <ul style="list-style-type: none"> • Check RCPs running • RCS temp stable or trending to 557 °F Determine if Boration required <ul style="list-style-type: none"> • RCPs –any running
	BOP	Check FW status <ul style="list-style-type: none"> • FW isolation valves lit • Trip all HD pumps • Total feed flow to SGs- > 500 gpm • SG Blowdown isolation valves closed – ISD002A-H (8)
	RO	<ul style="list-style-type: none"> • Verify all rod bottom lights are LIT • Check PZR level > 17% • Check charging in service • PZR level trending to program – this should raise the flag that inventory is not recovering and require a decision to SI and return to 1BEP-0
		NOTE: This is where step 5 of 1BEP-0 begins
	BOP	Verify FW isolated <ul style="list-style-type: none"> • FW pumps tripped • Isolation monitor lights lit • FW pumps discharge valves closed 1FW002A-C
	RO	Verify ECCS pumps running <ul style="list-style-type: none"> • CENT CHG pumps • RH pumps • SI pumps

Comments:

	BOP	<ul style="list-style-type: none"> • Verify RCFCs Accident Mode lights lit • Verify Phase A isolation - Group 3 monitor lights lit • Verify CNMT Ventilation isolation - Group 6 CNMT Vent Isol monitor lights lit
	RO	<p>Note: With the combination of the inventory loss from the SGTR and primary shrinkage from the cooldown, RCP trip criteria may be reached.</p> <ul style="list-style-type: none"> • Any RCP's running • Check if trip criteria satisfied: <ul style="list-style-type: none"> • HH SI flow >100 gpm OR SI pump discharge flow >200 gpm AND • RCS pressure < 1425 psig <p>Trip RCP's if controlled cooldown NOT in progress and above criteria satisfied</p>
	BOP	<p>Verify AF system:</p> <ul style="list-style-type: none"> • AF pumps running – recognize 1B will not start. • AF isolation valves open 1AF13A-H • AF flow control valves throttled 1AF005A-H <p>Verify CC Pumps running Verify SX Pump running – 1B SX pump is OOS Check if Main Steamline Isolation is NOT required</p> <ul style="list-style-type: none"> • Check SG pressure > 640 psig • Check CNMT pressure < 8.2 psig ○ If either condition is NOT met, then verify MSIVs and MSIV Bypass valves closed
	BOP	<p>Check if CNMT Spray is NOT required</p> <ul style="list-style-type: none"> • Check if CNMT pressure has NOT increased to greater than 20 psig
	BOP US	<p>Verify Total AF flow:</p> <ul style="list-style-type: none"> • AF flow > 500 gpm • SG levels maintained between 10% (31% Adverse) and 50%NR • SG levels NOT increasing in an uncontrolled manner – (this is where 1B SG should be identified as ruptured and 1AF013B and F isolated. This can also be done here as directed by the OAS page since abnormal secondary radiation will be seen on the RM-11)
	BOP [CT] [E-0-A]	<p>Verify ECCS valve alignment</p> <ul style="list-style-type: none"> • Group 2 Cold Leg Injection monitor lights lit • Manually open 1SI8801A and 1SI8801B, if not done previously
	BOP	<p>Verify ECCS flow</p> <ul style="list-style-type: none"> • HHSI flow >100 gpm • RCS pressure NOT <1700 psig

Comments:

	RO	<p>Check at least one PZR PORV relief path is available</p> <ul style="list-style-type: none"> • PORV isol valve – both ENERGIZED (1RY8000A/B – 1RY8000A may be de-energized) • PORV relief path – both AVAILABLE (1RY455A/456 – 1RY455A switch is in CLOSED) <ul style="list-style-type: none"> • PORVs in AUTO • 1RY456 Isolation valve is open – 1RY8000A is closed to isolate 1RY455A
	BOP/US	<p>Verify Generator Trip</p> <ul style="list-style-type: none"> • GCB 3-4 and OCB 4-5 open • PMG output breaker open
	BOP	<p>Verify both DGs running</p> <ul style="list-style-type: none"> • SX valves open 1SX169A and B • Dispatch operator locally to check operation
		Examiners note: US and RO will likely continue in 1BEP-0 while BOP is performing the next 3 ventilation steps:
	BOP	<p>Verify Control Room ventilation aligned for emergency operations:</p> <ul style="list-style-type: none"> • Dispatch NLO to trip VV supply fans • Operating VC train equipment running Train A <ul style="list-style-type: none"> • Supply fan • Return fan • M/U fan • Chilled water pump • MCR chiller 0A • Operating VC train dampers <ul style="list-style-type: none"> • M/U fan outlet damper NOT full closed 0VC24Y • VC train M/U filter light LIT • Operating VC train Charcoal Adsorber aligned for train A <ul style="list-style-type: none"> • 0VC43Y closed • 0VC21Y open • 0VC22Y open • Control Room pressure greater than +0.125 inches water on 0PDI-VC038
	BOP	<p>Verify Auxiliary Building ventilation aligned</p> <ul style="list-style-type: none"> • Two inaccessible filter plenums aligned <ul style="list-style-type: none"> • Plenum A fan 0VA03CB running <ul style="list-style-type: none"> • Damper 0VA023Y open • Damper 0VA436Y closed • Plenum C fan 0VA03CF running <ul style="list-style-type: none"> • Damper 0VA072Y open • Damper 0VA438Y closed
	BOP	<p>Verify FHB ventilation aligned</p> <ul style="list-style-type: none"> • Train B fan 0VA04CB running • 0VA055Y open • 0VA062Y open • 0VA435Y closed

