Simulation Facility Braidwood | Scenario No.: **NRC 09-1** | Operating Test No. **2009-1**

Examiners: _____ Applicant: _____ SRO

_____ _____ RO

_____ _____ BOP

Initial Conditions: IC-18

Turnover: Unit 1 is at 75% power, steady state, equilibrium xenon, MOL. Online risk is green. 1C CD/CB pump is OOS for an alignment and vibration problem. Expected back in service in one week. The CV Cation demin is scheduled to be placed on line for 30 minutes later in the shift. 1PR11J filter change planned early in shift.

Event No.	Malf. No.	Event Type*	Event Description
Preload	IMF RH01A IMF RP15F IRF RP85 OPEN IMF RP01 IMF RH04B IOR ZDI1CD05PC PTL IOR ZDI1CD05PCB PTL IOR ZDI1CB113C CLS		RHR pump 1A trip RHR pump 1B auto start failure Auto Rx trip failure 1SI8811B fails to auto open 1C CD/CB pump OOS 1C CD/CB AOP OOS 1CB113C INFO Carded closed
1	None	N-BOP TS-US	1PR11J filter change
2	IMF NI08H (500 10)	C-RO, US TS-US	PR NI N-44 fails high
3	IOR ZDIRM10 IN IMF RX17 –4.25	C-RO, US	Rod control failure
4	IMF TH18B		1B RCP shaft break
5	Preload	C-RO, US	Failure of Rx to auto trip
6	IMF TH06B 540000	M-ALL	Large break RCS LOCA (1B RCS cold leg)
7	Preload		1A RH pump trip
8	Preload		1SI8811A fails to auto open

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

SCENARIO OVERVIEW

Unit 1 is at 75% power, steady state, equilibrium xenon, MOL. Online risk is green. 1C CD/CB pump is OOS for an alignment and vibration problem. Expected back in service in one week. The CV Cation demin is scheduled to be placed on line for 30 minutes later in the shift.

After completing shift turnover and relief, a Radiation Protection Technician will contact the main control room and request the crew shutdown 1PR11J sample pump to support daily filter replacement. The Unit Supervisor will enter Tech Spec 3.4.15, condition B. Approximately two minutes later, the RP Technician will request restart of the 1PR11J skid. 1PR11J will be restarted. LCO 3.4.15 may be exited after filter change completion and monitor is operating normally for 15 minutes.

After changing the 1PR11J filter, a failure of power range N-44 lower detector will occur. The crew should take actions per 1BwOA INST-1 including defeating the channel functions. Technical Specifications 3.3.1 applies.

After the Power Range failure is addressed, the rod control summing amplifier will malfunction, resulting in uncontrolled inward rod motion. After checking turbine power stable, the RO will place rod control in shutdown bank D position to stop the inward rod motion. 1BwOA ROD-1, UNCONTROLLED ROD MOTION, will be implemented. Rods will remain in shutdown bank D position for the remainder of the scenario.

After the rod control failure has been addressed, the 1B RCP shaft will fail. RCS flow in the 1B loop will drop until a reactor trip is required due to low RCS loop flow. The auto Rx trip function will fail requiring a manual reactor trip. The 1B RCP will dislodge components into the RCS, followed shortly by a large break LOCA in RCS loop 1B due to the dislodged RCP components. The crew will take actions per 1BwEP-0, REACTOR TRIP OR SAFETY INJECTION. 1A RH pump will trip when starting. The crew must manually start 1B RH pump to establish low head ECCS flow. The crew will transition to 1BwEP-1 after determining that the RCS is not intact.

When the RWST level reaches the low-2 setpoint the crew will transition to 1BwEP ES-1.3, TRANSFER TO COLD LEG RECIRCULATION. Upon transition to 1BwEP ES-1.3, 1SI8811B will not automatically open due to failure of relay K648. The crew will align the 1B RH pump for cold leg recirculation per attachment A of 1BwEP ES-1.3 to ensure long term core cooling.

Completion criteria is performance of 1BwEP ES-1.3, step 3.

Critical Tasks

1. Manually trip reactor prior to completion of step 1 of 1BwEP-0.
   (ERG Critical Task number - E-0--A) (K/A number – 000007EA1.06 importance - 4.4/4.5)

2. Manually start 1B RH pump prior to completion of step 6 of 1BwEP-0.
   (ERG Critical Task number - E-0--H) (K/A number – 000011EA1.13 importance - 4.1/4.2)

3. Align 1B RH Pump suction to the containment sump prior to completion of step 3 of 1BwEP ES-1.3.
   (ERG Critical Task number – ES-1.3--A) (K/A 011000EA1.11 Importance 4.2/4.2)

SIMULATOR SETUP GUIDE:

- Verify/perform TQ-BR-201-0113, BRAIDWOOD TRAINING DEPARTMENT SIMULATOR EXAMINATION SECURITY ACTIONS CHECKLIST.
- Establish the conditions of IC 18, 75% power, BOL, steady state, equilibrium xenon.
- Complete items on Simulator Ready for Training Checklist.
- Verify/remove any Equipment Status Tags and Danger Tags not applicable to the scenario.
- Place simulator in RUN (allow simulator to run during board walk down and turnover).
- Place 1C CD/CB pump and 1C CD/CB pump aux oil pump C/S's in PTL.
- Place 1CB113C C/S in close.
- Place CD/CB Pump Standby Selector C/S to OFF.
- Verify RM-11 is on grid 1.
- Run **caep NRC 09-1 SETUP** from disk and verify the following actuate:
    - **IMF RH01A**
    - **IMF RP15F**
    - **IMF RP01**
    - **IMF RH04B**
    - **IOR ZDI1CD05PC PTL**
    - **IOR ZDI1CD05PCB PTL**
    - **IOR ZDI1CB113C CLS**
    - **IRF RP85 OPEN**
- Place INFO card on 1C CD/CB pump & 1C CD/CD pump aux oil pump.
- Place INFO card on 1CB113C C/S.
- Verify/Set ΔI Target Curve slopes to $\pm$2% of ΔI.
- Provide students with turnover sheets, 1BwOS NR-1 and critical parameter sheet.

Event 1: 1PR11J filter change

As rad protection, contact the MCR by phone (X-2209) shortly after completion of shift turnover and request shutdown of 1PR11J to obtain sample (change of particulate and iodine filter cartridges. The rad protection procedure governing the filter change is RP-BR-911).

Two minutes after 1PR11J is shutdown, contact the MCR by phone and request startup of 1PR11J. If asked, report the bypass/normal switch on 1PS36J CASP panel is in bypass. Following start of 1PR11J, provide MCR feedback that 1PR11J is operating properly.

Acknowledge as SM LCO 3.4.15, condition B entry for 1PR11J.

Event 2: Power range N-44 fails high.

Insert **IMF NI08H 500 10**

Acknowledge as SM entry into TS 3.3.1 conditions A, D & E.
Acknowledge as SM request for writing IR, performing risk assessment and making appropriate notifications.
As SM, if requested support for tripping bistables in AEER, report that AEER bistables are not to be tripped until work analyst and NSO support can be obtained (in approx. 2 hours) and that the abnormal operating procedure should be continued. AEER bistable tripping will be conducted later**.**

AT THE CONCLUSION OF THE SCENARIO,

- **ENSURE THE FOLLOWING COMPUTER POINTS ARE TAKEN OUT OF TEST AND RETURNED TO SCAN: N0047, N0048, U1143, N0052A**
- **ENSURE THE N44 INPUT TO DEH IS REMOVED FROM TEST**

Ensure control rods are returned to automatic prior to inserting the next event.

Event 3: Uncontrolled inward control rod motion.

If control rods are in manual, as SM direct crew to restore automatic rod control.

Run caep NRC 09-1 EVENT 3 **from disk and verify the following actuate:**

IOR ZDIRMIO IN
IMF RX17 –4.25
trgset 1 "ZDIBKSEL(5) == 1"
trg 1 "DOR ZDIRMIO"
trgset 2 "ZDIBKSEL(4) == 1"
trg 2 "DOR ZDIRMIO"
trgset 3 "ZDIBKSEL(3) == 1"
trg 3 "DOR ZDIRMIO"

If dispatched as Equipment Operator to rod control cabinets, report no abnormal indications present.

As SM acknowledge the failure, on line risk assessment, request for maintenance support, and IR requests.

If consulted as SM for status of manual or auto rod control, direct crew to perform actions in accordance with 1BwOA ROD-1.

INSTRUCTOR/SIMULATOR RUN AID GUIDE

Events 4 & 6: 1B RCP shaft break & Large break LOCA (1B RCS cold leg) after reactor trip.

Run **caep NRC 09-1 EVENT 4_6** from disk and verify the following actuate:

- **IMF TH18B**
- **TRGSET 1 "ZLO52BRKA(2) == 1"**
- **IMF TH06B (1 10) 540000 10**

Acknowledge as SM procedure changes, E Plan evaluations, and STA request.

After STA requested, as STA report CSF status.

Event 7: 1A RH pump trip

If dispatched as EO to investigate 1A RH pump, report ground overcurrent flag at breaker cubicle.

Event 8: 1SI8811B fails to auto open

Acknowledge as SM procedure changes, E Plan evaluations, and STA request.

After STA requested, as STA report CSF status.

AT THE CONCLUSION OF THE SCENARIO,

- **ENSURE THE FOLLOWING COMPUTER POINTS ARE TAKEN OUT OF TEST AND RETURNED TO SCAN: N0047, N0048, U1143, N0052A**
- **ENSURE THE N44 INPUT TO DEH IS REMOVED FROM TEST**

Scenario No:	**NRC 09-1**	Event No.	1
Event Description:	1PR11J filter change		

Time	Position	Applicant's Actions or Behavior
	CUE	• Request from RP to shutdown 1PR11J for filter change

	BOP	• Refer to BwOP AR/PR-19, ROUTINE SKID MOUNTED PROCESS RADIATION MONITOR OPERATIONS
		• Notify US of 1PR11J filter change request.
		• Secure 1PR11J
		  • Select Grid 2 on RM-11
		  • Select 1PR11J
		  • Depress flow button to secure 1PR11J.

	US	• Recognize entry conditions for TS LCO 3.4.15, condition B. o Inform SM of TS 3.4.15 entry
	CUE	• Request from RP to startup 1PR11J following filter change

	BOP	• Refer to BwOP AR/PR-19
		• Start 1PR11J
		  • Select Grid 2 on RM-11
		  • Select 1PR11J
		  • Depress flow button to start 1PR11J
		  • Verify flow indicated on 1PR11J
		• Notify US of completion of 1PR11J filter change

	US	o Inform SM of TS 3.4.15 exit 15 minutes after 1PR11J is restarted and no associated alarms have occurred.
		NOTE: After the actions for 1PR11J are complete and with lead examiner concurrence, enter next event.

Comments: _____

Scenario No:	**NRC 09-1**	Event No.	2
Event Description:	Power range N-44 fails high.		

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator PWR RNG FLUX RATE RX TRIP ALERT (1-10-C3) • Annunciator PWR RNG CHANNEL DEV (1-10-C4) • Annunciator PWR RNG LOWER DET FLUX DEV HIGH (1-10-B4) • Control rod inward motion
	RO/ BOP	• Determine PR channel N-44 failing high • Place control rods in manual o Reference BwARs as time permits
	CREW	• Identify entry conditions for 1BwOA INST-1, "NUCLEAR INSTRUMENTATION MALFUNCTION"
	US	• Implement 1BwOA INST-1, "NUCLEAR INSTRUMENTATION MALFUNCTION", Attachment A "PR CHANNEL FAILURE" and direct operator action • Notify SM of PR N-44 failure o Notify SM to evaluate for E-plan
	RO/ BOP	• Check rod control status • Rod bank select switch in manual • Check for rod stop • Annunciator PWR RNG FLUX HIGH ROD STOP (1-10-B5) – LIT • Place rod stop bypass switch to N-44 at 1PM07J
	RO	• Verify/restore T_{AVE} - T_{REF} to within 1°F o Withdraw control rods o Adjust RCS boron concentration o Adjust turbine load
	BOP	• Check SG levels normal and stable
	BOP	• Bypass/defeat PR channel functions at 1PM07J • N-44 upper current comparator • N-44 lower current comparator • N-44 power mismatch bypass o N-44 rod stop bypass • N-44 channel current comparator

Comments: _____

_____

_____

_____

Scenario No:	**NRC 09-1**	Event No.	2
Event Description:	Power range N-44 fails high.		

Time	Position	Applicant's Actions or Behavior
	BOP	• Reset flux rate trip alarm for N44

	RO/ BOP	• Place computer points in test
		  • N0047
		  • N0048
		  • U1143
		• Place computer point in removed from scan
		  • N0052A
		• Place N44 input to DEH in Test

	BOP	• Remove control power fuses on PR N-44 to trip bistables
	RO	• Select operable channel (other than 1D) to loop ΔT recorder

		• Check if rod control can be placed in auto
		  • C-5 not lit
		  • T_{AVE} - T_{REF} within 1°F
		• Place control rods in auto

	US	• Determines TS 3.3.1 conditions A, D, and E are applicable. o Enter dequip for P-10 • Contact SM to perform risk assessment, initiate IR, evaluate reactivity screening, make notifications and contact appropriate personnel to investigate/correct instrument failure.
		NOTE: After the actions for N-44 are complete and with lead examiner concurrence, enter next event. Ensure rods are back in auto prior to inserting the next event.

Comments: _____

Scenario No:	**NRC 09-1**	Event No.	3
Event Description:	Uncontrolled inward control rod motion		

Time	Position	Applicant's Actions or Behavior
	CUE	• Control rod inward motion. • RODS IN light lit at 1PM05J. • 1SI-412, rod speed indicator, indicates approximately 48 steps per minute.
	RO	• Identify control rods incorrectly inserting. • Report failure to US. • Determine turbine power stable at 1PM06J or OWS drop 210. • Place rod bank select switch to manual at 1PM05J to attempt to stop uncontrolled rod insertion.
	CREW	• Identify entry conditions for 1BwOA ROD-1, "UNCONTROLLED ROD MOTION".
	US	• Notify SM of plant status and procedure entry. • Enter/implement 1BwOA ROD-1, "UNCONTROLLED ROD MOTION " and direct operator actions of 1BwOA ROD-1 to establish the following conditions: o Direct BOP & RO to stop ramp.
	CREW	• Check turbine power stable at 1PM06J or OWS drop 210. • Check rod control status at 1PM05J: • Verify/place rod bank select switch in manual. • Verify rods still moving. • Cycle in hold out switch in both directions. • Verify rods still moving. • Determine rods were previously in auto • Place rod bank select switch in Shutdown Bank D. • Verify rods stopped moving.
	US	• Determine applicable Tech Spec entries. o If pressurizer pressure drops below 2209 psig, then LCO 3.4.1 Cond. A applies. o If any SD Bank rod inserted to less than 224 steps, then LCO 3.1.5 Cond. A applies. o If neither of the above happened, then no Tech Spec Applies. o Contact SM to perform risk assessment, initiate IR, and contact maintenance to investigate/correct rod control malfunction.
		EVALUATOR NOTE: After the actions for the rod control malfunction are complete and with lead examiners concurrence, insert the next event.

Comments: _____

Scenario No:	**NRC 09-1**	Event No.	4 & 5
Event Description:	1B RCP shaft failure/auto reactor trip failure		

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator LOOSE PARTS MONITORING SYSTEM TROUBLE (1-13-E9) • Annunciator RCP 1B BRKR OPEN OR FLOW LOW ALERT (1-13-B3) • Annunciator RCP LOW FLOW ABOVE P8 RX TRIP (1-11-C5) (RED FIRST OUT) o RCS loop 1B flow lowering
	RO **[CT]** **E-0--A**	• Identify/report Red First Out condition and failure of auto reactor trip • Manually trip reactor from 1PM05J or 1PM06J
	US	• Determine 1B RCP degraded flow requires reactor trip • Direct manual reactor trip
	CREW	• Identify entry conditions for 1BwEP-0, "REACTOR TRIP OR SAFETY INJECTION"
	US	• Notify SM of plant status and procedure entry • Request evaluation of Emergency Plan conditions • Enter/Implement 1BwEP-0 and direct operator actions of 1BwEP-0

	RO	Perform immediate operator actions of 1BwEP-0:
		• Verify reactor trip
		  • Rod bottom lights - ALL LIT
		  • Reactor trip & Bypass breakers - OPEN
		  • Neutron flux – DROPPING
		o Trip 1B RCP after reactor trip is verified.