Comments:

	RO	<p>Check PZR sprays & PORVs closed</p> <ul style="list-style-type: none"> • Normal spray valves closed 1RY455B and 1RY455C (NOTE: valves are failed closed due to loss of IA due to Cnmt Phase A) • PORV 1RY456 is closed (1RY455A is partially open and isolated)
	RO/BOP US	<p>Maintain RCS temperature control</p> <ul style="list-style-type: none"> • Determine RCPs running <ul style="list-style-type: none"> • RCS stable at or trending to 557 degrees F. <ul style="list-style-type: none"> ○ Verify AF is proper and no excess cooldown in progress, if temperature is continuing to drop because of the SI flow, close the MSIVs and Bypass valves. Keeping the condenser available is desirable, but not required.
	RO	<p>Check if RCP's should be stopped</p> <ul style="list-style-type: none"> • Any RCP's running • Check if trip criteria satisfied <ul style="list-style-type: none"> • HHSI flow >100 gpm OR SI pump discharge flow >200 gpm AND • RCS pressure < 1425 psig ○ Trip RCP's if controlled cooldown NOT in progress and above criteria satisfied (performed earlier)
	BOP	<p>Check if SG secondary pressure boundaries are intact:</p> <ul style="list-style-type: none"> • Check pressure in all SGs: <ul style="list-style-type: none"> • None decreasing in an uncontrolled manner (1B SG is decreasing in an uncontrolled manner) • None completely depressurized
	US	<p>Transition to 1BEP-2, FAULTED STEAM GENERATOR ISOLATION</p> <ul style="list-style-type: none"> • Notify SM to evaluate for E-plan
	BOP	<p>Check main steamline isolation:</p> <ul style="list-style-type: none"> • All MSIVs and MSIV Bypass valves closed
	BOP	<p>Check if any SG secondary pressure boundary is intact:</p> <ul style="list-style-type: none"> • Check all steam generators for any SG pressure stable or rising. • Identify 1A/1C/1D intact
	BOP/US	<p>Identify Faulted SG</p> <ul style="list-style-type: none"> • Check pressure in all SGs • Any decreasing in an uncontrolled manner • Identify/report 1B steam generator is faulted.
	BOP [CT] E-3--A	<p>Isolate 1B S/G:</p> <ul style="list-style-type: none"> • Close 1AF013B & F (performed earlier in 1BEP-0 at Step 15 or OAS action after Step 15) • Check FW to faulted SG isolated (should have performed in 1BEP-0) <ul style="list-style-type: none"> ○ Associated row on FW isolation monitor lights panel LIT for faulted SG. • Verify 1B S/G PORV closed (1MS018B) • Verify 1B S/G Blowdown valves closed (1SD002E and F) • Verify 1B S/G Blowdown sample isolation valves closed (1SD005C)

Comments:

	BOP	Monitor AF pump suction pressure: <ul style="list-style-type: none"> AF PUMP SX SUCT VLVS ARMED alarm 1-3-E7 NOT lit
	BOP/US	Check secondary radiation trends normal for plant conditions: <ul style="list-style-type: none"> RM11 Grid 1 indications for: <ul style="list-style-type: none"> SJAE/ gland steam exhaust gas (1PR27J) SG blowdown liquid radiation (1PR08J) Main steamline MSIV rooms (4AB222/223)
	ALL	Transition to 1BEP-3 "STEAM GENERATOR TUBE RUPTURE"
	US	Implement 1BEP-3 "STEAM GENERATOR TUBE RUPTURE" and direct operator actions. <ul style="list-style-type: none"> Notifies SM of BEP entry Requests Emergency Plan evaluation
	RO/US	Check status of RCPs and determine none running <ul style="list-style-type: none"> If any running, Check trip criteria satisfied <ul style="list-style-type: none"> HHSI flow >100 gpm OR SI flow > 200 gpm AND RCS pressure < 1425 psig Controlled cooldown NOT in progress or previously initiated Stop all RCPs
	ALL	Identify ruptured SG <ul style="list-style-type: none"> Unexpected rise in NR level <ul style="list-style-type: none"> Main steamline rad monitor <ul style="list-style-type: none"> 1RT-AR022 Grid 1 4AB222 1RT-AR023 Grid 1 4AB223
	ALL	Identify/report 1B SG as ruptured
	BOP	Isolate flow from ruptured SG by verifying <ul style="list-style-type: none"> SG PORV MS018B in AUTO Check SG PORV MS018B closed <ul style="list-style-type: none"> Verify closed when SG pressure < 1115 psig Verify SG blowdown valves closed unless open for sampling <ul style="list-style-type: none"> 1SD002E 1SD002F MSIV and MSIV bypass valves closed for 1B SG Check PORVs on intact SGs available for RCS cooldown

Comments:

	BOP	Check ruptured SG level <ul style="list-style-type: none"> • Narrow Range not > 10% - adhere to CAUTION prior to step to leave AF isolated • Verify/Close AF isol valves (should have been closed earlier) <ul style="list-style-type: none"> • 1AF013B • 1AF013F
	BOP US	Check ruptured SG pressure <ul style="list-style-type: none"> • Ruptured SG pressure greater than 320 psig • IF NOT, GO TO 1BCA 3.1, SGTR LOSS OF REACTOR COOLANT – SUBCOOLED RECOVERY DESIRED.
		NOTE: With lead examiner's concurrence, the scenario can be terminated. If continuation is desired, 1BCA 3.1 is continued on the next page.

Comments:

	ALL	Transition to IBCA-3.1, SGTR LOSS OF REACTOR COOLANT – SUBCOOLED RECOVERY DESIRED.
	US	Implement IBCA-3.1, SGTR LOSS OF REACTOR COOLANT – SUBCOOLED RECOVERY DESIRED, and direct operator actions. <ul style="list-style-type: none"> • Address CAUTIONs for RWST <46% action and manual RH and SI pump starts after SI reset. • Notifies SM of BCA entry • Requests Emergency Plan evaluation
	BOP	<ul style="list-style-type: none"> • Reset SI • Reset CNMT isolation Phase A • Restore Instrument Air to CNMT
	BOP/US	Verify all AC buses powered from offsite <ul style="list-style-type: none"> • Buses 142 and 143 • Buses 143 and 144 • Buses 156/157/158/159
	US	Check if CS should be stopped:
	BOP/US	Check ruptured SG level <ul style="list-style-type: none"> • Narrow Range >10% (31% Adverse) <p>Abide by caution to maintain feed flow isolated to faulted / ruptured SG</p>
	RO/US	Check if RH pumps should be stopped: <ul style="list-style-type: none"> • Check RCS pressure: <ul style="list-style-type: none"> • RCS pressure greater than 325 psig • RCS pressure stable or increasing • Stop RH pumps and place in standby
	ALL	<ul style="list-style-type: none"> • Initiate evaluation of plant status – check Aux Bldg Radiation Trends normal • Place hydrogen monitors in service per BOP PS-9 • Request sampling • Request SM input as to running hydrogen recombiners

Comments:

	BOP	<p>Check if SG secondary pressure boundaries are intact</p> <ul style="list-style-type: none"> • Check pressure in all SGs <ul style="list-style-type: none"> • No SG pressure decreasing in an uncontrolled manner • No SG completely depressurized
	BOP	<p>Check intact SG levels:</p> <ul style="list-style-type: none"> • Narrow range levels > 10% (31% Adverse). <ul style="list-style-type: none"> • Control feed flow to maintain narrow range levels between 18% (31% Adverse) and 50%. • Check narrow range levels not increasing in an uncontrolled manner.
		<p>Note: The next step initiates a plant cooldown to 200°F. Because of the faulted steamline, the cold leg temperature decrease limit of <100°F in any 1 hour has been exceeded and it is not allowed to conduct a controlled cooldown until back within the limit. Therefore the Crew will elect to wait at this step and conduct a summary, and delay performing this step (as it is considered a continuous action) and perform other steps. The lead examiner may decide to terminate the scenario at this point as continued delay will result in a LO-2 RWST level and subsequent transition to 1BEP ES-1.3 for cold leg recirc.</p>
	BOP [CT] E-3---A	<ul style="list-style-type: none"> ○ Initiate RCS Cooldown to 200°F (must be discussed and delayed for Integrity SF) <ul style="list-style-type: none"> • Maintain cooldown rate in RCS cold legs <100°F in any 1 hour • Use RH if in Shutdown cooling • Check PZR pressure < 1930 psig <ul style="list-style-type: none"> • PZR LOW PRESS SI BLOCK PERMISSIVE P-11 Lit <ul style="list-style-type: none"> • If NOT continue with procedure until P-11 Lit before blocking STM LINE SI • Block Steamline Isol SI <ul style="list-style-type: none"> • Place STM LINE SI BLOCK switches to BLOCK for train A and B • Determine steam dumps not available • Dump Steam to via SG PORVs
	BOP	<p>Check if subcooled recovery is appropriate:</p> <ul style="list-style-type: none"> • Check RWST level greater than 67% <ul style="list-style-type: none"> • If NOT > 67% <ul style="list-style-type: none"> • Verify per Fig 1BCA 3.1-3 than CNMT Floor Water Level is AS EXPECTED • Check ruptured SG level less than 93% (81% Adverse)
	RO/US	<p>Check RCS subcooling:</p> <ul style="list-style-type: none"> • Acceptable per ICONIC or Attachment A and Figure 1BCA-3.1-1

Comments:

	RO	<p>Check if ECCS is in service:</p> <ul style="list-style-type: none"> o Any SI pump running o 1SI 8801A or B open o Any RH pump running in ECCS mode
	RO	<p>Deenergize PZR heaters:</p> <ul style="list-style-type: none"> • Place B/U heater contactors in OFF • Place variable heaters control switch in AFTER TRIP
	RO	<p>Depressurize RCS to refill PZR</p> <ul style="list-style-type: none"> o Use normal sprays <ul style="list-style-type: none"> • Determine NOT available due to no RCPs o Use PZR PORV (preferred) o Use Aux spray
	SRO(s)	<p>NOTE: Scenario may be terminated at this point with lead examiners concurrence. EAL will be determined by the SRO candidates for the events. (EAL FS1)</p>

Comments:

Unit Supervisor Turnover –FOR TRAINING ONLY

PLANT STATUS				
Grid Status: Green	"B" Train Week	WWM: R. Freidel	Shift: 95 to 96	Date: TODAY
Unit 1			Unit 2	
Mode: 1	% Pwr: 75	MW: 865	OLR: Yellow	
CB: 780	Xenon: Steady State	Rod Height: 171		
IN PROGRESS			IN PROGRESS	
-1B SX pump Aux Oil pump replacement -1C HD pump seal replacement			-2HD099 contingency plan to Furmanite. -SAT 242-2 bank 4 deenergized with EST tag (cooling fan 2 missing)	
LCOAR	C/O / T/L / RTS		LCOAR	C/O / T/L / RTS
-1BOL 7.8	1B SX pump 1C HD pump			2HD0099B
LCOAR's Exited:			LCOAR's Exited:	
MAINTENANCE			MAINTENANCE	
-1B SX pump -1C HD pump			-SAT 242 bk 4 fans	
MAJOR PROC.			MAJOR PROC.	
PENDING			PENDING	
NO LIQ REL w/o permission from Ops Dir & SVP -U1/U2 Cnmt Release Package prep -Power Team has requested power ascension to 1235 Mwe as soon as the Unit is capable. - SM directed power ascension at 3% power per hour.			-U2 EH sample	

Unit Supervisor Turnover – FOR TRAINING ONLY

<u>ADMINISTRATIVE</u>		<u>COMMENTS</u>
Temporary Alterations	X	
Unit 0 Logbook	X	
Unit 1 Logbook	X	
Unit 2 Logbook	X	
Train Inop Status Board	X	
Degraded Equipment Log	X	
Daily Orders	X	
* CRs	X	
Abnormal Component Posit.	X	