	BOP	Perform immediate operator actions of 1BwEP-0:
		• Verify Turbine Trip
		  • All Turbine throttle valves - CLOSED
		  • All Turbine governor valves - CLOSED

	BOP	Perform immediate operator actions of 1BwEP-0: • Verify power to 4KV busses • ESF Buses – BOTH ENERGIZED (141 & 142)

Comments: _____

Scenario No:	**NRC 09-1**	Event No.	6 & 7
Event Description:	Large break RCS LOCA/1A RH pump trip		

Time	Position	Applicant's Actions or Behavior
	CREW	• Check SI Status o SI First OUT annunciator - LIT o SI ACTUATED Permissive Light - LIT o SI Equipment – AUTOMATICALLY ACTUATED o Either SI pumps - RUNNING o Either CV pump to cold leg isolation valve OPEN – 1SI8801A/B • Recognize SI Actuated • Manually actuate SI from 1PM05J and 1PM06J
	RO	o Determine RCP trip required o CNMT phase B actuated o RCS pressure < 1425 psig & High head SI flow (1FI-917) > 100 gpm o Trip ALL RCPs
	US	o Direct BOP to perform Attachment B of 1BwEP-0
		EVALUATOR NOTE: US and RO will continue in 1BwEP-0 while BOP is performing Attachment B:
	BOP	• Verify FW isolated at 1PM04J: • FW pumps – TRIPPED. • Isolation monitor lights – LIT. • FW pumps discharge valves - CLOSED (or going closed) 1FW002A-C. • Verify DGs running at 1PM01J: • DGs – BOTH RUNNING. • 1SX169A/B OPEN. • Dispatch operator locally to check operation • Verify Generator Trip at 1PM01J: • OCB 1-8 and 7-8 open. • PMG output breaker open. • Trip all running HD pumps. • Verify Control Room ventilation aligned for emergency operations at 0PM02J: • VC Rad Monitors – LESS THAN HIGH ALARM SETPOINT. • Operating VC train equipment – RUNNING. • 0B Supply fan • 0B Return fan • 0B M/U fan • 0B Chilled water pump • 0B Chiller

Comments: _____

Scenario No:	**NRC 09-1**	Event No.	6 & 7
Event Description:	Large break RCS LOCA/1A RH pump trip		

Time	Position	Applicant's Actions or Behavior

		• Operating VC train dampers – ALIGNED.
		  • M/U fan outlet damper – 0VC08Y NOT FULLY CLOSED.
		  • 0B VC train M/U filter light – LIT.
		  • 0VC09Y - OPEN
		  • 0VC313Y - CLOSED
		• Operating VC train Charcoal Absorber aligned for train B.
		  • 0VC44Y - CLOSED
		  • 0VC05Y - OPEN
		  • 0VC06Y - OPEN
		• Control Room pressure greater than +0.125 inches water on 0PDI-VC038.
		• Verify Auxiliary Building ventilation aligned at 0PM02J:
		• Two inaccessible filter plenums aligned.
		  • Plenum A:
		  • 0VA03CB - RUNNING
		  • 0VA023Y - OPEN
		  • 0VA436Y - CLOSED
		  • Plenum C:
		  • 0VA03CF - RUNNING
		  • 0VA072Y – OPEN
		  • 0VA438Y - CLOSED
		• Verify FHB ventilation aligned at 0PM02J:
		• 0VA04CB - RUNNING
		• 0VA055Y - OPEN
		• 0VA062Y - OPEN
		• 0VA435Y – CLOSED
		• Notify US Attachment B complete

	RO/ BOP **[CT] E-0--H**	• Verify ECCS pumps running • Both CV pumps – RUNNING • NEITHER RH pump – RUNNING • Manually start 1B RH pump prior to completion of step 6 of 1BwEP-0. o Place 1A RH pump in pull out • Both SI pumps – RUNNING

Comments: _____

_____

_____

_____

Scenario No:	**NRC 09-1**	Event No.	6
Event Description:	Large break RCS LOCA		

Time	Position	Applicant's Actions or Behavior
	RO	• Perform the following at 1PM06J: • Verify RCFCs running in Accident Mode: • Group 2 RCFC Accident Mode lights – ALL LIT. • Verify Phase A isolation: • Group 3 Cnmt Isol monitor lights – ALL LIT. • Verify Cnmt Vent isolation: • Group 6 Cnmt Vent Isol monitor lights – ALL LIT. • Verify AF system: • AF pumps – Both RUNNING. • AF isolation valves – 1AF13A-H OPEN. • AF flow control valves – 1AF005A-H THROTTLED. • Verify CC pumps – BOTH RUNNING. • Verify SX pumps - BOTH RUNNING. • Check if Main Steamline Isolation – required: o All S/G pressures > 640 psig (at 1PM04J). o CNMT pressure > 8.2 psig. • Verify MSIVs & MSIV bypass valves – CLOSED. • Check if CS is required. • CNMT pressure has risen > 20 psig. • Group 6 CS monitor lights – ALL LIT. • Group 6 phase B lights – ALL LIT. • Verify/Stop ALL RCPs (at 1PM04J). • CS eductor suction flow - > 15 gpm on 1FI-CS013 & 1FI-CS014. • CS eductor additive flow - > 5 gpm on 1FI-CS015 & 1FI-CS016.
	BOP/ RO	• Verify Total AF flow: • AF flow > 500 gpm • S/G NR levels – NOT rising in an uncontrolled manner
	RO/ BOP	• Verify ECCS valve alignment • Determine Group 2 Cold Leg Injection monitor lights required for injection - All lit

Comments: _____

Scenario No:	**NRC 09-1**	Event No.	6
Event Description:	Large break RCS LOCA		

Time	Position	Applicant's Actions or Behavior

	RO/ BOP	• Verify ECCS flow
		  • High Head SI flow >100 gpm (1FI-917)
		  • RCS pressure < 1700 psig
		  • SI pumps discharge flow > 200 gpm
		  • RCS pressure < 325 psig
		  • 1B RH pump discharge flow > 1000 gpm

	RO	• Check PZR PORVs and SPRAY VALVES at 1PM05J:
		  • 1RY455 & 1RY456 CLOSED
		  • PORV isol valves – 1RY8000A & 1RY8000B BOTH ENERGIZED
		  • PORV relief path – Both PORVs in AUTO, Both isolation valves – OPEN.
		  • Normal PZR Spray Valves CLOSED

	RO	• Maintain RCS temperature control at 1PM05J:
		  • Check RCP's – NONE RUNNING.
		  • Verify RCS average temperature stable at or trending to 557^{o}F.
		• MSIVs closed.

	RO	• Check status of RCPs at 1PM05J: o All RCP's – NONE RUNNING. o Any RCPs still running – TRIP All RCPs

	BOP/ RO	• Check if SG secondary pressure boundaries are intact at 1PM04J:
		  • Check pressure in all SGs:
		  • None dropping in an uncontrolled manner.
		  • None completely depressurized.

	BOP/ RO	• Check S/G tubes are intact at RM-11 console:
		  • 1PR08J SG Blowdown.
		  • 1PR27J SJAE/GS.
		  • 1AR22/23A-D Main steam Lines.

Comments: _____

Scenario No:	**NRC 09-1**	Event No.	6 & 7
Event Description:	Large break RCS LOCA/1A RH pump trip		
Time	Position	Applicant's Actions or Behavior	
	CREW	• Determine RCS in NOT intact: o CNMT area rad monitors > alert alarm setpoint at RM-11 console. o CNMT pressure > 3.4 psig (1PI-CS 934-937) at 1PM06J. o CNMT floor drain sump level > 46 inches (1LI-PC002/003) at 1PM06J.	
	CREW	Transition to 1BwEP-1, 'LOSS OF REACTOR OR SECONDARY COOLANT'	
	US	• Notify SM of plant status and procedure entry • Request evaluation of Emergency Plan conditions • Request STA evaluation of status trees • Enter/Implement 1BwEP-1 and direct operator actions of 1BwEP–1 to establish the following conditions:	
		Examiner's note: When RWST level reaches the low-2 setpoint, the crew will transition to 1BwEP ES-1.3 to align ECCS for cold leg recirc. 1BwEP ES-1.3 actions begin on page 17.	

Comments: _____

Scenario No:	**NRC 09-1**	Event No.	8
Event Description:	1SI8811B fail to auto open.		

Time	Position	Applicant's Actions or Behavior
	RO	• Check Status of RCPs: • RCPs – NONE RUNNING

	RO/ BOP	• Check if SG secondary pressure boundaries are intact:
		  • Check pressure in all SGs:
		  • None dropping in an uncontrolled manner
		  • None completely depressurized
		• Check intact SG levels
		  • SG levels maintained between 10% (31%) and 50%
		  • SG NR levels – NOT rising in an uncontrolled manner
		• Check secondary radiation normal.
		  • Reset Phase A
		  • Depress BOTH Phase A Reset Pushbuttons at 1PM06J
		  • OPEN 1SD005A-D at 1PM11J
		  • At RM-11 or HMI Check secondary rad trends on :
		  • 1PR08J SG Blowdown
		  • 1PR27J SJAE/GS
		  • 1AR22/23A-D Main steam lines

	RO	• Check at least ONE PZR PORV relief path available:
		  • PORV isol valves – BOTH ENERGIZED
		  • PORV relief path – BOTH PORVs in AUTO, 1RY8000A & B – OPEN

	CREW	• Check if ECCS flow should be reduced
		  • RCS subcooling – NOT acceptable
		  • Check if CS should be stopped
		  • Both CS pumps – RUNNING
		  • Reset CS
		  • Spray add tank lo-2 level light – NOT LIT
		  • CS termination requirements
		  • CNMT pressure < 15 psig
		  • Spray operating time < 8 hours
		  • Check if RH pumps should be stopped
		  • Reset SI
		  • Depress BOTH SI Reset Pushbuttons at 1PM06J
		  • Verify SI ACTUATED BP light NOT lit at 1PM05J
		  • Verify AUTO SI BLOCKED BP light NOT lit at 1PM05J
		  • RCS pressure < 325 psig – go to 1BwEP-1, step 9.

	CUE	• Annunciator RWST LEVEL LO-2 (1-6-B7) • RWST level <46%.

Comments: _____

_____

_____

_____

Scenario No:	**NRC 09-1**	Event No.	8
Event Description:	1SI8811B fail to auto open.		

Time	Position	Applicant's Actions or Behavior
	CREW	Transition to 1BwEP ES-1.3, 'TRANSFER TO COLD LEG RECIRCULATION'
	US	• Notify SM of plant status and procedure entry • Request evaluation of Emergency Plan conditions • Request STA monitor status trees – BwFRs should not be implemented during steps 1 thru 6 of 1BwEP ES-1.3 • Enter/Implement 1BwEP ES-1.3 and direct operator actions of 1BwEP ES-1.3 to establish the following conditions:

	RO/ BOP	• Establish CC flow to RH HXs
		  • 1CC9473A & B – OPEN
		  • CC pumps – TWO RUNNING
		  • Open 1CC9412A & B
		  • CC to RH HX flows – 1FI-0689 & 1FI-0688 > 5000 gpm
		• Check CNMT floor level – 1LI-PC006 & 1LI-PC007 > 8 inches (13 inches)
		• Align RH pumps suction to CNMT sumps
		  • Place SVAG valve C/Ss to close
		  • Check RH pumps
		  • 1B RH pump – RUNNING
		  • 1A RH pump tripped (PTL)
		• Check CNMT sump isolation valves
		  • 1SI8811A – OPEN
		  • 1SI8811B – CLOSED – go to attachment A, step 1.

	CREW	**Note: If RWST level drops < 9% during manual realignment of ECCS pumps to containment sump, any pump taking suction from RWST should be stopped, unless a suction flowpath also exists from the containment sump.**

Comments: _____

Scenario No:	**NRC 09-1**	Event No.	8
Event Description:	1SI8811B fail to auto open		
Time	Position	Applicant's Actions or Behavior	

	BOP/ RO
	
	[CT] ES-1.3--A
		• Check if 1A RH pump needs to be aligned to CNMT sump
		  • 1SI8811A – OPEN
		  • CLOSE 1SI8812A
		• Check if 1B RH pump needs to be aligned to CNMT sump
		  • 1SI8811B – CLOSED
		• Check train B recirc flowpath from CNMT sump available
		  • 1B RH pump – RUNNING
		  • 1SI8811B – energized
		• Manually align 1B RH Pump suction to the containment sump.
		  • Place 1B RH pump in PULL OUT
		  • Close 1SI8812B
		  • Place 1B CS pump in PULL OUT
		  • Close 1CS001B
		  • Open 1SI8811B
		  • Start 1B RH pump
		  • Open 1CS001B
		  • Restart 1B CS pump (manually actuate CS/Phase B)
		• Check at least one CNMT sump recirc flowpath established
		  • 1B RH pump - RUNNING
		  • 1SI8811B – OPEN
		• Return to 1BwEP ES-1.3, step 3.d	

		Note: At this point the scenario may be terminated	

(Final)

Comments: _____

Simulation Facility Braidwood | Scenario No.: **NRC 09-2** | Operating Test No.: **2009-1**

Examiners: _____ Applicant: _____ SRO

_____ _____ RO

_____ _____ BOP

Initial Conditions: IC-18

Turnover: Unit 1 is at 75% power, steady state, equilibrium xenon, MOL. Online risk is green. 1B Heater Drain Pump is OOS for motor replacement for the past 3 days. Expected back in service in 7 days. 1CV8149C was returned to service last shift following maintenance to replace its fuse block. Following completion of turnover, the shift manager requests the BOP swap 75 gpm letdown orifices from 1CV8149B to 1CV8149C per BwOP CV-9 for an upcoming clearance order on 1CV8149B to replace its fuse block while the RO monitors reactor power.

Event No.	Malf. No.	Event Type*	Event Description
	IOR ZDI1HD01PB PTL IMF CV32B TRGSET 1 ZLO1SI01PA(3) = = 1 IMF CV01A (1 0) TRGSET 2 ZAO1PI524A < 0.46 IMF TH03B (2 10) 600 60		1B HD pump OOS 1B CV pump auto start failure 1A CV pump trip 1B SGTR when SG pressure drops to 600 PSIG
1	None	N-BOP, US	Swap Letdown orifices
2	IMF PB2411 ON IMF PB2412 ON IOR ZDI1MS018B CLS	TS-US	SG PORV 1MS018B inoperable
3	IMF TH10B 100 15	C-RO, US (Potential) TS-US	1RY455C spray valve fails open in auto
4	IMF RX10A 0 15	I-RO, US TS-US	Turbine Impulse Pressure channel 1PT-505 failed low
5	IMF FW35A	C-BOP, US R-RO, US	1A Heater Drain Pump trip requiring turbine runback
6	IMF MS03B 100 0 IMF MS03F 100 0 IMF MS03J 100 0	M-ALL	1B SG safety valves stuck open after turbine runback
7	Preload		1A CV pump trips/1B CV pump fails to auto start
8	Preload	M-ALL	1B SGTR (600 gpm) (faulted and ruptured)

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

SCENARIO OVERVIEW

Unit 1 is at 75% power, steady state, equilibrium xenon, MOL. Online risk is green. 1B Heater Drain Pump is OOS for motor replacement for the past 3 days. Expected back in service in 7 days. 1CV8149C was returned to service last shift following maintenance to replace its fuse block. Following completion of turnover, the shift manager requests the BOP swap 75 gpm letdown orifices from 1CV8149B to 1CV8149C per BwOP CV-9 for an upcoming clearance order on 1CV8149B to replace its fuse block while the RO monitors reactor power.

After completing shift turnover and relief, the crew will swap letdown orifices. The BOP will manually lower letdown pressure, remove 1CV8149B from operation and place 1CV8149C on-line. The BOP will then restore letdown line pressure and restore letdown to automatic operation

After completing the letdown orifice swap, Steam Generator 1B atmospheric relief valve 1MS018B, will develop a hydraulic leak. The Unit Supervisor will enter Tech Spec 3.7.4, Condition A and Tech Spec 3.6.3, Condition C. The crew may dispatch an operator to close 1MS019B to comply with TS 3.6.3, condition C. 1MS018B will remain unavailable for the remainder of the scenario.

After the 1MS018B failure has been addressed, 1PK-455C Pressurizer Spray Valve controller will fail to full demand position. 1RY455C will fail full open and pressurizer pressure will drop. The RO will take manual control of 1PK-455C and lower demand to close the pressurizer spray valve. TS 3.4.1 may be applicable if pressurizer pressure drops below 2209 psig.

After the 1PK-455C failure has been addressed, First Stage Turbine Impulse Pressure channel 1PT-505 will fail low. The RO will diagnose the failure of 1PT-505 and take manual control of rods after verifying turbine load stable. 1BwOA INST-2, OPERATION WITH A FAILED INSTRUMENT CHANNEL-Attachment D will be entered. TS 3.3.1 conditions A and P will be entered. The RO will return rod control to automatic after verifying Tave and Tref are within 1°F.

After the 1PT-505 failure has been addressed, 1A Heater Drain Pump will trip. 1BwOA SEC-1, SECONDARY PUMP TRIP-Attachment C will be entered. The BOP will initiate a turbine load reduction to 780 MW at 20 MW/minute. The RO will borate the RCS as necessary to stabilize RCS temperature.

After the 1A HD pump trip has been addressed, the secondary pressure transient causes three safety valves on the 1B SG to stick open, causing a faulted SG. SG pressures will drop and a manual reactor trip will be required. The crew will implement 1BwEP-0, REACTOR TRIP OR SAFETY INJECTION. When safety injection is actuated, the 1A CV pump will trip. The 1B CV pump must be manually started to establish high head ECCS flow. After determining 1B SG secondary pressure boundary is not intact the crew will transition to 1BwEP-2, FAULTED STEAM GENERATOR ISOLATION. When 1B SG pressure drops to 600 psig, a 600 gpm SGTR will occur on the 1B SG, causing a faulted/ruptured SG. The crew will complete isolation of 1B SG and transition to 1BwEP-3, STEAM GENERATOR TUBE RUPTURE, based on secondary radiation trends on the 1B SG. In addition, the crew will recognize 1B SG pressure does not drop to zero and lowering pressurizer level/pressure will indicate a SGTR (alternate indications). After determining ruptured SG pressure is less than 320 psig the crew will transition 1BwCA-3.1, SGTR WITH LOSS OF REACTOR COOLANT – SUBCOOLED RECOVERY DESIRED.

Completion criteria is completion of step 6 of 1BwCA-3.1.

Critical Tasks

1. Manually start the 1B CV pump prior to completion step 6 of 1BwEP-0.
   (ERG Critical Task number - E-0--I) (K/A number - 013000A4.01 importance – 4.5/4.8)

2. Isolate 1B Steam Generator prior to completing step 4 of 1BwEP-2.
   (ERG Critical Task number - E-2--A) (K/A number - 000040AA1.10 importance - 4.1/4.1)

SIMULATOR SETUP GUIDE:

- Verify/perform TQ-BR-201-0113, BRAIDWOOD TRAINING DEPARTMENT SIMULATOR EXAMINATION SECURITY ACTIONS CHECKLIST.
- Establish the conditions of IC-18, 75% power, steady state, equilibrium xenon.
- Complete items on Simulator Ready for Training Checklist.
- Verify/remove any Equipment Status Tags and Danger Tags not applicable to the scenario.
- Place simulator in RUN (allow simulator to run during board walk down and turnover).
- Place 1B HD pump in PTL.
- Run **caep NRC 09-2 SETUP** from disk and verify the following actuate:
    - **IOR ZDI1HD01PB PTL**
    - **IMF CV32B**
    - **TRGSET 1 ZLO1SI01PA(3) = = 1**
    - **IMF CV01A (1 0)**
    - **TRGSET 2 ZAO1PI524A < 0.46**
    - **IMF TH03B (2 10) 600 60**
- Place info tag on 1B HD pump and INFO tag on 1HD075B.
- Verify/Set ΔI Target Curve slopes to $\pm$2% of ΔI.
- Provide examinees with turnover sheets, 1BwOS NR-1 and critical parameter sheet.

Event 1: Swap Letdown orifices

As SM, acknowledge the completion of letdown orifice swap.

Event 2: SG PORV 1MS018B inoperable (Tech Spec)

Run **caep NRC 09-2 EVENT 2** from disk and verify the following actuate:

- **IMF PB2411 ON**
- **IMF PB2412 ON**
- **IOR ZDI1MS018B CLS**

As SM acknowledge the failure, LCO 3.6.3, condition C and LCO 3.7.4, condition A, and requests for on line risk assessment, maintenance support, and IR initiation.

If dispatched as EO, report 1MS018B has a broken hydraulic line and a small puddle of hydraulic fluid is present beneath the valve. The hydraulic pump is running.

As WEC supervisor, acknowledge request for EST for 1MS018B C/S, if EST is requested.

If dispatched as EO to close 1MS019B, perform the following:

- **IRF MS52 0**

Event 3: 1PK-455C Pressurizer Spray Valve Controller failure.

Insert **IMF TH10B 100 15**

As SM, acknowledge the failure, LCO 3.4.1 condition A entry and exit (if applicable), and requests for, maintenance support, and IR initiation.

Event 4: Turbine Impulse Pressure channel 1PT-505 failed low.

Insert **IMF RX10A 0 15**

As SM, acknowledge the failure, 1BwOA INST-2 entry, request for E Plan evaluation, LCO 3.3.1 conditions A & P entry, and requests for on line risk assessment (GREEN), maintenance support, and IR initiation.

As SM, if requested support for tripping bistables in AEER, report that AEER bistables are not to be tripped until work analyst and NSO support can be obtained (in approx. 2 hours) and that the abnormal operating procedure should be continued. AEER bistable tripping will be conducted later**.**

Event 5: 1A Heater Drain Pump trip

ENSURE ROD CONTROL IS RETURNED TO AUTOMATIC PRIOR TO INSERTING THE NEXT MALFUNCTION.

If control rods are in manual, as SM direct crew to restore automatic rod control.

Insert **IMF FW35A**

As SM, acknowledge the failure, 1BwOA SEC-1 entry, request for E Plan evaluation, and requests for on line risk assessment, maintenance support, and IR initiation.

If dispatched as EO, report 1A Heater Drain pump is seized and report ground overcurrent flag at breaker cubicle.

Event 6: 1B SG Safety valves stuck open after runback

WHEN THE LEAD EVALUATOR IS SATISFIED AFTER THE HD PUMP TRIP AND TURBINE RUNBACK:

Run **caep NRC 09-2 EVENT 5** from disk and verify the following actuate:

IMF MS03B 100 0
IMF MS03F 100 0
IMF MS03J 100 0

After faulted SG is diagnosed by crew OR two minutes after malfunction is inserted, report as security, steam flow from 1B/1C MSIV room safety valve tailpipes.

Acknowledge as SM procedure changes, E Plan evaluations, and STA request.

Event 7: 1A CV pump trips/1B CV pump fails to auto start (preload)

If dispatched as EO to investigate 1A CV pump, report ground overcurrent flag at breaker cubicle.

Event 8: Faulted ruptured 1B SG (preload)

Acknowledge as SM procedure changes, E Plan evaluations, and STA request.

After STA requested, as STA report CSF status.

Scenario No:	**NRC 09-2**	Event No.	1
Event Description:	Swap Letdown orifices		

Time	Position	Applicant's Actions or Behavior
	CUE	• Shift manager requests swapping letdown orifices from 1B to 1C (from turnover).
	US	• Directs RO to swap letdown orifices from 1B to 1C per BwOP CV-9

	BOP	• Refers to BwOP CV-9
		• Determine BwOP CV-9, steps F.2 and F.1 to be performed
		• Lower letdown pressure
		  • Place 1PK-131, LTDWN Line Press Cont Vlv 1CV131, to MANUAL
		  • Lower demand on 1PK-131, LTDWN Line Press Cont Vlv 1CV131, to raise letdown pressure to ~ 400 psig (1PI-131)
		• Remove 1B letdown orifice from operation
		  • Close 1CV8149B
		• Restore letdown pressure to 370 psig
		  • Lower demand on 1PK-131, LTDWN Line Press Cont Vlv 1CV131
		• Raise demand on 1PK-131, LTDWN Line Press Cont Vlv 1CV131, to lower letdown pressure to ~ 180 psig (1PI-131)
		• Align 1C letdown orifice
		  • Open 1CV8149C
		• Restore automatic letdown pressure control
		  • Verify letdown pressure stable at ~370 psig (1PI-131)
		  • Place 1PK-131, LTDWN Line Press Cont Vlv 1CV131, to AUTO
		• Verify letdown temperature 90°F - 115°F (1TI-130)
		• Verify PZR level is being maintained at the program value
		• Inform US letdown orifices swapped

	US	• Acknowledge report • Notify SM letdown orifices swapped from 1B to 1C
		NOTE: After the actions for swapping letdown orifices are complete and with lead examiner concurrence, enter next event

Comments: _____

Scenario No:	**NRC 09-2**	Event No.	2
Event Description:	SG PORV 1MS018B inoperable		

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator S/G 1B PORV TROUBLE (1-15-B10). • SER 2411, 1B PORV HYDRAULIC FLUID RESERVOIR LOW. • SER 2412, S/G PORV 1B ACCUMULATOR PRESSURE LOW.
	BOP	• Identify/report trouble alarm on 1MS018B • Refer to BwAR 1-15-B10 • Dispatch operator to 1MS018B o Place 1MS018B C/S in close to stop hydraulic pump o Request Equipment Status Tag for 1MS018B C/S & 1MS019B hand wheel.
	RO	o Assist US & BOP o Refer to BwAR o Dispatch operators o Refer to Tech Specs o Inform SM of 1MS018B failure
	US	• Identify entry conditions for TS 3.7.4, condition A. • Identify entry conditions for TS 3.6.3, condition C o Direct operator to close 1MS019B.
	US	o Inform SM of 1MS018B status, TS Status, request IR, On Line Risk Assessment, maintenance support, and clearance order/EST for 1MS019B.
		NOTE: After the actions for 1MS018B failure are complete and with lead examiner concurrence, enter next event

Comments: _____

Scenario No:	**NRC 09-2**	Event No.	3
Event Description:	1PK-455C failure		

Time	Position	Applicant's Actions or Behavior
	CUE	o Annunciator PZR PRESS CONT DEV LOW HTRS ON (1-12-C1). • 1RY455C position lights indicating full open. • Pressurizer Pressure dropping. • Master Pressurizer Pressure Controller demand dropping.
	RO	• Identify condition/report alarm on 1PM05J • Place 1PK-455C in manual and lower demand to close 1RY455C
	BOP	o Assist US & RO o Refer to BwAR o Refer to Tech Specs o Inform SM of 1PK-455C failure
	US	o Identify entry conditions for TS 3.4.1, condition A. o Identify exit conditions for TS 3.4.1, condition A o Direct operator to close 1RY455C.
	US	o Inform SM of 1PK-455C failure, TS Status, request IR, On Line Risk Assessment and maintenance support.
		NOTE: After the actions for 1PK-455C failure are complete and with lead examiner concurrence, enter next event

Comments: _____

Scenario No:	**NRC 09-2**	Event No.	4
Event Description:	Turbine Impulse Pressure Channel 1PT-505 failed low		

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator TAVE CONT DEV HIGH (1-14-D1) • 1PI-505, First Stage Pressure, indication lowering. • Control rod inward motion • 1TR-0412, Auct Tave/Tref recorder, Tref indication lowering • 1SI-412, Rod Speed, indicates 72 step per minute
	RO/ BOP	• Recognizes 1PT-505 has failed low • Report failure to US o Place rod control in manual o Refer to BwAR 1-14-D1 as time permits
	BOP	o Verifies turbine load not lowering
	CREW	• Identify entry conditions for 1BwOA INST-2, "OPERATION WITH A FAILED INSTRUMENT CHANNEL"
	US	• Notify SM of plant status and procedure entry • Request evaluation of Emergency Plan conditions • Implement 1BwOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL", Attachment D "TURBINE IMPULSE PRESSURE CHANNEL FAILURE" and direct operator actions of 1BwOA INST -2 to establish the following conditions. • Direct RO to place rod control in manual o If Pzr Pressure drops below 2209 psig, enter LCO 3.4.1 until pressure is > 2209 psig.
	RO/ BOP	• Restore steam dumps • C-7 NOT lit • Place 1PK-507 in manual • Lower 1PK-507 demand to 0% • Place steam dump mode select switch to STM PRESS mode • Place 1PK-507 in auto o Check Reactor Power <100%
	RO/ BOP	• Defeat 1PT-505 • Place 1PS505Z, Turbine Impulse Pressure Defeat Switch, to DEFEAT P-505

Comments: _____

Scenario No:	**NRC 09-2**	Event No.	4
Event Description:	Turbine Impulse Pressure Channel 1PT-505 failed low		

Time	Position	Applicant's Actions or Behavior
	US/RO	• Check if rod control can be placed in auto o C5 NOT lit o Tave/Tref stable and within 1°F. o If control rods need to be adjusted to restore Tave – Tref within 1°F, perform the following: o Conduct reactivity brief for restoring control rods per OP-AP-300-1004, Reactivity Change Determination Form o Obtain SM concurrence for reactivity change o Adjust Tave – Tref within 1°F using control rods • Place Rod control in auto
	RO/ BOP	• Check P13 interlock • Turbine power > 10% - P13 NOT lit
	US	• Determine TS 3.3.1 conditions A and P are applicable. • Contact SM to perform risk assessment, initiate IR, perform reactivity screening and contact personnel to investigate/correct instrument failure.
		The next event is to be inserted following the above actions by the US and Lead Examiner concurrence.

Comments: _____

Scenario No:	**NRC 09-2**	Event No.	5
Event Description:	1A Heater Drain Pump trip		

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator HD PUMP TRIP (1-17-D2) • HD Tank level rising • HD Pump discharge valves opening
	BOP	• Recognizes 1A HD pump tripped o Refer to BwAR 1-17-D2 as time permits • Reports failure to US • Recognizes one Heater Drain Pump running
	CREW	• Identify entry conditions for 1BwOA SEC-1, "SECONDARY PUMP TRIP"
	US	• Acknowledge 1A HD pump trip • Contact SM to perform risk assessment, initiate IR, and contact maintenance to investigate/correct failure • Implement 1BwOA SEC-1, "SECONDARY PUMP TRIP" Attachment C "HD PUMP TRIP" and direct operator actions of 1BwOA SEC-1 to establish the following conditions.

	BOP	• Recognizes standby HD pump NOT AVAILABLE
		• Check HD pump status
		  • ONLY 1C HD pump running
		  • Initiate turbine load reduction to 780 MW at 20 MW/min
		  • Initiate HD runback on OWS graphic 5512
		  • Verify turbine load lowering

Comments: _____

Scenario No:	**NRC 09-2**	Event No.	5
Event Description:	1A Heater Drain Pump trip		

Time	Position	Applicant's Actions or Behavior

	BOP	• Check HD Tank level
		  • Level > 72% and rising
		  • Maintain HD tank level
		  o Verify 1HD046A &B in AUTO
		  o Open 1CB113A-D
		  o Manually open 1HD117, HD tank overflow valve
		  o Lower turbine load as necessary to maintain HD tank level <72%
		• Check 1HD117, HD tank overflow valve in auto and closed
		  o Lower turbine load as necessary to close 1HD117
		• Check 1C HD pump parameters
		• 1C HD pump amps < 168 amps
		• 1C HD pump flow < 2950 KLB/HR
		  o Lower turbine load as necessary to restore 1C HD pump parameters
		• Deactivate turbine runback.

	US/RO	• Check PDMS operable
		  • Annunciator PDMS INOPERABLE not lit (1-10-E8)
		  • 1BwOS PDMS-1A not implemented
		  • Annunciator PDMS LIMIT EXCEEDED not lit (1-10-D7)

	RO	• Control ΔI near target
		  • Operate control rods in manual to restore ΔI near target
		• Monitor RCS parameters
		  o If RCS pressure lowers < 2209 psig, notify US to enter TS 3.4.1, RCS DNB Limits
		  o If control rods < low – 2 rod insertion limit, notify US to enter TS 3.1.6, Control Bank Insertion Limits

Comments: _____

_____

_____

_____

Scenario No:	**NRC 09-2**	Event No.	5
Event Description:	1A Heater Drain Pump trip		

Time	Position	Applicant's Actions or Behavior
	RO	• Initiate RCS boration • Determine required boric acid volume (approximate band: 50 gal – 300 gal) o Determine from ReMa • Determine desired boric acid flow rate • Set 1FK-110 BA Flow Control to desired boration rate • Set 1FY-0110 BA Blender Predet Counter to desired volume. • Place MAKE-UP MODE CONT SWITCH to STOP position • Place MODE SELECT SWITCH to BORATE position • Place MAKE-UP MODE CONT SWITCH to START • Verify proper operation of valves and BA transfer pump (1CV110B open, Boric Acid Transfer Pump running, 1CV110A throttles open, proper BA flow indicated on recorder). o Turn on PZR backup heaters in accordance with BwOP RY-14, PRESSURIZER BACKUP HEATER OPERATION. OR Batch addition of Boric Acid: • Open 1CV110B • Open 1CV110A • Start the BA Transfer pump • When desired amount of BA has been added, stop the BA Transfer Pump • Close 1CV110A • Close 1CV110B o May flush boric acid lines per BwOP CV-6 step. F.5.
	BOP	• Verify running CB pump recirc valves in auto • 1CB113A-D on running pumps • Dispatch operators to perform BwOP HD-2 for 1A HD pump • Shutdown CD/CB pump (if started during procedure performance)

Comments: _____

_____

_____

_____

Scenario No:	**NRC 09-2**	Event No.	5
Event Description:	1A Heater Drain Pump trip		
Time	Position	Applicant's Actions or Behavior	
	US	• Notify chemistry to monitor secondary plant chemistry • Notify SM to perform risk assessment • Check reactor power change > 15% in one hour o Notify chemistry to perform TS 3.4.16 sampling o Notify rad protection to perform RETS 12.4.1.A sampling o Refer to BwOP FW-26 to evaluate FW venturi fouling o Determine TS 3.1.6, condition A entry required if control rods below low – 2 rod insertion limit	
		The next event (SG 1B safety valves fail open) is to be inserted when the Lead Examiner is satisfied the crew has adequately addressed the HD pump trip. Suggest the malfunction be inserted during latter part of the turbine runback when crew is attempting to find a turbine load that allows HD tank overflow valve to be closed.	

Comments: _____

_____

_____

_____

Scenario No:	**NRC 09-2**	Event No.	6 & 7
Event Description:	1B SG safety valves fail open, 1A CV pump trips/1B CV pump fails to auto start		

Time	Position	Applicant's Actions or Behavior
	CUE	o Annunciator S/G 1B FLOW MISMATCH FW FLOW LOW (1-15-B4) o NI power rising o PZR pressure lowering o Turbine MW output lowering
	CREW	• Recognize indications of Faulted SG o Dispatch operators to look for steam leak o If report is receives that 1B SG safeties are open, recognize that SG pressure is below safeties lift setpoints and initiate reactor trip.
	RO	• Initiate a manual reactor trip and transition to 1BwEP-0 • Initiate a manual SI
	US	• Notify SM of plant status and procedure entry • Request evaluation of Emergency Plan conditions • Enter/Implement 1BwEP-0 and direct operator actions of 1BwEP-0

Comments: _____

Scenario No:	**NRC 09-2**	Event No.	6 & 7
Event Description:	1B SG safety valves fail open, 1A CV pump trips/1B CV pump fails to auto start		

Time	Position	Applicant's Actions or Behavior

	RO	Perform immediate operator actions of 1BwEP-0:
		• Verify reactor trip
		  • Rod bottom lights - ALL LIT
		  • Reactor trip & Bypass breakers - OPEN
		  • Neutron flux - DROPPING

	BOP	Perform immediate operator actions of 1BwEP-0:
		• Verify Turbine Trip
		  • All Turbine throttle valves - CLOSED
		  • All Turbine governor valves - CLOSED

	BOP	Perform immediate operator actions of 1BwEP-0: • Verify power to 4KV busses • ESF Buses – BOTH ENERGIZED (141 & 142)
	CREW	(If manual SI not previously performed) Recognize and respond to conditions requiring a Safety Injection in accordance with 1BwEP-0 "REACTOR TRIP OR SAFETY INJECTION", Step 4: • SG pressure cannot be maintained > 640 psig • Manually actuate SI from 1PM05J and 1PM06J

	CREW	• Check SI Status
		  o SI First OUT annunciator - LIT
		  o SI ACTUATED Permissive Light - LIT
		  o SI Equipment – AUTOMATICALLY ACTUATED
		  o Either SI pumps - RUNNING
		  o Either CV pump to cold leg isolation valve OPEN – 1SI8801A/B

	CREW	o May choose to isolate 1B SG immediately due to safety considerations.
		  o Isolate FW to 1B SG.
		  o Actuate Main Steam Isolation.

	US	• Direct BOP to perform Attachment B of 1BwEP-0
		EVALUATOR NOTE: US and RO will continue in 1BwEP-0 while BOP is performing Attachment B:

	BOP	• Verify FW isolated at 1PM04J:
		  • FW pumps – TRIPPED.
		  • Isolation monitor lights – LIT.