<u>TURNOVER ITEMS</u>	<u>Normal</u> <u>YES/NO</u>	<u>COMMENTS</u>
NSO Shiftly and Daily Surv	Yes	-1B SX pump Aux Oil pump, 1A SX pump is Protected -1C HD pump OOS; RTS by end of shift today
SYS - Primary	No	
SYS – Balance of Plant	No	
Nuclear Instrumentation	Yes	
MCB Instrumentation	Yes	
MCB Controllers	Yes	
Electrical Distribution - AC	Yes	
Electrical Distribution - DC	Yes	
Electric Operations	Yes	
Blowdown (CW/SD)	Yes	
Alarms (MCB)	Yes	
Chemistry	Yes	
Radiation Precautions	Yes	
FME Issues	Yes	

UNIT 1 TURNOVER EFPH: 7500

U-1 Reactivity: Dilute 55 gals=.3°F **Nuke Engineer:** K. Elam **Boron to ramp to 780 MW:** 525 **700 MW:** 360 gals

BAT = 7581, BA Pot = 3.05 Equals 12.2 gpm @ Steady State FUEL DEPLETION:150 gallons/shift
 RWST = 2383 ppm 1A CV pp Cb = 780 ppm

U-2 Reactivity: Dilute 20 gal=.2°F **Nuke Engineer:** F. Funke **Boron to ramp to 780 MW:** 480 **700 MW:** 290 gals

BAT = 7579, BA Pot = 4.61 Equals 18.4 gpm @ Steady State FUEL DEPLETION: 40 gallons PW/shift
 RWST = 2350 ppm 2B CV pp Cb = 1188 ppm

Exceptional OOS's Requiring Special Plant Conditions

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MISCELLANEOUS

Review BA Pot settings on turnover
 2HD099B steam leak (~120 drops/min) Monitor 2X/shift

Post Reviews: FS, US, Unit NSO, Turnovers Logs, MCR Tour, Daily Orders and Standing Orders

OFF-GOING		ON-COMING	
<i>UNIT 1 Supervisor</i>		U-1 Unit Supervisor	
<i>UNIT 2 Supervisor</i>		U-2 Unit Supervisor	
<i>STA</i>		STA	

Center Desk Operator Turnover- FOR TRAINING ONLY

PLANT	U1 Mode: 1	% Pwr: 75	MW: 865	IN PROGRESS	
STATUS	U2 Mode: 1	% Pwr: 100	MW: 1229	CW Warming line is OFF	
MUDS					
BOILER		IA DRYERS ON LINE			
0A: Standby	U1: Wet L/U		U1/U2		
0B: Exhausted	U2: Wet L/U	AS	U1 ES		
ADMINISTRATIVE					
1. Temporary Procedures			X		
2. Temporary Alterations			X		
3. ESTs			X		
4. Unit 0 Logbook			X		
5. Center Desk Routine			X		
6. Daily Orders			X		
7. SM Notes			X		
8. Switching Orders / Electric Ops / Division LD			X		
9. Control Board Walkdown			X		
10. 1 st Shift Annun Check Completed			NA		
LCOAR		C/O / RTS		Surveillances	Maint / WR
TURNOVER ITEMS		Normal			
1. HVAC		Yes	OCB's 12-13, 4-5, & 11-12 have temporary Cabinet Htrs 1B SX OOS for Aux Oil pp replacement 2HD099B steam leak, 1C HD pp seal replacement		
2. 345 KV Systems, Relay House		No			
3. Air Systems (IA, SA)		Yes			
4. Fire Protection		Yes			
5. Blowdown		Yes			
6. Radiation Releases		Yes			
7. MCB Instrumentation		Yes			
8. MCB Controllers		Yes			
9. Tank Capacity		Yes			
10. Chemistry		Yes			
11. Radiation Protection		Yes			
12. Alarms – MCB Annun		Yes			
13. Alarms – FP / Other		Yes			
14. SYS – Safeguards		No/14			
15. SYS - Primary		Yes			
16. SYS – Balance of Plant		No/16			
17. MDCT		Yes			
18. NDCT, Flume		Yes			
19. FME Issues		Yes			
TIME	DATE	SHIFT	OFF-GOING	ON-COMING	
Now	TODAY	95 to 96	<i>Center Desk</i>		