Comments: _____

Scenario No:	**NRC 09-2**	Event No.	6 & 7
Event Description:	1B SG safety valves fail open, 1A CV pump trips/1B CV pump fails to auto start		

Time	Position	Applicant's Actions or Behavior
		• FW pumps discharge valves - CLOSED (or going closed) 1FW002A-C. • Verify DGs running at 1PM01J: • DGs – BOTH RUNNING. • 1SX169A/B OPEN. • Dispatch operator locally to check operation • Verify Generator Trip at 1PM01J: • OCB 1-8 and 7-8 open. • PMG output breaker open. • Secure all HD running pumps. • Verify Control Room ventilation aligned for emergency operations at 0PM02J: • VC Rad Monitors – LESS THAN HIGH ALARM SETPOINT. • Operating VC train equipment – RUNNING. • 0B Supply fan • 0B Return fan • 0B M/U fan • 0B Chilled water pump • 0B Chiller • Operating VC train dampers – ALIGNED. • M/U fan outlet damper – 0VC08Y NOT FULLY CLOSED. • 0B VC train M/U filter light – LIT. • 0VC09Y - OPEN • 0VC313Y - CLOSED • Operating VC train Charcoal Absorber aligned for train B. • 0VC44Y - CLOSED • 0VC05Y - OPEN • 0VC06Y - OPEN • Control Room pressure greater than +0.125 inches water on 0PDI-VC038. • Verify Auxiliary Building ventilation aligned at 0PM02J: • Two inaccessible filter plenums aligned. • Plenum A: • 0VA03CB - RUNNING • 0VA023Y - OPEN • 0VA436Y - CLOSED • Plenum C: • 0VA03CF RUNNING • 0VA072Y - OPEN • 0VA438Y - CLOSED

Comments: _____

Scenario No:	**NRC 09-2**	Event No.	6 & 7
Event Description:	1B SG safety valves fail open, 1A CV pump trips/1B CV pump fails to auto start		

Time	Position	Applicant's Actions or Behavior

		• Verify FHB ventilation aligned at 0PM02J:
		  • 0VA04CB - RUNNING
		  • 0VA055Y - OPEN
		  • 0VA062Y - OPEN
		  • 0VA435Y – CLOSED
		• Notify US Attachment B complete

	RO/ BOP **[CT] E-0--I**	• Verify ECCS pumps running
		  • CV pumps - NONE RUNNING
		  • Manually start the 1B CV pump prior to completion step 6 of 1BwEP-0.
		  • Both RH pumps - RUNNING
		  • Both SI pumps - RUNNING

	RO/ BOP	• Verify RCFCs running in Accident Mode
		  • Group 2 RCFC Accident Mode lights - LIT
		• Verify Phase A isolation
		  • Group 3 Cnmt Isol monitor lights - LIT
		• Verify Cnmt Vent isolation
		  • Group 6 Cnmt Vent Isol monitor lights - LIT
		• Verify AF system:
		  • AF pumps – BOTH RUNNING
		  • AF isolation valves – OPEN
		  • 1AF13A-H
		  • AF flow control valves - THROTTLED
		  • 1AF005A-H
		• Verify CC pumps – BOTH RUNNING
		• Verify SX pumps – BOTH RUNNING

	RO/ BOP	• Check Main Steamline Isolation not required
		  • Check pressures
		  o SG pressures > 640 psig – continue on in 1BwEP-0
		  o SG pressures < 640 psig - verify MSIVs and MSIV bypass valves closed
		  • CNMT pressure < 8.2 psig

	RO/ BOP	• Check CS not required • CNMT pressure remained < 20 psig

Comments: _____

Scenario No:	**NRC 09-2**	Event No.	6 & 8
Event Description:	1B SGTR (600 gpm), Faulted ruptured 1B SG		

Time	Position	Applicant's Actions or Behavior
	RO/ BOP	• Verify Total AF flow: • AF flow > 500 gpm • SG levels maintained between 10% and 50% • Check status of S/G NR levels • S/G level not rising in an uncontrolled manner
	RO/ BOP	• Verify ECCS valve alignment • Group 2 Cold Leg Injection monitor lights required for injection – LIT • Verify ECCS flow • High Head SI flow >100 gpm (1FI-917) o RCS pressure < 1700 psig o SI pump discharge flow > 200 gpm o RCS pressure > 325 psig
	RO	• Check PZR PORVs and SPRAYs: • PORV isolation valves – ENERGIZED • PORV relief paths – PORVs in AUTO, PORV isolation valves OPEN • Normal PZR Spray valves - CLOSED
	RO	• Maintain RCS temperature control • Check RCPs - RUNNING • Verify RCS average temperature stable at or trending to 557^{o}F o Throttle AF flow o Isolate AF flow to 1B SG
	RO	• Check status of RCPs • All RCPs - RUNNING • Check RCP trip criteria o RCS pressure > 1425 psig – continue on in 1BwEP-0 o RCS pressure < 1425 psig • Verify high head injection flow (1FI-917) > 100 gpm • Trip all RCPs
	BOP/ RO	• Check if SG secondary pressure boundaries are intact: • Check pressure in all SGs: • 1B SG pressure dropping in an uncontrolled manner

Comments: _____

Scenario No:	**NRC 09-2**	Event No.	6 & 8
Event Description:	1B SGTR (600 gpm), Faulted ruptured 1B SG		

Time	Position	Applicant's Actions or Behavior
	CREW	• Transition to 1BwEP-2, 'FAULTED STEAM GENERATOR ISOLATION'
	US	• Notify SM of plant status and procedure entry • Request evaluation of Emergency Plan conditions • Request STA evaluation of status trees • Enter/Implement 1BwEP-2 and direct operator actions of 1BwEP–2 to establish the following conditions
	BOP	• Check MS isolation • All MSIVs and bypass valves - CLOSED
	BOP	• Check if any SG secondary pressure boundary is intact • 1A, 1C, & 1D SG pressures stable

	CREW	• Identify faulted SG
		  • 1B SG pressure decreasing in an uncontrolled manner
		  • 1B SG indicates steam flow with MSIVs and MSIV bypass valve closed

	RO/ BOP **[CT] E-2--A**	• Isolate 1B Steam Generator prior to completing step 4 of 1BwEP-2.
		  • Verify/Close 1AF013B & F – may have already be closed at step 15 of 1BwEP-0
		  • 1B row of FW isolation monitor lights – lit
		  • 1MS018B closed
		  • 1SD002E & F closed
		  • 1SD005C closed

	BOP	• Check Annunciator AF PUMP SX SUCTION VLVS ARMED (1-3-E7) – NOT LIT

	CREW	• Check Secondary Radiation
		  • Depress Phase A Reset Pushbuttons at 1PM06J
		  • OPEN 1SD005A-D at 1PM11J
		  • Request Chemistry sample SG for activity (US)
		  • Check 1AR22/23B 1B Main Steam Line on HMI or RM-11

	CREW	Transition to 1BwEP-3, 'STEAM GENERATOR TUBE RUPTURE'

Comments: _____

_____

_____

_____

Scenario No:	**NRC 09-2**	Event No.	6 & 8
Event Description:	Faulted ruptured 1B SG		

Time	Position	Applicant's Actions or Behavior
	US	• Notify SM of plant status and procedure entry • Request evaluation of Emergency Plan conditions o Request STA evaluation of status trees • Enter/Implement 1BwEP-3 and direct operator actions of 1BwEP–3 to establish the following conditions
	RO	• Check Status of RCPs: • RCPs – NONE running – should have been tripped earlier when RCP trip criteria met
	BOP	• Identify ruptured SG 1B o 1B Main steam line rad monitor ABNORMAL for plant conditions • Isolate ruptured SG • 1MS018B inoperable due to hydraulic leak o Confer with SM about continuing procedure with 1MS018B NOT in auto • Verify 1SD002E & F CLOSED • Verify MSIVs and MSIV bypass valves for 1B SG CLOSED • Check PORVs on intact (1A, 1C, & 1D) SGs available for RCS cool down • Check ruptured SG level - Narrow Range < 10% • Do not feed 1B SG per caution prior to step o Verify/close 1AF013B & F - should have already be closed in 1BwEP-0 OR 1BwEP-2
	CREW	• Determine ruptured SG pressure < 320 psig
		Transition to 1BwCA-3.1, 'SGTR WITH LOSS OF REACTOR COOLANT, - SUBCOOLED RECOVERY DESIRED'
	US	• Notify SM of plant status and procedure entry • Request evaluation of Emergency Plan conditions o Request STA evaluation of status trees • Enter/Implement 1BwCA-3.1 and direct operator actions of 1BwCA-3.1 to establish the following conditions

Comments: _____

_____

_____

_____

Scenario No:	**NRC 09-2**	Event No.	6 & 8
Event Description:	Faulted ruptured 1B SG		

Time	Position	Applicant's Actions or Behavior

	RO/BOP	• Reset SI
		  • Depress both SI reset pushbuttons
		  • Verify SI actuated permissive light – NOT LIT
		  • Verify auto SI blocked permissive light – LIT
		• Reset CNMT isolation
		  • Reset phase A isolation
		  • Check SAC – one running
		  • Open 1IA065 and 1IA066
		• Verify all AC buses energized by offsite power
		  • All 4 KV ESF buses energized
		  • All 4KV non-ESF buses energized
		  • All 6.9 KV buses energized
		• De-energize PZR Heaters
		  • Place all B/U heaters contactors to OFF
		  • Place variable heaters in NAT
		  o Consult with SM (TSC) for recommended minimum Prz level.
		• Check if CS should be stopped
		• CS pumps – NONE running
		• Check ruptured SG level
		  • 1B SG NR level < 10% - do not feed 1B SG per caution prior to step
		• Check if RH pumps should be stopped
		  • 1SI8812A & B open (aligned to RWST)
		  • RCS pressure > 325 psig and stable
		  • Stop both RH pumps and place in standby

		Note: At this point the scenario may be terminated

Final

Comments: _____

Simulation Facility Braidwood | Scenario No.: **NRC 09-3** | Operating Test No.:**2009-1**

Examiners: _____ Applicant: _____ SRO

_____ _____ RO

_____ _____ BOP

Initial Conditions: IC-21

Turnover: The unit is operating at 100% power, steady state, equilibrium xenon, Boron concentration is 800 ppm. U-0 Boric Acid Transfer pump is OOS. Rods are in manual due to rod control summing amplifier malfunction last shift. 1B HD pump has been OOS for the last 3 days for breaker refurbishment. Expected back in 6 days. Online risk is yellow.

Event No.	Malf. No.	Event Type*	Event Description
Preload	IMF RP14A IMF RP14B IMF MS01A 100 IMF MS01B 100 IMF MS01C 100 IMF MS01D 100 IMF CS01B MRF RP37 OUT TRGSET 1 ZDISIA1 = = 1 TRG 1 DMF RP14A TRGSET 2 ZDISIA1 = = 1 TRG 2 DMF RP14B TRGSET 3 ZDISIA2 = = 1 TRG 3 DMF RP14A TRGSET 4 ZDISIA2 = = 1 TRG 4 DMF RP14B IOR ZDI1HD01PB PTL IMF RX17 3.5		SI auto actuation failure (Train A) SI auto actuation failure (Train B) MSIV fail to close MSIV fail to close MSIV fail to close MSIV fail to close 1B CS pp failure K643 CS Trn A actuation relay failure 1B HD pp OOS Rod control failure
1	IMF RX01J 0 300	I-BOP, US TS-US	1D SG steam pressure channel fails low
2	IMF CV10 0 30	I-RO, US	1CV121 controller failure
3	IMF TH08 0.01	R-RO, US TS-US	High RCS activity requiring plant shutdown
4	IMF CV03	C-RO, US	Boric acid transfer pump trip
5	MS07C 4 0	M-ALL	Uncontrolled depressurization of all SGs
6	Preload	C-RO, US	Failure of SI to automatically actuate
7	Preload	C-BOP, US	Failure of both trains of CS to automatically actuate
8	DMF MS01D	C-ALL	1D MSIV closes

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

SCENARIO OVERVIEW

The unit is operating at 100% power, steady state, equilibrium xenon, Boron concentration is 800 ppm. Online risk is yellow. 1B HD pump has been OOS for the last 3 days for seal replacement. Expected back in 6 days. Rods are in manual due to rod control summing amplifier malfunction last shift.

About 2 minutes into the scenario, 1D SG steam pressure channel, 1PT-544, fails low. The crew should take actions to stabilize the plant per 1BwOA INST-2. Technical Specifications 3.3.2 and 3.3.4 apply.

After the 1D SG steam pressure failure has been addressed, 1CV121 Charging pump flow control valve controller 1FK-121 will fail to 0% demand. The 1CV121 valve will full close and pressurizer level will drop. The crew will take actions to stabilize the plant by taking manual control of the 1FK-121.

After the 1FK-121 failure has been addressed, a fuel element failure will be indicated by the VCT Cubicle and Gross Failed Fuel radiation monitors. The crew will implement 1BwOA PRI-4 and take actions accordingly. Technical Specification 3.4.16 applies. Technical Specification 3.4.15 applies if 1PR11J reaches the high alarm limit and isolates. A unit shutdown will be required. The crew should commence a power reduction.

During a boric acid addition, the Unit 1 Boric Acid pump motor bearing will seize while the pump is running. MCC 133X3, cubicle A4 will open, causing a trip of the Unit 1 Boric Acid Transfer Pump. The crew will stop the load reduction. The U-0 Boric Acid Transfer pump is OOS, and the crew will need to re-commence the ramp using rods only.

After a measurable change in power, a large fault will occur on the 1C MS line. While performing the actions of 1BwEP-0, the crew should note the failure of SI to automatically actuate. The crew should manually actuate SI. When containment pressure reaches 20 psig, Phase B actuates but the CS pumps do not start. The crew should manually realign train A CS valves which will start the 1A CS pump. Operators should transition to 1BwEP-2 and recognize that the MSIVs have failed to close and that an uncontrolled depressurization of all SGs is in progress. The crew should transition to 1BwCA-2.1 where they will throttle AF flow to the SGs. Entry into 1BwFR-H.1 will be required when the crew throttles AF flow to 45 gpm per SG, however, note in 1BwFR-H.1 directs the procedure not to be performed. The crew will continue in 1BwCA-2.1 until SI termination when the 1D MSIV will close and the crew will transition to 1BwEP-2. The crew will then isolate AF to the 1A, B & C SGs. Entry into 1BwFR-P.1 may be required as directed by the status trees.

Completion criteria is completion of 1BwEP-2.

Critical Tasks

1. Manually actuate Safety Injection prior to transition to 1BwEP-2 or past step 7.a of 1BwEP ES-0.1. (ERG Critical Task number - E-0--D) (K/A number - 000040AA1.01 importance - 4.6/4.6)
2. Manually actuate one train of containment spray prior to transition out of 1BwEP-0. (ERG Critical Task number - E-0--E) (K/A number - 013000A4.01 importance - 4.5/4.8)
3. Manually control AF flowrate to 45 gpm for each SG before orange path for integrity occurs. (ERG Critical Task number - ECA-2.1--A) (K/A number – 0WE12EA1.3 importance – 3.4/3.9)

SIMULATOR SETUP GUIDE:

- Verify/perform TQ-BR-201-0113, BRAIDWOOD TRAINING DEPARTMENT SIMULATOR EXAMINATION SECURITY ACTIONS CHECKLIST.
- Establish the conditions of IC-21, 100% power, steady state, equilibrium xenon.
- Complete items on Simulator Ready for Training Checklist.
- Verify/remove any Equipment Status Tags and Danger Tags not applicable to the scenario.
- Place simulator in RUN (allow simulator to run during board walk down and turnover).
- Place “Safety System Status Yellow” placard on 1PM05J
- **Place 1B HD pump in PTL and place info tag on 1B HD pump C/S.**
- **Place rod control to Manual**
- Run **caep “DEMO NRC 09-3 SETUP”** from disk and verify the following actuate:
    - **IMF RP14A**
    - **IMF RP14B**
    - **IMF MS01A 100**
    - **IMF MS01B 100**
    - **IMF MS01C 100**
    - **IMF MS01D 100**
    - **IMF CS01B**
    - **MRF RP37 OUT**
    - **TRGSET 1 ZDISIA1 = = 1**
    - **TRG 1 DMF RP14A**
    - **TRGSET 2 ZDISIA1 = = 1**
    - **TRG 2 DMF RP14B**
    - **TRGSET 3 ZDISIA2 = = 1**
    - **TRG 3 DMF RP14A**
    - **TRGSET 4 ZDISIA2 = = 1**
    - **TRG 4 DMF RP14B**
    - **IOR ZDI1HD01PB PTL**
    - **IMF RX17 3.5**
- Verify/Set ΔI Target Curve slopes to $\pm$2% of ΔI.
- Provide examinees with turnover sheets, 1BwOS NR-1and critical parameter sheet.

Event 1: 1D SG steam pressure channel fails low

Insert **IMF RX01J 0 300**

As SM acknowledge 1PT-544 failure, LCOAR entry, on line risk assessment, EAL evaluation, request for maintenance support, and IR request.

As SM, if requested support for tripping bistables, report that bistables are not to be tripped until work analyst and NSO support can be obtained (i.e. not at this time) and that the abnormal operating procedure should be continued. Bistable tripping will be conducted later**.**

Event 2: 1FK121 Controller failure

Insert **IMF CV10 0 30**

If dispatched as EO to investigate, wait two minutes and report no visible damage to 1CV121 Valve. Valve appears to be failed closed in auto and responding correctly in manual (if asked for feedback to manual ops).

Acknowledge as Shift Manager the failure, request for maintenance support, and IR request.

Event 3: High RCS activity requiring plant shutdown

Insert **IMF TH08 0.01**

As SM acknowledge high RCS activity, procedure entry, EAL review, TS entry, request for nuclear engineer, and shutdown required.

As Chemistry, acknowledge RCS sample request. 5 minutes after request to sample, give the following results: **This may need to be revised per TS amendment to LCO 3.4.16 if it is in effect.**
E(bar) = 1.7, DE I-131 = 50 µCi/gm, Gross Activity = 75 µCi/gm. Mixed bed decon factor is 65.

Acknowledge as chemistry/rad protection requests for RCS samples during shutdown (if required).

Acknowledge as Electric Ops initiation of ramp.

Event 4: Boric acid transfer pump trip

Note: Ensure a boration is in progress prior to inserting the next malfunction.

Insert **IMF CV03**

If dispatched as EO, report Unit 1 AB pump breaker at MCC 133X3 is tripped and does not appear to be damaged. If breaker re-closure is requested, report breaker is closed. DO NOT DELETE MALFUNCTION. If pump restart is attempted, report the breaker is open.

If dispatched as EO, report the Unit 1 AB pump bearing is hot and appears to be damaged.

If asked as SM about availability of U-0 boric acid transfer pump, report that the return to service will be expedited, however it may take several hours. Insist that the unit continue to ramp on rods only, until an AB transfer pump becomes available.

As SM, acknowledge the failure and requests for on line risk assessment, maintenance support, and IR initiation.

Event 5: Uncontrolled depressurization of all SGs/Auto SI, and CS failures

Insert **IMF MS07C 4 0**

Acknowledge as SM procedure changes, E Plan evaluations, and STA request.

After STA requested, as STA report CSF status: Red on heat sink when AF throttled to 45 gpm per SG, orange on integrity if RCS temperature < 240°F.

If dispatched as EO to investigate 1B CS pump, report ground overcurrent flag at breaker cubicle.

PERFORM THE FOLLOWING IMMEDIATELY <u>AFTER</u> AF IS THROTTLED TO 45 GPM PER SG

Event 8: 1D MSIV closes

- **DMF MS01D**

Acknowledge as SM procedure changes, E Plan evaluations, and STA request.

Scenario No:	**NRC 09-3**	Event No.	1
Event Description:	1D SG steam pressure channel fails low		

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator MS PRESS RATE STM LINE ISOL ALERT (1-15-E1) • Annunciator S/G 1D LOW PRESS STEAMLINE ISOL ALERT (1-15-D1) • Annunciator S/G 1D FLOW MISMATCH STM FLOW LOW (1-15-D3) o Annunciator S/G 1D LEVEL DEVIATION (1-15-D9) • S/G 1D feed flow and NR level lowering
	BOP	• Determine SG 1D feed flow and/or NR level lowering • Identify 1PI-544 indicates low steam pressure o Reference BwARs 1-15-D1/1-15-D3 as time permits
	CREW	• Identify entry conditions for 1BwOA INST-2, "OPERATION WITH A FAILED INSTRUMENT CHANNEL"
	US	• Implement 1BwOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL", Attachment F "STEAM PRESSURE CHANNEL FAILURE" and direct operator action o Notify SM of SG pressure channel failure o Notify SM to evaluate for Emergency Plan.

	BOP	• Stabilize 1D SG level at 1PM04J:
		  • Place 1FK-540, FW Reg Valve 1FW540 controller, in manual.
		  • Raise demand on 1FK-540 sufficiently to raise feedwater flow to restore 1D SG level.
		  • Operate 1FK-540 in manual to stabilize 1D SG level in the normal operating band.
		  • Verify 1PI-509 indicates approximately 215 psid to ensure adequate feedwater ΔP.
		  o Manually control FW pump speed to restore ΔP, if necessary.
		• Select operable steam flow channel.
		  • Place 1D SG steam flow channel select C/S to F-543.
		  • Establish automatic level control by placing 1FK-540 in auto.

Comments: _____

_____

_____

_____

Scenario No:	**NRC 09-3**	Event No.	1
Event Description:	1D SG pressure channel failed low		

Time	Position	Applicant's Actions or Behavior
	RO/BOP	• Perform the following: • Monitor reactor power at 1PM05J. • Reduce turbine load by initiating 5 MW ramp at OWS 211 or 210. • Assist US by making notifications. o Refer to BwARs as time permits.
		Note: The reactor may exceed 100% power during the secondary transient. The crew may choose to enter 1BwOA PRI-16 to lower reactor power. Steps for 1BwOA PRI-16 are in italics below.
	US	• Determines TS 3.3.2 conditions A and D are applicable. • Determines TS 3.3.4 condition A is applicable. (May determine Tech Spec applicability by referring to 1BwOSR 3.3.4.1, UNIT ONE REMOTE SHUTDOWN INSTRUMENTATION MONTHLY CHANNEL CHECKS) • Contact SM to perform risk assessment, initiate IR, and contact appropriate personnel to investigate/correct instrument failure.
		EVALUATOR NOTE: After the actions for SG pressure channel failure are complete and with lead examiners concurrence, enter next event.
	CREW	• *Identify entry conditions for 1BwOA PRI-16, "RESPONSE TO OVERPOWER CONDITION"*
	US	• *Implement 1BwOA PRI-16, "RESPONSE TO OVERPOWER CONDITION" and direct operator action.* • *Notify SM of procedure entry.*
	RO/BOP	• *Check Reactor trip setpoints not exceeded* • *PR NIs < 109%* • *DT < OTDT and OPDT setpoints*
	RO/BOP	• *Check Reactor Power <100%* • *PR NIs* • *10 min. Calorimetric computer point*
	RO/BOP	o *Reduce turbine load by initiating ramp at OWS 211 or 210.*
	US	• *Contact SM to perform risk assessment, initiate IR, and contact appropriate personel.*

Comments: _____

Scenario No:	**NRC 09-3**	Event No.	2
Event Description:	1CV121 controller fails low in auto		

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator 1-9-D3, CHG LINE FLOW HIGH LOW • Annunciator 1-9-A1, REGEN HX LTDWN TEMP HIGH • 1FK-121 controller output failed low. • 1FI-121A Charging Flow Indication dropping. • Pzr level indicators 1LI459A/460A/461 indicate lowering level.

	RO/ BOP	• Perform the following at 1PM05J:
		  • Determine loss of charging flow.
		  • Identify 1FK-121 is failing low.
		  • Report failure to US.

	CREW	o Reference BwARs o Isolate Letdown per BwAR direction. (the crew may elect to do this) • Recognize 1FK-121 output failed low. o Dispatch operator to investigate cause of failure.
		Note: The crew may elect to enter 1BwOA PRI-15, LOSS OF NORMAL CHARGING. Actions for 1BwOA PRI-15 are in italics below.
	US	• Direct/Ensure RO takes manual control of 1FK-121 and returns charging flow to normal. o Inform SM of FK-121 failure.

	RO	• Perform the following at 1PM05J:
		  • Place 1FK-121, 1CV121 Controller, in manual.
		  • Raise demand on 1FK-121.
		  • Monitor charging flow and pressurizer level and return level to normal.
		  • Maintain charging flow by operating 1FK-121 in manual.

	US	• Contact SM to perform risk assessment, initiate IR, and contact maintenance to investigate/correct instrument failure.
	US	o IF PZR pressure drops below 2209 psig, enter Tech Spec 3.4.1 condition A.
		Note: If crew elected to enter 1BwOA PRI-15, LOSS OF NORMAL CHARGING. Actions for 1BwOA PRI-15 are in italics below.

Comments: _____

Scenario No:	**NRC 09-3**	Event No.	2
Event Description:	1CV121 controller fails low in auto		
Time	Position	Applicant's Actions or Behavior	
	US	• *Notify Shift Manager of plant status and procedure entry.* o *Request evaluation of Emergency Plan conditions.* • *Implement 1BwOA PRI-15, LOSS OF NORMAL CHARGING, and direct operator actions of 1BwOA PRI-15 to establish the following conditions:*	
	RO	• *Perform the following at 1PM05J:* • *Check CV pump status:* • *Identify 1A CV pump is running.* • *Check indications of charging pumps NOT fluctuating.* • *Check CV valve alignment.* • *1CV8146 open* • *1CV8324A open* • *1CV8105 and 1CV8106 open* • *Check charging flow NOT established.* • *Throttle 1CV121 open by placing controller in manual and raising demand.* o *Re-establish letdown per 1BwOA ESP-2*	
		Note: If letdown was isolated, it must be restored before initiating the next event.	
		Initiate the next event when the lead examiner approves.	

Comments: _____

_____

_____

_____

Scenario No:	**NRC 09-3**	Event No.	3 & 4	
Event Description:	High RCS activity requiring plant shutdown/ AB transfer pump trip.			

Time	Position	Applicant's Actions or Behavior
	CUE	• High alarm on gross failed fuel rad monitor 1PR06J o High alarm on VCT cubicle rad monitor 1AR013J o High alarm on containment atmosphere monitor 1PR11J
	CREW	• Identify entry conditions for 1BwOA PRI-4, 'HIGH RCS ACTIVITY UNIT 1'
	US	• Notify SM of plant status and procedure entry • Request evaluation of Emergency Plan conditions • Enter/Implement 1BwOA PRI-4 and direct operator actions of 1BwOA PRI-4 to establish the following conditions:
	US	• Notify Chemistry to calculate DF for letdown mixed bed demineralizer • Notify Chemistry to sample for dose equivalent I-131 and noble gas activity • Notify Rad Protection to monitor aux building radiation
	RO/ BOP	• Verify high alarm on gross failed fuel rad monitor 1PR06J • Verify 120 gpm letdown flow

	US	• Consult station nuclear engineer for operational guidance
		• Refer to TS 3.4.16
		  • Determine conditions A & C applies – DE I-131 > 1 μCi/gm and gross radioactivity > 100/E-bar limit
		o Refer to TS 3.4.15
		  o Determine condition B applies if 1PR11J status changes to dark blue
		• Determine unit shutdown required
		o Check letdown demin DF acceptable per Chemistry Procedure

Comments: _____

Scenario No:	**NRC 09-3**	Event No.	3
Event Description:	High RCS activity requiring plant shutdown		

Time	Position	Applicant's Actions or Behavior
	US	• Implement actions of 1BwGP 100-4 • Perform pre-job brief per HU-AA-1211 "PRE-JOB, HEIGHTENED LEVEL OF AWARENESS, INFREQUENT PLANT ACITIVITY, AND POST JOB BRIEFINGS" for load ramp.
	US	• Direct plant shutdown o Initiate power reduction flow chart, 1BwGP 100-4T1 o Initiate rapid power reduction flow chart, 1BwGP 100-4T3 o Initiate load swing instruction sheet, 1BwGP 100-4T2 o If requested, nuclear engineer will obtain reference reactivity data
	CREW	o Review applicable Precautions, Limitations and Actions of 1BwGP 100-4
		Note: The boric acid transfer pump will trip during the boration.
	RO	• Verify rod position and boron concentration • Initiate boration, if required. (BwOP CV-6) • Determine required boric acid volume approximate band: approx 234-345 gal) o Reactivity Maneuver (ReMa) Form • Determine desired boric acid flow rate • Set 1FK-110 BA Flow Control to desired boration rate • Set 1FY-0110 BA Blender Predet Counter to desired volume. • Place MAKE-UP MODE CONT SWITCH to STOP position • Place MODE SELECT SWITCH to BORATE position • Place MAKE-UP MODE CONT SWITCH to START • Verify proper operation of valves and BA transfer pump (1CV110B open, Boric Acid Transfer Pump running, 1CV110A throttles open, proper BA flow indicated on recorder). o Turn on PZR backup heaters in accordance with BwOP RY-13, PRESSURIZER BACKUP HEATER OPERATION. OR

Comments: _____

Scenario No:	**NRC 09-3**	Event No.	3 & 4
Event Description:	High RCS activity requiring plant shutdown/ AB transfer pump trip.		
Time	Position	Applicant's Actions or Behavior	
	RO	Batch addition of Boric Acid: • Open 1CV110B • Open 1CV110A • Start the BA Transfer pump • When desired amount of BA has been added (or AB pump trips), stop the BA Transfer Pump • Close 1CV110A • Close 1CV110B	
		Note: When AB transfer pumps trips, RO must manually insert control rods for reactivity control prior to initiating next event.	
	BOP	• Lower turbine load at 1PM02J or Operator Work Station drop 210 (DEH computer terminal located behind Unit 1 desk) by performing the following: • Select SETPOINT. • Enter MW value that is below current value in REF window into REF DEMAND window. • Select ENTER. • Enter desired MW/min into the RATE window. • Select ENTER. • Select EXIT. o Notify US and RO of pending ramp. • Select GO/HOLD. • Verify GO/HOLD button illuminates. • Verify HOLD illuminated RED. • Select GO. • Verify GO illuminates RED. • Verify main turbine load begins to lower.	
	RO/ BOP	• Monitor reactor power and load reduction • Monitor NI's, Tave, ΔI, Pzr press/level • Monitor MWe, Turb loading, EHC	
		When lead examiner concurs, initiate the next event.	

Comments: _____

Scenario No:	**NRC 09-3**	Event No.	4
Event Description:	Boric acid transfer pump trip		
Time	Position	Applicant's Actions or Behavior	
	CUE	o (If boration was done in batch mode) o Annunciator BA XFER PUMP TRIP (1-9-A4) o Trip/yellow disagreement light on Boric Acid Transfer pump 1 + 0 C/S o (If boration was done in borate mode) o Boric acid flow stops o Annunciator BA FLOW DEVIATION (1-9-A6)	
	RO	• Identify/report trip of Unit 1 Boric Acid Transfer pump • Refer to BwAR 1-9-A4 • Dispatch operator to Unit 1 Boric Acid Transfer pump and breaker	
	US	• Notify SM of Unit 1 Boric Acid Transfer pump trip. o Direct BOP to stop load ramp	
	BOP	o Stop turbine load ramp o Select GO/HOLD. o Assist US & RO o Refer to BwARs o Dispatch operators	
	RO	• Determine Unit 1 Boric Acid Transfer pump bearing is damaged • Report from EO o MAKE-UP MODE CONT SWITCH to STOP • Place Boric Acid Transfer pump 1 + 0 C/S in PULL OUT o Close 1CV110A o Close 1CV110B	
	US	o Contact SM to perform risk assessment, initiate IR, and contact maintenance to investigate/correct component. o Recommence ramp using rods only.	
	BOP	o Initiate turbine load reduction: o When ready to begin load reduction, depress GO o Verify load reduction occurring	

Comments: _____

	RO/ BOP	• Monitor reactor power and load reduction
		  • Monitor NI's, Tave, ΔI, Pzr press/level
		  • Monitor MWe, Turb loading, EHC

	RO	• Maintain Tave/Tref within desired band: • At 1PM05J – insert rods manually at desired intervals.
		NOTE: After the actions for boric acid pump trip are complete and with lead examiners concurrence, enter next event

Comments: _____

_____

_____

_____

_____

Scenario No:	**NRC 09-3**	Event No.	5, 6 & 7
Event Description:	Steam leak inside containment/uncontrolled depressurization of all SGs		
Time	Position	Applicant's Actions or Behavior	
	CUE	• Annunciator STEAM LINE LOW PRESS SI/RX TRIP (1-11-D1) • Annunciator S/G 1D LOW PRESS STEAMLINE ISOL ALERT (1-15-D1) • Rx Trip breakers open	
	US	• Notifies SM of plant status and procedure entry o Requests evaluation of Emergency Plan conditions • Enter/Implement 1BwEP-0 and direct operator actions of 1BwEP-0	
	RO	Perform immediate operator actions of 1BwEP-0: • Verify reactor trip • Rod bottom lights - ALL LIT • Reactor trip & Bypass breakers - OPEN • Neutron flux - DROPPING	
	BOP	Perform immediate operator actions of 1BwEP-0: • Verify Turbine Trip • All Turbine throttle valves – CLOSED • All Turbine govenor valves – CLOSED	
	BOP	Perform immediate operator actions of 1BwEP-0: • Verify power to 4KV busses • ESF Buses – BOTH ENERGIZED	
	RO **[CT]** **E-0--D**	Perform immediate operator actions of 1BwEP-0: • Check SI status • Annunciator CNMT PRESS HIGH SI/RX TRIP (1-11-E1) – LIT • Manually actuate SI	
	US	• Direct BOP to perform Attachment B of 1BwEP-0	
		EVALUATOR NOTE: US and RO will continue in 1BwEP-0 while BOP is performing Attachment B:	

Comments: _____

Scenario No:	**NRC 09-3**	Event No.	5
Event Description:	Steam leak inside containment/uncontrolled depressurization of all SGs		

Time	Position	Applicant's Actions or Behavior

	BOP	• Verify FW isolated at 1PM04J:
		  • FW pumps – TRIPPED.
		  • Isolation monitor lights – LIT.
		  • FW pumps discharge valves - CLOSED (or going closed) 1FW002A-C.
		• Verify DGs running at 1PM01J:
		  • DGs – BOTH RUNNING.
		  • 1SX169A/B OPEN.
		  • Dispatch operator locally to check operation
		• Verify Generator Trip at 1PM01J:
		  • OCB 1-8 and 7-8 open.
		  • PMG output breaker open.
		• Trip all running HD pumps.
		• Verify Control Room ventilation aligned for emergency operations at 0PM02J:
		  • VC Rad Monitors – LESS THAN HIGH ALARM SETPOINT.
		  • Operating VC train equipment – RUNNING.
		  • 0B Supply fan
		  • 0B Return fan
		  • 0B M/U fan
		  • 0B Chilled water pump
		  • 0B Chiller
		  • Operating VC train dampers – ALIGNED.
		  • M/U fan outlet damper – 0VC08Y NOT FULLY CLOSED.
		  • 0B VC train M/U filter light – LIT.
		  • 0VC09Y - OPEN
		  • 0VC313Y - CLOSED
		  • Operating VC train Charcoal Absorber aligned for train B.
		  • 0VC44Y - CLOSED
		  • 0VC05Y - OPEN
		  • 0VC06Y - OPEN
		  • Control Room pressure greater than +0.125 inches water on 0PDI-VC038.

Comments: _____

Scenario No:	**NRC 09-3**	Event No.	5
Event Description:	Steam leak inside containment/uncontrolled depressurization of all SGs		

Time	Position	Applicant's Actions or Behavior

		• Verify Auxiliary Building ventilation aligned at 0PM02J:
		  • Two inaccessible filter plenums aligned.
		  • Plenum A:
		  • 0VA03CB - RUNNING
		  • 0VA023Y - OPEN
		  • 0VA436Y - CLOSED
		  • Plenum C:
		  • 0VA03CF RUNNING
		  • 0VA072Y - OPEN
		  • 0VA438Y - CLOSED
		• Verify FHB ventilation aligned at 0PM02J:
		  • 0VA04CB - RUNNING
		  • 0VA055Y - OPEN
		  • 0VA062Y - OPEN
		  • 0VA435Y – CLOSED
		• Notify US Attachment B complete

	RO/ BOP	• Verify ECCS pumps running
		  • Both CV pumps - RUNNING
		  • Both RH pumps - RUNNING
		  • Both SI pumps - RUNNING

	RO/ BOP	• Verify RCFC's running in Accident Mode - Group 2 RCFC Accident Mode lights - LIT
		• Verify Phase A isolation - Group 3 Cnmt Isol monitor lights - LIT
		• Verify Cnmt Vent isolation - Group 6 Cnmt Vent Isol monitor lights - LIT
		• Verify AF system:
		  • AF pumps – BOTH RUNNING
		  • AF isolation valves – OPEN
		  • 1AF13A-H
		  • AF flow control valves - THROTTLED
		  • 1AF005A-H
		• Verify CC pumps – BOTH RUNNING
		• Verify SX pumps- -BOTH RUNNING

Comments: _____

Scenario No:	**NRC 09-3**	Event No.	5
Event Description:	Steam leak inside containment/uncontrolled depressurization of all SGs		

Time	Position	Applicant's Actions or Behavior

	RO/ BOP	• Check Main Steamlines Should Be Isolated
		  • CNMT pressure > 8.2 psig
		• Verify MS isolation
		  • MSIV's open
		• Manually actuate MS isolation
		  • MSIV's remain open

	BOP/ RO	• Check if CS is required
		  • CNMT pressure > 20 psig
		  • Group 6 CS monitor lights – NOT ALL LIT
		  • Manually actuate CS and Phase B Isolation
		  • Group 6 CS monitor lights remain – NOT ALL LIT, Go to attachment C

		Note: RCPs may be stopped by crew any time after recognizing a Phase B isolation has occurred.
	US	• Implement 1BwEP-0, Attachment C, MANUAL CS ACTUATION

Comments: _____

Scenario No:	**NRC 09-3**	Event No.	8
Event Description:	Failure of both trains of CS to automatically actuate		

Time	Position	Applicant's Actions or Behavior

	RO/ BOP **[CT] E-0--E**	• Check CS alignment
		  • Check 1CS001A - OPEN
		  • Check 1CS007A - OPEN
		  • Manually open 1CS007A
		  • Check 1CS019A - OPEN
		  • Place 1A CS pump test switch in test
		  • Manually open 1CS019A
		  • Place 1A CS pump test switch in normal
		  • Check 1CS010A – OPEN
		• Check CS pumps – AT LEAST ONE RUNNING
		  • 1A CS pump running
		  o Place 1B CS pump in PTL

	US	• Return to main body, step 14.c.