Unit 1 Nuclear Station Operator Turnover – FOR TRAINING ONLY

PLANT	Mode: 1	% Pwr: 75	MW: 865	ADMINISTRATIVE					
STATUS	Grp: CBD 171	Cb: 780 ppm	Xe: Steady State	1. <u>Temporary Procedures</u>	X				
TURNOVER				2. <u>TCCP's</u>	X				
EFPH: 7500				3. <u>EST's</u>	X				
LCOAR	C/O / RTS	Surveillances	Maint / WR	4. <u>Unit 1 Logbook</u>	X				
1B SX (1BOL 7.8)	1B SX C/S 1C HD pp C/S			5. <u>Unit Routine</u>	X				
				6. <u>Aux Elec Equip Rm General Inspection</u>	X				
				7. <u>Daily Orders</u>	X				
				8. <u>SM Notes</u>	X				
				9. <u>Control Board Walkdown</u>	X				
				10. <u>Abnormal Component Positions</u>	X				
				11. <u>1st Shift Annun Check Completed</u>	NA				
				IN PROGRESS				PENDING	
				1B SX pp Aux Oil pp replacement work/1A SX pump Protected 1C HD pp seal replacement				Load ramp to 1235 Mwe at 3%/hr BA Pot = 3.05 Equals 12.2 gpm @ Steady State FUEL DEPLETION: 150 gallons/shift Dilute 55 gals =.3°F	
				Exceptional C/O's Req Plant Cond:					
				TURNOVER ITEMS		Normal			
1. No Major Procedures in Progress		Yes	1B SX pump OOS 1C HD pp OOS						
2. NSO Shiftly and Daily Surveillance		Yes							
3. SSPS Channels / Bistables		Yes							
4. ALARMS – SER / Annunciators		Yes							
5. ALARMS – Process / RM-11		Yes							
6. SER / Alarm Typer / Trend Typer		Yes							
7. Alarms – FP / Other		Yes							
8. Tank Capacity		Yes							
9. Chemistry		Yes							
10. Radiation Precautions		Yes							
11. Nuclear Instrumentation		Yes							
12. MCB Instrumentation		Yes							
13. MCB Controllers		Yes							
14. Electrical Distribution - AC		Yes							
15. Electrical Distribution - DC		Yes							
16. SYS - Safeguards		No/16							
17. SYS - Primary		Yes							
18. SYS – Balance of Plant		No/18							
19. FME Issues									
20.									
21.									
TIME	DATE	SHIFT	OFF-GOING	ON-COMING					
NOW	TODAY	95 to 96	<i>Center Desk</i>						

BORATION / DILUTION CALCULATIONS

Purpose: The purpose of this power change reactivity worksheet is to establish a boundary for the amount of boration / dilution that may be required and to assist in meeting industry expectations for reactivity control during a power ramp. The worksheet assumes steady state reactor power prior to the ramp and DOES NOT consider Xenon effects. Since the worksheet establishes a boundary, the operator experience plays an equal if not more important role in ensuring proper reactivity controls. 40% to 70% of the boration / dilution amount will normally be added.

CALCULATION:

1. Basis: Approx Cycle Burnup: 7500 EFPH Initial Cb: 780 ppm
Initial Reactor Power: 75 % Initial CBD: 171 steps
Final Reactor Power: 100 % Final CBD: 221 steps (est)

2. Determine the change in power defect:

Use BCB-1 Figure 17A, pages 1-4 or Table 2-1:

$$\frac{(-) 1800}{\text{final power defect}} - \frac{(-) 1375}{\text{present power defect}} = \frac{-425}{\text{Change in power defect}} \text{ pcm}$$

3. Determine the amount of reactivity change due to control rod repositioning:

Use BCB-1 Figure 2C, pages 1-4 or Table 1-7 (Ensure correct curve w/respect to core life):

$$\frac{140}{\text{present inserted rod worth}} - \frac{10}{\text{final inserted rod worth}} = \frac{+130}{\text{Change in control rod worth}} \text{ pcm}$$

4. Determine the reactivity the boration / dilution will compensate for:

$$\frac{-425}{\text{step 2 result}} + \frac{130}{\text{step 3 result}} = \frac{-295}{\text{Reactivity to compensate for}}$$

5. Determine the Differential Boron Worth (DBW):

Use BCB-1 Figure 10B, pages 1-4 or Table 2-4: 7.26 pcm/ppm (Avg of 2 values)
(Use the DBW absolute value, i.e., positive)-> 7.26 differential boron worth

6. Determine the ppm change in RCS boron concentration:
(NOTE: + number indicates boration; - number indicates dilution)

$$\frac{(\text{step 4 result})}{(\text{step 5 result})} \frac{-295}{7.26} = \frac{-40.6}{\text{ppm change in RCS boron conc.}}$$

7. Determine the amount of boration / dilution required: (Data taken using 575°F)

Use Table 3-1 → ~ 3550 gallons PW BORATION or **DILUTION** required
(circle one)**(BOLDED)**

(Final)