	RO/ BOP	• Check if CS is required
		  • Group 6 phase B monitor lights – ALL LIT
		  • Verify/Stop all RCPs (may have been done previously)
		  • Check CS eductor suction flow – 1FI-CS013 > 15 gpm
		  • Check CS eductor additive flow – 1FI-CS015 > 5 gpm

	RO/ BOP	• Verify Total AF flow:
		  • AF flow > 500 gpm
		  • Control feed flow to maintain NR level 31% - 50%
		  • Check status of S/G NR levels – not rising in an uncontrolled manner

	RO/ BOP	• Verify ECCS valve alignment • Group 2 Cold Leg Injection monitor lights required for injection - LIT

Comments: _____

Scenario No:	**NRC 09-3**	Event No.	5
Event Description:	Steam leak inside containment/uncontrolled depressurization of all SGs		

Time	Position	Applicant's Actions or Behavior
	RO/ BOP	• Verify ECCS flow • High Head SI flow >100 gpm (1FI-917) • RCS pressure < 1700 psig • SI pump flow > 200 gpm • RCS pressure > 325 psig
	RO	• Check PZR PORVs and SPRAYs: • PORVs CLOSED. • PORV isolation valves – 1RY8000A and 1RY8000B ENERGIZED • PORV relief paths – PORVs in AUTO, PORV isolation valves OPEN • Normal Spray valves CLOSED.
	RO	• Maintain RCS temperature control • Check RCP's – NONE RUNNING • RCS Tcold temperature is NOT stable at or trending to 557^{o} • Stop dumping steam • Throttle AF flow while maintaining > 500 gpm • MSIV's open – verify closed (will not close)
	RO/ BOP	• Check status of RCP's • RCP's – NONE RUNNING
	CREW	Determine status of SG secondary pressure boundary: • Check if SG secondary pressure boundaries are intact: • All SG pressures dropping in an uncontrolled manner

Comments: _____

Scenario No:	**NRC 09-3**	Event No.	5
Event Description:	Steam leak inside containment/uncontrolled depressurization of all SGs		
Time	Position	Applicant's Actions or Behavior	
	CREW	Transitions to 1BwEP-2, 'FAULTED STEAM GENERATOR ISOLATION'	
	US	• Notifies SM of plant status and procedure entry • Requests evaluation of Emergency Plan conditions • Request STA evaluation of status trees • Enter/Implement 1BwEP-2 and direct operator actions of 1BwEP–2 to establish the following conditions	
	RO/ BOP	• Check MS isolation • MSIVs remain open	

	CREW	• Check if any secondary pressure boundary intact
		  • No SG pressure stable or rising
		  • All SG depressurizing in an uncontrolled manner
		• GO TO 1BwCA-2.1, 'UNCONTROLLED DEPRESSURIZATION OF ALL SGs'	

		Examiner note: Throttling AF flow to 45 gpm per SG will result in a red path on the heat sink status tree and require transition to 1BwFR-H.1, 'RESPONSE TO LOSS OF SECONDARY HEAT SINK'. 1BwFR-H.1 will be entered and immediately exited due to operator action lowering AF flow to < 500 gpm.	

Comments: _____

Scenario No:	**NRC 09-3**	Event No.	5
Event Description:	Steam leak inside containment/uncontrolled depressurization of all SGs		

Time	Position	Applicant's Actions or Behavior
	CREW	Transitions to 1BwCA-2.1, 'UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS'
	US	• Notifies SM of plant status and procedure entry • Requests evaluation of Emergency Plan conditions • Enter/Implement 1BwCA-2.1 and direct operator actions of 1BwCA–2.1 to establish the following conditions

	RO/ BOP	• Check secondary pressure boundary
		  • MSIVs open – attempt to close w/control switch (may have been previously tried)
		  • MSIV bypass valves – CLOSED
		  • SG PORVs – CLOSED
		  • Check FW isolation monitor lights – LIT
		  • Check 1SD002A-H – CLOSED
		  • Check 1SD005A-D – CLOSED

	RO/ BOP **[CT] ECA-2.1--A**	• Control feed flow to minimize RCS cooldown
		  • Throttle AF to 45 gpm per SG
		  • Check hot leg temperatures – Stable or Dropping
		  • Check RCPs –NONE RUNNING
		  • Check Pzr PORVs and Isolation Valves
		  • PORV Isolation Valves – BOTH Energized and Open
		  • PORVs – BOTH Closed

		Note: When the crew recognizes 1D SG MSIV has closed and pressure is rising in the 1D SG. Transition is made back to 1BwEP-2 per the OAS.

	RO/ BOP	• Check Secondary Radiation
		  • Reset Phase A
		  • Open 1SD005A-D
		  • Check secondary radiation trends on RM-11 Or HMI – ALL Normal

Comments: _____

Scenario No:	**NRC 09-3**	Event No.	5
Event Description:	Steam leak inside containment/uncontrolled depressurization of all SGs		

Time	Position	Applicant's Actions or Behavior
	RO/ BOP	• Check If RH Pumps Should Be Stopped • RH Pumps – BOTH Running o RCS pressure >325 and stable or rising o Reset SI and Secure RH pps RCS pressure < 325 psig – Go to step 7
	RO/ BOP	• Check if CS Should be Isolated • CS Pumps – BOTH Running o CS Add Tank LO-2 lights LIT **and** CNMT pressure <15 psig o Secure CS pumps and close 1CS007A/B and 1CS019A/B valves o CS Add Tank LO-2 lights NOT LIT **or** CNMT pressure >15 psig o Go to step 8
		• Check RWST Level > 46% • Check RCS pressure > 125 psig
		• Check if ECCS Flow Should be Reduced • Subcooling – ACCEPTABLE • RCS Pressure stable or Rising • Pzr Level > 28%
		Note: By this point the crew should recognize 1D MSIV has closed and pressure is rising in the 1D SG. **If the crew has not recognized 1D MSIV has closed, the drill may be terminated at this point.**
	CREW	Transitions to 1BwEP-2, 'FAULTED STEAM GENERATOR ISOLATION'
	US	• Notifies SM of plant status and procedure entry o Requests evaluation of Emergency Plan conditions • Enter/Implement 1BwEP-2 and direct operator actions of 1BwEP–2 to establish the following conditions
	RO/ BOP	• Check MS isolation • 3 MSIVs remain open
	CREW	• Check if any secondary pressure boundary intact

Comments: _____

Scenario No:	**NRC 09-3**	Event No.	5
Event Description:	Steam leak inside containment/uncontrolled depressurization of all SGs		

Time	Position	Applicant's Actions or Behavior
		• Recognize 1D SG pressure is stable or rising.
	RO/ BOP	• Identify Faulted SGs • Recognize 1A, 1B & 1C SG pressure is lowering.
	RO/ BOP	• Isolate the faulted SGs • CLOSE 1AF013A, B, C, E, F & G
		Note: At this point the scenario may be terminated.

Comments: _____

Simulation Facility Braidwood | Scenario No.: **NRC 09-4** | Operating Test No.:**2009-1**

Examiners: _____ Applicant: _____ SRO

_____ _____ RO

_____ _____ BOP

Initial Conditions: IC-16

Turnover: Unit 1 is operating at 51% power, steady state, equilibrium xenon, Boron concentration is 742 ppm. Online risk is yellow. 1B RH pump has been OOS for breaker work for the past 10 hours. LCO 3.5.2 has been entered. Expect 1B RH pump back in 48 hours. Following completion of turnover, the crew is to perform 1BwOS MS-Q1, UNIT 1 MAIN STEAM DUMP VALVE STROKE SURVEILLANCE. Power Team has requested Unit 1 be prepared to raise power to 880 MW at 0.6 MW/min due to grid demand following completion of 1BwOS MS-Q1. 1CV111B BORIC ACID BLNDR TO VCT VLV is OOS for solenoid replacement.

Event No.	Malf. No.	Event Type*	Event Description
Preload	IOR ZDI1RH01PB PTL IMF RP01 IOR ZDIRT2 NORMAL IMF RD05G13 15 IMF RD05H12 15 IMF RD05H14 8 IMF RD05J13 25 IMF EG08A IMF EG08B IOR ZDI1CV111B CLS IOR ZDO1CV111B(1) OFF IOR ZDO1CV111B(2) OFF		1B RH pump OOS Failure of Rx to auto trip Failure of Rx Trip switch on 1PM05J stuck rod stuck rod stuck rod stuck rod 1A DG failure 1B DG failure 1CV111B OOS
1	None	N-BOP, US	Steam Dump Valve Stroke Surv.
2	None	R-RO, US	Raise power at 0.6 Mw/Min, Alt. Dilute only
3	IMF RX18H, 650 IMF RX18L, 650	I-RO, US TS-US	Loop 4 Thot RTD fails high
4	None	TS-US	1SA032, containment isol.valve fails stroke time test
5	IOR ZDI1HSTG010 TRIP Preload	C-RO, US	Inadvertent turbine trip, failure of auto Rx trip
6	Preload	C-RO, US	four stuck rods
7	IMF ED15C		Loss of Offsite Power
8	Preload	M-ALL	EDGs fail to start resulting in a loss of all AC power

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

SCENARIO OVERVIEW

Unit 1 is operating at 51% power, steady state, equilibrium xenon, Boron concentration is 742 ppm. Online risk is yellow. 1B RH pump has been OOS for breaker work for the past 10 hours. LCO 3.5.2 has been entered. Expect 1B RH pump back in 48 hours. Following completion of turnover, the crew is to perform 1BwOS MS-Q1, UNIT 1 MAIN STEAM DUMP VALVE STROKE SURVEILLANCE using the step 2, full stroke test method. The Field Supervisor and Equipment Operators have been briefed and are standing by at the steam dump isolation valves. Power Team has requested Unit 1 be prepared to raise power to 880 MW at 0.6 MW/min due to grid demand following completion of 1BwOS MS-Q1.

After completing shift turnover and relief, the BOP will perform 1BwOS MS-Q1, UNIT 1 MAIN STEAM DUMP VALVE STROKE SURVEILLANCE.

After completing 1BwOS MS-Q1, the crew will raise power to 880 MW @ 0.6 MW/min due to grid demand.

After a measurable change in power, Loop 4 Thot fails high, resulting in demanded rod inward motion. The crew should take actions to stabilize the plant per 1BwOA INST-2. Technical Specifications 3.3.1 applies.

After the RTD failure has been addressed, an extra NSO will inform the US that 1SA032 valve failed its stroke time test. Tech Spec 3.6.3 applies.

Once the above actions have been taken, a trip of the main turbine will occur. The reactor does not automatically trip and the manual trip switch at 1PM05J is disabled. The crew should trip the reactor from 1PM06J and complete immediate actions of 1BwEP-0. When the reactor trips, one control bank rod and three shutdown bank rods will not fully insert. The crew will transition to 1BwEP ES-0.1 and initiate emergency boration for the stuck rods. Once the crew has initiated emergency boration, a loss of all offsite power will occur. The EDGs will not start resulting in a loss of all AC power to the unit. Transition will be made to 1BwCA-0.0. **The crew must restore power to Unit 1 within 10 minutes**. After power is restored to Bus 141, a transition will be made to either 1BwCA-0.1 or 1BwCA-0.2.

Completion criteria The scenario ends following transition to 1BwCA-0.1 or 1BwCA-0.2.

Critical Tasks

1. Perform a manual reactor trip at 1PM06J before transition out of 1BwEP-0.
   (ERG Critical Task number - E-0--A) (K/A number - 000029EA1.08 importance - 4.5/4.5)
2. Cross-tie an ESF bus to opposite unit within 10 minutes of Loss of All AC.
   (10CFR50.63 section (c)(2)) (K/A number - 000055EA2.03 importance – 3.9/4.7)
3. Isolate RCP seal injection before a CV pump is started.
   (ERG Critical Task number - ECA-0.0--H) (K/A number - 003000A4.01 importance - 3.3/3.2)

SIMULATOR SETUP GUIDE:

- Verify/perform TQ-BR-201-0113, BRAIDWOOD TRAINING DEPARTMENT SIMULATOR EXAMINATION SECURITY ACTIONS CHECKLIST.
- Establish the conditions of IC-16, 51% power, steady state, equilibrium xenon.
- Complete items on Simulator Ready for Training Checklist.
- Verify/remove any Equipment Status Tags and Danger Tags not applicable to the scenario.
- Place simulator in RUN (allow simulator to run during board walk down and turnover).
- Run **caep NRC 09-4 SETUP** from disk and verify the following actuate:
    - **IOR ZDI1RH01PB PTL**
    - **IMF RP01**
    - **IOR ZDIRT2 NORMAL**
    - **IMF RD05G13 15**
    - **IMF RD05H12 15**
    - **IMF RD05H14 8**
    - **IMF RD05J13 25**
    - **IMF EG08A**
    - **IMF EG08B**
    - **IOR ZDI1CV111B CLS**
    - **IOR ZLO1CV111B1 OFF**
    - **IOR ZLO1CV111B2 OFF**
- Place 1B RH pump in PTL and place a info tag on the 1B RH pump control switch.
- Place INFO card on 1CV111B C/S stating valve is de-energized for solenoid replacement.
- Place PZR backup heaters in AUTO.
- Update PARAGON to reflect 1B RH pump OOS and place YELLOW on line risk placard.
- Provide examinees with turnover sheets, 1BwOS NR-1 and critical parameter sheet.

Event 1: Perform 1BwOS MS-Q1.

When requested, as Equipment Operator report you are standing by at the steam dump isolation valves ready to isolate the steam dumps and condenser spray valves.

Note: valve positions can be monitored from SIM Graphic Display FW1 and MS6

Acknowledge as EO request to locally close 1MS003A-M and 1CB038A-M / 1CB006, then run **CAEP NRC 09-4 to CLOSE valves EVENT 1** from disk and verify the following:

- **MRF MS09 0**
- **MRF MS10 0**
- **MRF MS11 0**
- **MRF MS12 0**
- **MRF MS13 0**
- **MRF MS14 0**
- **MRF MS15 0**
- **MRF MS16 0**
- **MRF MS17 0**
- **MRF MS18 0**
- **MRF MS19 0**
- **MRF MS20 0**
- **MRF FW001 0**
- **MRF FW002 0**
- **MRF FW003 0**
- **MRF FW004 0**
- **MRF FW005 0**
- **MRF FW006 0**
- **MRF FW007 0**
- **MRF FW008 0**
- **MRF FW009 0**
- **MRF FW010 0**
- **MRF FW011 0**
- **MRF FW012 0**

Report as EO that 1MS003A-M and 1CB038A-M / 1CB006 are locally closed.

Acknowledge as EO request to locally open 1MS003A-M and 1CB038A-M / 1CB006, then run **CAEP NRC 09-4 to OPEN valves EVENT 1** from disk and verify the following:

- **MRF MS09 100**
- **MRF MS10 100**
- **MRF MS11 100**
- **MRF MS12 100**
- **MRF MS13 100**
- **MRF MS14 100**
- **MRF MS15 100**
- **MRF MS16 100**
- **MRF MS17 100**
- **MRF MS18 100**

- **MRF MS19 100**
- **MRF MS20 100**
- **MRF FW001 100**
- **MRF FW002 100**
- **MRF FW003 100**
- **MRF FW004 100**
- **MRF FW005 100**
- **MRF FW006 100**
- **MRF FW007 100**
- **MRF FW008 100**
- **MRF FW009 100**
- **MRF FW010 100**
- **MRF FW011 100**
- **MRF FW012 100**

Report as EO that 1MS003A-M and 1CB038A-M / 1CB006 are locally open.

Acknowledge as Shift Manager commencement and completion of procedure.

Event 2: Raise power at 0.6 MW/min

As Shift Manager, contact the MCR and request Unit 1 raise power to 880 MW at 0.6 MW/min due to grid demand.

Acknowledge as chemistry/rad protection requests for RCS samples (if required).

Acknowledge as TSO initiation of ramp.

Event 3: Loop 4 Thot 2 RTD fails high

Run **caep NRC 09-4 EVENT 3** from disk and verify the following actuate:

- **IMF RX18H 650**
- **IMF RX18L 650**

Acknowledge as SM entry into TS 3.3.1, conditions A and E entry, request for NSO's, on line risk assessment(yellow), request for maintenance support, and IR requests.

As SM, if requested support for tripping bistables, report that bistables are not to be tripped until work analyst /NSO support can be obtained (i.e. not at this time) and that the abnormal operating procedure should be continued. Bistable tripping will be conducted later.

FOLLOWING COMPLETION OF THE SCENARIO, VERIFY/RESTORE THE FOLLOWING COMPUTER POINTS:

- **T0460**
- **T0462**

Event 4: 1SA032 fails its stroke time test

As an extra NSO, deliver 1BwOSR 3.6.3.5.SA-1 surveillance to the US for review.

Acknowledge as SM entry into TS 3.6.3 Condition A, request for maintenance support, and IR requests.

If requested for support to isolate the failed containment penetration with a manual isolation valve, report 1SA155 manual isolation valve is already closed in its normal position.

Events 5 & 6: Inadvertent turbine trip/auto reactor trip failure with four stuck rods/loss of offsite power/loss of all AC power

Insert: **IOR ZDI1HSTG010 TRIP** for inadvertent turbine trip.

Acknowledge as SM procedure changes, E Plan evaluations, request for SDM calculation, and STA request.

Events 7 & 8: Loss of offsite power/loss of all AC power

Verify the crew has initiated emergency boration prior to initiating the next event

Insert: **IMF ED15C**

Record time loss of all AC power occurred: _____:_____:_____

Record time AC power restored to Unit 1: _____:_____:_____

Calculate time to restore AC power: _____:_____:_____

Record time bus 142 restored _____:_____:_____

Acknowledge as SM procedure changes, E Plan evaluations, request for SDM calculation, and STA request.

After STA requested, as STA report CSF status – Yellow on inventory if pressurizer level < 17%.

When requested as EO to start the U1 D/Gs report that 1A D/G is seized and 1B D/G tripped on loss of control power. 1BwOA ELEC-3 was ineffective.

Acknowledge as EO request to depress U1 DG emergency stop push buttons and insert the following:

- **MRF EG19 TRIP**
- **MRF EG20 TRIP**

As Unit 2 operator, acknowledge request to perform 2BwCA-0.3, report both Unit 2 4KV ESF buses powered from Unit 2 SATs, and acknowledge request to monitor crosstie current as loads are started.

After loss of all AC power perform 2BwCA 0.3 then: Insert the following to perform crosstie:

- **MRF ED006 CLOSE** (closes 2414 brk)
- **MRF ED007 CLOSE** (closes 2424 brk)

Acknowledge as EO request to close 1CV8384A & B and insert the following to isolate the seal injection filters:

- **MRF CV41 0**
- **MRF CV42 0**

Acknowledge as EO request to isolate CC surge tank auto makeup and insert the following to isolate CC surge tank makeup:

- **MRF CC51 0**
- **MRF CC52 0**

Acknowledge as EO request to drain CC surge tank to normal level and insert the following as needed to initiate CC surge tank drain:

- **MRF CC15 100**
- **MRF CC16 100**

FOLLOWING COMPLETION OF THE SCENARIO, VERIFY/RESTORE THE FOLLOWING COMPUTER POINTS:

- **T0460**
- **T0462**

Scenario No:	**NRC 09-4**	Event No.	1
Event Description:	Perform 1BwOS MS-Q1		

Time	Position	Applicant's Actions or Behavior
	CUE	o From turnover, perform 1BwOS MS-Q1, UNIT 1 MAIN STEAM DUMP VALVE STROKE SURVEILLANCE.
	US	• Direct BOP to perform 1BwOS MS-Q1.

	BOP	• Refer to 1BwOS MS-Q1.
		• Record initial data on step F.1.2.
		• Notify Equipment Operator to locally close 1MS003A thru M and 1CB038A thru M or 1CB006.
		o Acknowledge report from EO that requested valves are closed.
		• Perform the following at 1PM02J:
		  • Place 1PK-507 controller in MANUAL.
		  • Verify the controller demand is 0%.
		  • Place steam dump MODE SELECT switch in STM PRESS position.
		  • Verify 1MS004A-M CLOSED lamps are illuminated.
		  • Raise 1PK-507 controller steam pressure demand to 100%.
		  • Verify 1MS004A-M CLOSED lamps are NOT illuminated.
		  • Verify 1MS004A-M OPEN lamps are illuminated.
		  • Lower 1PK-507 controller steam pressure demand to 0%.
		  • Verify 1MS004A-M OPEN lamps are NOT illuminated.
		  • Verify 1MS004A-M CLOSED lamps are illuminated.
		• Notify Equipment Operator to locally open 1MS003A thru M and 1CB038A thru M or 1CB006.
		o Acknowledge report from EO that requested valves are open.
		• At 1PM05J, verify C7 bypass permissive light is NOT illuminated.
		• Perform the following at 1PM02J:
		  • Place steam dump MODE SELECT switch in RESET then TAVE position.
		  • Verify all steam dump valves remain closed.
		  • Place 1PK-507 controller in AUTO.
		• Inform US 1BwOS MS-Q1 complete.

	US	• Acknowledge report. o Notify SM 1BwOS MS-Q1 is complete.

Comments: _____

_____

_____

_____

Scenario No:	**NRC 09-4**	Event No.	1
Event Description:	Perform 1BwOS MS-Q1		
Time	Position	Applicant's Actions or Behavior	
		EVALUATOR NOTE: After 1BwOS MS-Q1 is complete and with lead examiner concurrence, enter next event.	

Comments: _____

Scenario No:	**NRC 09-4**	Event No.	2
Event Description:	Raise power at 0.6 MW/min		

Time	Position	Applicant's Actions or Behavior
	CUE	o Call from Transmission System Operations to raise power to 880 MW at 0.6 Mw/min.
	US	• Acknowledge request to raise power to 880 MW at 0.6 Mw/min. o Perform pre-job brief per HU-AA-1211 "PRE-JOB, HEIGHTENED LEVEL OF AWARENESS, INFREQUENT PLANT ACITIVITY, AND POST JOB BRIEFINGS" for load ramp.
	US	• Direct raising load to 880 MW at 0.6 MW/min. • Initiate load swing instruction sheet, 1BwGP 100-4T2.
	CREW	• Review applicable Precautions, and Limitations and Actions

	RO	• Verify rod position and boron concentration.
		• Initiate dilution, if required (BwOP CV-5)
		• Determine required PW volume: (approximate band: 2500 gal – 3000 gal)
		  o Effects of previously performed dilutions
		  o Braidwood Boration Dilution Tables
		• Determine required PW flow rate.
		• Set 1FK-111 PW Flow Cont to desired PW flow rate.
		• Set 1FY-0111 PW/Total Predet Counter to desired PW volume.
		• Place MAKE-UP CONT SWITCH to STOP position.
		• Set MODE SELECT to DIL/ALT DIL position.
		• Place MAKE-UP CONT Switch to START
		o Verify proper operation of valves and PW makeup pump, 1CV111A throttled, 1CV110B open (ALT DIL only), PW pump running, PW flow on recorder)
		o Turn on PZR backup heaters in accordance with BwOP RY-13, PRESSURIZER BACKUP HEATER OPERATION.
		
		OR
		Batch addition of PW:
		• Open CV110B.
		• Open CV111A.
		When desired amount of primary water added:
		• Close CV110B.
		• Close CV111A.

Comments: _____

_____

_____

_____

Scenario No:	**NRC 09-4**	Event No.	2
Event Description:	Raise power at 0.6 MW/min		

Time	Position	Applicant's Actions or Behavior

	BOP	• Raise turbine load at 1PM02J or OWS drop 210 by performing the following::
		  • Select SETPOINT.
		  • Enter 880 MW into REF DEMAND window
		  • Select ENTER.
		  • Enter 0.6 MW/min into the RATE window.
		  • Select ENTER.
		  • Select EXIT.
		o Notify US and RO of pending ramp.
		  • Select GO/HOLD.
		  • Verify GO/HOLD button illuminates.
		  • Verify HOLD illuminated RED.
		  • Select GO.
		  • Verify GO illuminates RED.
		  • Verify main turbine load begins to lower.

	RO/ BOP	• Monitor reactor power and load increase:
		  • Monitor NI's, Tave, ΔI, Pzr press/level
		  • Monitor MWe, Turb loading, EHC
		• During dilution:
		  • Monitor VCT level
		  • Verify RCS boron concentration lowering
		  • Monitor PW/Total flow predet counter
		  • Verify dilution auto stops at preset value.
		  • Return Reactor Makeup System to automatic at current boron concentration.

		After measurable change in power and lead examiner approves, initiate the next event.

Comments: _____

Scenario No:	**NRC 09-4**	Event No.	3
Event Description:	Loop D Thot RTD fails high.		

Time	Position	Applicant's Actions or Behavior
	CUE	• Loop D Tave rise • Loop D ΔT rise • Control rod inward motion o Annunciator CHG LINE FLOW HIGH/LOW (1-9-D3) • Annunciator PZR LVL CONT DEV LOW (1-12-B4) • Numerous annunciators on blocks 10 and 14
	RO	• Determines rod motion due to instrument failure • Place rod bank select switch in MANUAL
	RO	• Identify/report failed Tave & ΔT • Determine RTD failed on Loop D • Maintain Rod Bank Select switch in MANUAL
	US	• Implement 1BwOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL", Attachment A "RCS NARROW RANGE RTD CHANNEL FAILURE" and direct operator action. o Direct BOP/RO to stop load ramp/dilution
	RO	• Manually defeat failed RTD channel • Select 1D position on Tave DEFEAT switch • Select 1D position on ΔT DEFEAT switch • Check Reactor Power < 100% o Select operable channel for ΔT recorder • Check if rod control can be placed in auto • C5 - NOT LIT • Check Tave-Tref stable and within 1°F o Restore to within 1°F o Place rod control in AUTO • Check PZR level normal & stable o Manually restore PZR level to program level – throttle 1CV121 to restore level

Comments: _____

_____

_____

_____

Scenario No:	**NRC 09-4**	Event No.	3
Event Description:	Loop D Thot 2 RTD fails high.		

Time	Position	Applicant's Actions or Behavior
	RO	• Check P12 interlock • LO-2 TAVE STM DUMP INTLK P12 (1-BP-4.5) not lit
	BOP	• Place Computer points T0460 and T0462 in TEST
	US	• Check Technical Specifications: • Determines TS 3.3.1 conditions A and E are applicable.
	US	• Inform SM/Maint of Loop 1D Thot RTD failure • Inform SM of unit status/potential EP event and TS 3.3.1 cond A and E entry. o Enter dequip for P-12 • Contact SM to perform risk assessment, initiate IR, and contact maintenance to investigate/correct instrument failure
		Initiate the next event when the lead examiner approves.

Comments: _____

Scenario No:	**NRC 09-4**	Event No.	4
Event Description:	1SA032 containment isolation valve fails stroke time test.		
Time	Position	Applicant's Actions or Behavior	
	CUE	• Extra NSO delivers 1BwOSR 3.6.3.5.SA-1 surveillance to the US for review.	
	US	• Recognize entry conditions for Tech Spec 3.6.3 Condition A o Inform SM of 1SA032 status, TS Status, request IR and maintenance support. o Request verification that 1SA155 valve is closed.	
		EVALUATOR NOTE: After the actions for the 1SA032 failure are complete and with lead examiner concurrence, insert the next event.	

Comments: _____

_____

_____

_____

Scenario No:	**NRC 09-4**	Event No.	5 & 6
Event Description:	Inadvertent turbine trip/auto reactor trip failure with four stuck rods		

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator TURB TRIP ABOVE P8 RX TRIP (1-11-A9) • Annunciator TURB STOP VLV CLOSED ALERT (1-18-A4)
	US	• Enter/Implement 1BwEP-0 and direct operator actions of 1BwEP-0 "REACTOR TRIP OR SI" and direct operator actions to establish the following conditions:

	RO
	
	[CT]
	E-0---A
		Perform immediate operator actions of 1BwEP-0
		• Verify reactor trip
		  • Rod bottom lights – NOT ALL LIT
		  • Manually trip the reactor (1PM06J)
		  • Reactor trip & Bypass breakers - OPEN
		  • Neutron flux – DROPPING
		  • PR channels < 5%
		  • IR SUR is negative

	BOP	Perform immediate operator actions of 1BwEP-0:
		• Verify Turbine Trip
		  • All Turbine throttle valves - CLOSED
		  • All Turbine governor valves - CLOSED

	BOP	Perform immediate operator actions of 1BwEP-0: • Verify power to 4KV busses • ESF Buses – BOTH ENERGIZED (141 & 142)

	CREW	Determine SI NOT actuated/required
		• Check SI status
		  • SI First OUT annunciators NOT lit (1-11-B1, 1-11-C1, 1-11-D1, 1-11-E1)
		  • SI ACTUATED permissive light NOT lit (1-BP-4.1)
		  • SI Equipment NOT automatically actuated (no SI pump running, no1SI8801A/B open)
		• Check if SI is required
		  • PZR pressure > 1829 psig
		  • Steamline pressure > 640 psig
		  • CNMT pressure <3.4 psig

	US	• Review immediate operator actions and determine SI not required

Comments: _____

_____

_____

_____

Scenario No:	**NRC 09-4**	Event No.	5 & 6
Event Description:	Inadvertent turbine trip/auto reactor trip failure with four stuck rods		

Time	Position	Applicant's Actions or Behavior
		• Notify SM of plant status (auto reactor trip failure) and procedure entry • Request evaluation of Emergency Plan conditions • Transition to 1BwEP ES-0.1 "REACTOR TRIP RESPONSE" o Request STA evaluation of status trees

	RO	• Maintain RCS temperature control
		  • Check RCP's - RUNNING
		  • Verify RCS average temperature stable at or trending to 557^{o}

	RO	• Verify ALL control rods fully inserted
		  • Rod at bottom lights – NOT ALL LIT
		  • Initiate emergency boration of 5280 gallons (22000 gal. from RWST) per 1BwOA PRI-2, "EMERGENCY BORATION"
		  • Calculate shutdown margin within one hour (request U-2 operators to perform SDM calculation)

	RO/BOP	• Initiate emergency boration per 1BwOA PRI-2 "EMERGENCY BORATION"
		  • Check CV pump status
		  • 1A CV pump running
		  • Emergency borate RCS
		  • Establish boration flow from BAT
		  o Open 1CV8104
		  o Open 1CV110A & 1CV110B
		  • Start boric acid transfer pump
		  • Check emergency boration flow > 30 gpm (1FT-0110 or 1FI-183A)
		  • Verify CV pump discharge flow path aligned with proper flow
		  • Equalize RCS and PZR boron
		  • Verify PZR backup heaters energized
		  • Continue boration until required gallons of boron added

		Once the crew has initiated emergency boration, initiate the next event.

	RO/BOP	o Check PZR level control
		  • Level > 17% and trending to 26%
		  • Charging and letdown – IN Service

Comments: _____

_____

_____

_____

Scenario No:	**NRC 09-4**	Event No.	5 & 6
Event Description:	Inadvertent turbine trip/auto reactor trip failure with four stuck rods		

Time	Position	Applicant's Actions or Behavior
	RO/BOP	o Check PZR pressure control • Pressure > 1829 psig and trending to 2235 psig
	RO/BOP	o Check FW isolation • Isolation monitor lights - LIT • Trip FW pumps o Check total feed flow to SGs – GREATER THAN 500 GPM o Start 1A FW Pump o Start AF pump(s)
	RO/BOP	o Check SG levels • Levels maintained between 10% and 50%
	RO/BOP	o Verify generator trip • Main transformer output breakers - OPEN • OCB 1-8 • OCB 7-8 • PMG output breaker – OPEN • Verify ALL AC busses energized

Comments: _____

Scenario No:	**NRC 09-4**	Event No.	7 & 8
Event Description:	Loss of Offsite Power with EDGs failing.		

Time	Position	Applicant's Actions or Behavior
	CUE	• A Loss of Offsite power is indicated • Annunciator LOSS OF OFFSITE POWER (1-20-A1)
	CREW	• Identify Loss of Offsite Power.
	RO	o Determine emergency boration stopped
	US	• Implement 1BwCA-0.0 "LOSS OF ALL AC POWER" • Direct operator actions of 1BwCA-0.0 • Notifies SM of plant status and procedure entry • Requests evaluation of Emergency Plan conditions
		NOTE: For evaluation of critical task, Record time loss of all AC power occurred. _____**:**_____**:**_____
	RO	Perform immediate operator actions of 1BwCA-0.0: • Verify reactor trip • Reactor trip & Bypass breakers - OPEN • Neutron flux – DROPPING
	BOP	Perform immediate operator actions of 1BwCA-0.0: • Isolate Steamlines • Actuate main steamline isolation • Verify all MSIVs and MSIV Bypass valves - CLOSED
	BOP	• Verify AF flow • >500 gpm (1B AF only)

Comments: _____

_____

_____

_____

Scenario No:	**NRC 09-4**	Event No.	7 & 8
Event Description:	Loss of Offsite Power with EDGs failing.		

Time	Position	Applicant's Actions or Behavior

		• Verify RCS isolated
		  • 1RY455A and 1RY456 closed
		  • 1CV8149A, B & C closed
		  • 1CV459 and 1CV460 closed
		  • 1CV8153A & B closed

	BOP	• Try to restore power to any/both Unit 1 4KV ESF buses
		  • Identify/report neither DG running
		  • Actuate SI from 1PM05J and 1PM06J

	BOP/ US	• Prepare for Unit 2 crosstie
		  • Dispatch operator to depress emergency stop push buttons on both U1 DGs.
		  • Reset SI

	US	• Check status of Unit 2 ESF buses
		  • Both Unit 2 4 KV ESF buses energized from SAT
		  • Notify Unit 2 to implement 2BwCA-0.3.

	BOP/ US	• Crosstie bus 141 to Unit 2
		  • Bus 241 energized from SAT
		  • Check Bus 141 – NOT FAULTED
		  • ACB 1413 (DG feed) in PULL OUT
		  • ACB 1411 (Non-ESF bus tie) in PULL OUT
		  • ACB 1412 (SAT feed) in PULL OUT
		  • ACB 1414 (Reserve feed) in PULL OUT
		  • Verify Bus 141 alarms NOT LIT
		  • Annunciator BUS 141 FD BRKR ACB 1412 TRIP (1-21-A7)
		  • Annunciator BRKR 1414 CROSS-TIE OVERCURRENT (1-21-B8)
		  • Annunciator DG 1A OVERLOAD (1-21-B9)

Comments: _____

Scenario No:	**NRC 09-4**	Event No.	7 & 8
Event Description:	Loss of Offsite Power with EDGs failing.		
Time	Position	Applicant's Actions or Behavior	
	[CT]	• Crosstie bus 141 to Unit 2 (Cont'd) • Verify loads fed from Bus 141 available • Bus 131X • CENT CHG pump 1A • CC pump 1A or 0 • SX pump 1A • MCR chiller 0A • Place ESF loads in PULL OUT • CENT CHG pumps • RH pumps • SI pumps • AF pump 1A • RCFCs (HI and LO) • CS pumps • CC pumps (1A, 1B, and 0) • SX pumps • MCR chillers • Check ACB 2414 closed (reserve feed light lit.) • Synch and Close Bus 141/241 reserve feeder breaker • Close ACB 1414 • Check Bus 141 energized • Check Bus 131X energized	
		NOTE: For evaluation of critical task, record time AC power restored: **_____:_____:_____** **Time power restored – time power lost = _____:_____:_____ (<10 minutes)**	
	BOP	• Restore Unit 1 SX cooling • Check valves for available SX pump - OPEN • 1SX001A • 1SX016A • 1SX027A • Start SX pump 1A • Check open SX crosstie valves - 1SX033 and 1SX034	

Comments: _____

_____

_____

_____

Scenario No:	**NRC 09-4**	Event No.	7 & 8
Event Description:	Loss of Offsite Power with EDGs failing.		

Time	Position	Applicant's Actions or Behavior
	RO /BOP	• Verify Equipment loaded on energized 4KV ESF Bus(es) • Annunciator 125V DC BATT CHGR 111 TROUBLE NOT LIT (1-21-E8) • Annunciator Bus 111 INVERTER TROUBLE NOT LIT (1-4-A5) • Annunciator Bus 113 INVERTER TROUBLE NOT LIT (1-4-C5)
	BOP/ RO **[CT] ECA-0.0--H**	• Align equipment for Unit 1 restoration • Verify 1B AF pump – RUNNING • Check both Unit 2 ESF buses – ENERGIZED FROM SAT • Check Bus 142 – NOT FAULTED • ACB 1423 (DG feed) in PULL OUT • ACB 1421 (Non-ESF bus tie) in PULL OUT • ACB 1422 (SAT feed) in PULL OUT • ACB 1424 (Reserve feed) in PULL OUT • Verify Bus 142 alarms NOT LIT • Annunciator BUS 142 FD BRKR ACB 1422 TRIP (1-22-A7) • Annunciator BRKR 1424 CROSS-TIE OVERCURRENT (1-22-B8) • Annunciator DG 1B OVERLOAD (1-22-B9) • Check ACB 2424 closed • Synch and Close Bus 142/242 reserve feeder breaker • Close ACB 1424 • Dispatch EO's to start DGs per 1BwOA ELEC-3, LOSS OF 4KV ESF BUS • Dispatch EO's to Close 1CV8384A & B • Close CC from RCP Thermal Barrier isol valves – 1CC685 or 1CC9438 • Close RCP seal water return isol valves – 1CV8100 or 1CV8112 • Place S/G PORVs in Auto • Check VC fans – ONE TRAIN RUNNING • Start makeup fan

Comments: _____

_____

_____

_____

Scenario No:	**NRC 09-4**	Event No.	7 & 8
Event Description:	Loss of Offsite Power with 1B DG trip and failure of 1A DG 90 sec after start.		

Time	Position	Applicant's Actions or Behavior
	CREW	• Select proper recovery procedure • Check RCS subcooling acceptable per ICONIC DISPLAY or attachment A • Check PZR level > 14% (28% ADVERSE) • Verify SI Equipment NOT automatically actuated upon AC power restoration • Determine proper recovery procedure: • 1BwCA-0.1 if all the following satisfied: • RCS subcooling acceptable o Iconic Display OR o Attachment A • Pzr level > 14% (28% ADVERSE) • NO SI equipment auto actuation on AC restoration: • No high head ECCS or SI pump flow indicated • 1BwCA-0.2 if ANY of the above conditions NOT satisfied
	US	o Transition to 1BwCA-0.1 "Loss of All AC Power Recovery without SI Required" o Transition to 1BwCA-0.2 "Loss of All AC Power Recovery with SI Required"
		NOTE: Scenario may be terminated at this point

Comments: _____

Simulation Facility	Braidwood	Scenario No.: **NRC 09-5**	Operating Test No.: **2009-1**
Examiners:	_____	Applicant: _____	SRO
	_____	_____	RO
	_____	_____	BOP

Initial Conditions: IC-21

Turnover: Unit 1 is at 100% power, steady state, equilibrium xenon, BOL. RCS boron concentration in 798 ppm. On line risk is green. Following completion of turnover, the crew is to perform 1BwOS EH-M1, UNIT 1 EH PUMP OPERABILITY MONTHLY SURVEILLANCE using the preferred method of depressing and holding the MCB pushbutton. The Field Supervisor and Equipment Operators have been briefed and are standing by at the Unit 1 EH skid. Power Team has requested Unit 1 lower power to 1125 MW at 3 MW/min due to grid demand following completion of 1BwOS EH-M1.

Event No.	Malf. No.	Event Type	Event Description
Preload	IMF RP15R MRF RP89 OPEN IMF PN1143 OFF IMF PN1144 OFF		1B SX pump fail to automatically start Prevent inadvertent EH Sys. Trouble alarm
1	None	N-BOP, US	Perform 1BwOS EH-M1
2	None	R-RO, US	Lower power at 3 MW/Min
3	IOR ZAI1TK130 100 5	I-RO, US	1TK-130 output fails high
4	IMF ED11C	TS-US	Loss of DC to inverter 113
5	IMF RX21A 1700 10	C-RO, US TS-US	Pressurizer pressure channel 1PT-455 fails low
6	IMF EG03 100 10	C-BOP, US	Generator voltage regulator failure
7	IMF ED07A		Loss of bus 141, Rx trip and SI
8	IMF TH03D 450	M-ALL	1D SGTR
9	Preload	C-BOP, US	1B SX pump fail to automatically start

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

SCENARIO OVERVIEW

Unit 1 is at 100% power, steady state, equilibrium xenon, BOL. RCS boron concentration in 798 ppm. On line risk is green. Following completion of turnover, the crew is to perform 1BwOS EH-M1, UNIT 1 EH PUMP OPERABILITY MONTHLY SURVEILLANCE using the preferred method of depressing and holding the MCB pushbutton. The Equipment Operator has been briefed and is standing by at the Unit 1 EH skid. Power Team has requested Unit 1 lower power 125 MW at 3 MW/min due to grid demand following completion of 1BwOS EH-M1.

After completing shift turnover and relief, the BOP will perform 1BwOS EH-M1, UNIT 1 EH PUMP OPERABILITY MONTHLY SURVEILLANCE.

After completing 1BwOS EH-M1, the crew will lower power to 1125 MW at 3 MW/min due to grid demand. The crew will commence a power reduction at 3 MW/min.

After a measurable change in power, 1TK-130 output, Letdown Heat Exchanger Outlet Temperature Controller, will fail high. The BwAR should be referenced and the RO should take manual control to restore letdown temperature to normal. The crew may elect to isolate letdown due to high temperature. If isolated, letdown should be restored per BwOP CV-17.

After the 1TK130 Controller has been addressed, a loss of DC to instrument inverter 113 will occur. The crew will follow the annunciator response BwAR 1-4-C5. The crew will determine from field report that the instrument inverter DC input has failed. Technical Specification 3.8.7, condition A applies. On line risk becomes yellow.

Following completion of inverter 113 actions, the controlling pressurizer pressure channel will fail low. The RO will identify the failure and take manual control to restore pressurizer pressure. The US will enter 1BwOA INST 2, OPERATION WITH A FAILED INSTRUMENT CHANNEL-Attachment B. Tech Specs 3.3.1 conditions A, E, and K, 3.3.2 conditions A and D, and 3.3.4 condition A will be entered.

After the pressurizer pressure channel failure has been addressed, the generator voltage regulator output will fail high, causing the main generator to be overexcited. The BOP will turn the voltage regulator to off/test and manually lower main generator excitation using the base adjuster.

After the voltage regulator failure is addressed, a ground fault will occur on bus 141. The loss of bus 141 will cause a loss of instrument bus 113. The loss of instrument bus 113 in conjunction with the previously tripped pressurizer bistables will generate a reactor trip and safety injection actuation. The 1B SX pump must be manually started due to a failure of its actuation relay. The SI initiation will cause a 1D SGTR. The crew will perform 1BwEP-0, REACTOR TRIP OR SAFETY INJECTION, and transition to 1BwEP-3, STEAM GENERATOR TUBE RUPTURE, at step 22 of 1BwEP-0.

The scenario is complete when the crew has terminated high head injection and established normal charging flow in 1BwEP-3.

Critical Tasks

1. Manually start the 1B SX pump before transition out of 1BwEP-0

   (ERG Critical Task number - E-0--L) (K/A number 076000A4.01 2.9/2.9)

2. Identify the 1D SG as the ruptured SG and isolate prior to a transition to 1BwCA-3.1 is required.

   (ERG Critical Task number – E-3--A) (K/A number EPE038EA1.32 importance 4.6/4.7)

3. Depressurize RCS to restore RCS inventory prior to 1D SG PORV or safety valve water release.

   (ERG Critical Task number – E-3--C) (K/A number EPE038EA1.09 importance 3.2/3.3)

SIMULATOR SETUP GUIDE:

- Verify/perform TQ-BR-201-0113, BRAIDWOOD TRAINING DEPARTMENT SIMULATOR EXAMINATION SECURITY ACTIONS CHECKLIST.
- Establish the conditions of IC-21, 100% power, BOL, steady state, equilibrium xenon.
- Complete items on Simulator Ready for Training Checklist.
- Verify/remove any Equipment Status Tags and Danger Tags not applicable to the scenario.
- Place simulator in RUN (allow simulator to run during board walk down and turnover).
- Monitor ruptured S/G status by using monitor file - SGTR
- Run **caep DEMO CERT 09-5 SETUP** from disk and verify the following actuate:
  - **IMF RP15R**
  - **MRF RP89 OPEN**
  - **IMF PN1143 OFF**
  - **IMF PN1144 OFF**
- Verify/Set ΔI Target Curve slopes to $\pm$2% of ΔI.
- Provide examinees with 1BwOS EH-M1 with predefine cover sheet, turnover sheets, 1BwOS NR-1 and critical parameter sheet.

Event 1: Perform 1BwOS EH-M1.

When requested, as Equipment Operator report you are standing by at the Unit 1 EH skid. Report the following data as EH pumps are started and stopped:

- EH system temperature is 110°F.
- EH system pressure is 2025 psig with ONE EH pump running.

If requested, as Field Supervisor report you are providing direct supervision in the field for production risk.

Acknowledge as Shift Manager commencement and completion of procedure.

Event 2: Lower power to 1125 MW at 3 MW/min

Acknowledge as chemistry/rad protection requests for RCS samples (if required).

Acknowledge as Power Team initiation of ramp.

Event 3: 1TK-130 fails high

Insert: **IOR ZAI1TK130 100 5**

Open monitor file for 1CC130A/B valve position (CCV1CC130A/B)

Acknowledge as SM requests for maintenance support, on line risk assessment (yellow), and IR for 1TK-130 failure.

If dispatched as EO to 1CC130A/B, report valve position as indicated in monitor file.

As chemistry (if called), report that the in-service mixed bed demin will remain off until it can be sampled.

Event 4: Loss of DC to inverter 113

Insert **IRF ED025 OPEN** for loss of DC to inverter 113.

When dispatched as Equipment Operator to instrument inverter 113, wait two minutes and report DC input breaker to Inverter 113, B1 is tripped open and Low DC Voltage light P16 is lit.

If requested to close the DC input breaker locally, report breaker will not close.

If dispatched as Equipment Operator /NSO to instrument bus 113, wait one minute and report instrument bus 113 appears normal.

Acknowledge as SM entry into TS 3.8.7 and on line risk status. Acknowledge requests for an IR and System Engineering/Maintenance support.

Event 5: Pressurizer pressure channel 1PT-455 fails low

Insert **IMF RX21A 1700 10** to fail 1PT-455 low in a 10 second period.

As SM, if requested support for tripping bistables, report that bistables are not to be tripped until work analyst/NSO support can be obtained (i.e. not at this time) and that the abnormal operating procedure should be continued. Bistable tripping will be conducted later.

As SM acknowledge the failure, LCOs 3.3.1, conditions A, E and K, 3.3.2, conditions A and D, and 3.3.4, condition A entries, on line risk assessment, request for maintenance support, and IR request.

Event 6: Main generator voltage regulator failure

Insert **IMF EG03 100 10** for main generator voltage regulator failed.

Acknowledge as SM voltage regulator failure, on line risk assessment, requests for maintenance and OAD support, and IR request.

Acknowledge as Power Team failure of generator voltage regulator.

Event 7 and 8: Loss of bus 141, Rx trip and SI, 1D SGTR

- Run **caep NRC 09-5 EVENT 7_8** from disk and verify the following actuate:
    - **IMF ED07A**
    - **IMF TH03D 450**

Acknowledge as SM procedure changes, E Plan evaluations, and STA request.

If requested as Equipment Operator to cross-tie 125 VDC bus 111 to 125 VDC bus 211 wait five minutes and insert the following:

- **MRF ED111 CLOSED**

If dispatched as Equipment Operator to depress 1A DG emergency stop push button insert the following:

- **MRF EG19 TRIP**

If dispatched as Equipment Operator to close containment isolation valves outside containment, wait 5 minutes and insert the following:

- **MRF CH13 0 (closes 1WO020A)**
- **MRF CH11 0 (closes 1WO006A)**
- **MRF CV17 0 (closes 1CV8100)**

If dispatched as Equipment Operator to locally close 1AF005D insert the following:

- **IRF FW174 0 30**

Scenario No:	**NRC 09-5**	Event No.	1
Event Description:	Perform 1BwOS EH-M1		

Time	Position	Applicant's Actions or Behavior
	CUE	o From turnover, perform 1BwOS EH-M1, UNIT 1 EH PUMP OPERABILITY MONTHLY SURVEILLANCE.
	US	• Direct BOP to perform 1BwOS EH-M1.

	BOP	• Refer to 1BwOS EH-M1.
		• Record initial data on Data Sheet D-2.
		• Notify Equipment Operator at EH skid of pending 1B EH pump start
		• At 1PM02J, depress EH PP LO PRESS AUTO START TEST (20/MPT) pushbutton.
		o Equipment Operator locally verify 1B EH pump started.
		• Perform the following at 1PM02J:
		  • Verify annunciator 1-18-B15, EH SYSTEM TROUBLE, remained clear.
		  • Place 1B EH pump C/S in AFTER CLOSE.
		• Notify Equipment Operator at EH skid of pending 1A EH pump shutdown
		• At 1PM02J, place 1A EH pump C/S in AFTER TRIP.
		• Equipment Operator locally verify EH pressure 2000 $\pm$ 50 psig.
		• Notify Equipment Operator at EH skid of pending 1A EH pump start
		• At 1PM02J, depress EH PP LO PRESS AUTO START TEST (20/MPT) pushbutton
		o Equipment Operator locally verify 1A EH pump started.
		• Perform the following at 1PM02J:
		  • Verify annunciator 1-18-B15, EH SYSTEM TROUBLE, remained clear.
		  • Place 1A EH pump C/S in AFTER TRIP.
		• Equipment Operator locally verify EH pressure 2000 $\pm$ 50 psig.
		• Record initial data on Data Sheet D-2.
		• Inform US 1BwOS EH-M1 complete.

	US	• Acknowledge report. o Notify SM 1BwOS EH-M1 is complete.
		EVALUATOR NOTE: After 1BwOS EH-M1 is complete and with lead examiner concurrence, enter next event.

Comments: _____

_____

_____

Scenario No:	**NRC 09-5**	Event No.	2
Event Description:	Lower power to 1125 MW at 3 MW/min		

Time	Position	Applicant's Actions or Behavior
	US	• Implement actions of 1BwGP 100-4, POWER DESCENSION. o Perform pre-job brief per HU-AA-1211 "PRE-JOB, HEIGHTENED LEVEL OF AWARENESS, INFREQUENT PLANT ACTIVITY, AND POST JOB BRIEFINGS" for load ramp.
	CREW	o Review Precautions, and Limitations and Actions, if not already performed during pre-job brief.
	RO	• Verify rod position and boron concentration. • Initiate boration, if required. (BwOP CV-6) (approximate: 115-202 gal). • Determine required boric acid volume. o Perform boration boundary calculation per 1BwGP 100-4T2. o Refer to operator aid for ramp. • Determine desired boric acid flow rate. • Perform the following at 1PM05J: • Set 1FK-110 BA Flow Control to desired boration rate. • Set 1FY-0110 BA Blender Predet Counter to desired volume. • Place MAKE-UP MODE CONT SWITCH to STOP position. • Place MODE SELECT SWITCH to BORATE position. • Place MAKE-UP MODE CONT SWITCH to START. • Verify proper operation of valves and BA transfer pump (1CV110B open, Boric Acid Transfer Pump running, 1CV110A throttles open, proper BA flow indicated on recorder). o Turn on PZR backup heaters in accordance with BwOP RY-13, PRESSURIZER BACKUP HEATER OPERATION. OR

Comments: _____

_____

_____

Scenario No:	**NRC 09-5**	Event No.	2
Event Description:	Lower power to 1125 MW at 3 MW/min		

Time	Position	Applicant's Actions or Behavior

		• Batch addition of Boric Acid:
		  • Open 1CV110B.
		  • Open 1CV110A.
		  • Start the BA Transfer pump.
		  • When desired amount of BA has been added, stop the BA Transfer Pump.
		  • Close 1CV110A.
		  • Close 1CV110B.
		o Turn on Pressurizer backup heater group

	BOP	• Lower turbine load at 1PM02J or OWS drop 210 by performing the following::
		  • Select SETPOINT.
		  • Enter desired MW into REF DEMAND window
		  • Select ENTER.
		  • Enter 3 MW/min into the RATE window.
		  • Select ENTER.
		  • Select EXIT.
		  o Notify US and RO of pending ramp.
		  • Select GO/HOLD.
		  • Verify GO/HOLD button illuminates.
		  • Verify HOLD illuminated RED.
		  • Select GO.
		  • Verify GO illuminates RED.
		  • Verify main turbine load begins to lower.

	RO/ BOP	• Monitor reactor power and turbine load lowering:
		• Monitor NI's, Tave, ΔI, Pzr press/level at 1PM05J.
		• Monitor MWe and DEHC system response at 1PM02J or OWS drop 210.
		• During boration, monitor the following at 1PM05J and HMI:
		  o Monitor VCT level.
		  o Verify RCS boron concentration rising.
		  o Monitor BA predet counter.
		  o Verify boration auto stops at preset value.
		  o Return Reactor Makeup System to automatic at current boron concentration.

		After measurable change in power and lead examiner concurrence, insert the next event.

Comments: _____

_____

_____

Scenario No:	**NRC 09-5**	Event No.	3
Event Description:	1TK-130 Failure		

Time	Position	Applicant's Actions or Behavior
Event 3	CUE	• Annunciator LETDWN TEMP HIGH (1-9-E2) • Annunciator LETDWN HX OUTLET TEMP HIGH (1-8-C5) • 1TI-130 indicates letdown temperature high • 1CV-129, demin high temp letdown divert valve, in VCT position
	RO	• Recognize 1TK-130 output failed low.
	CREW	o Refer to BwARs as time permits
	US	• Direct/Ensure RO takes manual control of 1TK-130 and returns letdown temperature to normal. • Inform SM and ask for IR and additional personnel for assistance. o Direct BOP/RO to stop load ramp/dilution
	RO	• Inform US of Letdown High temperature divert valve status
	US	o Direct RO to place divert valve to DEMIN position o May contact chemistry to determine if demin should be returned to service. If chemistry contacted, direction will be provided to leave demin bypassed pending sampling
		Note: The crew may elect to isolate letdown based on elevated temperature. The steps for isolating and restoring letdown are in italics below.
	RO /BOP	o *Establish normal letdown per BwOP CV-17* o *Verify/close 1CV8149A/B/C* o *Verify CC aligned to letdown Hx (was previously aligned)* o *Place 1CV131 manual at 30% demand* o *Place 1CC130 in manual at 60% demand* o *Open 1CV8152/8160* o *Open 1CV459/460* o *Verify open 1CV8324B & 1CV8389B* o *Verify/open 1CV381B* o *Verify/close 1CV381A* o *Verify/open 1CV8401A* o *Verify/close 1CV8145* o *Verify/open 1CV8146/8147*

Comments: _____

_____

_____

Scenario No:	**NRC 09-5**	Event No.	3
Event Description:	1TK-130 Failure		
Time	Position	Applicant's Actions or Behavior	
		o *Open 1SI8105/8106* o *Adjust charging flow to approx. 100 gpm w/seal injection 8-10 gpm per RCP* o *Open 1CV8149A/B/C and control 1CV131 to maintain letdown pressure 360-380 psig* o *Control 1CC130 to maintain letdown temperature 90-115°F* o *Place controllers in auto* o *Verify 1PR06J in service* o *Verify proper operation of RMCS during VCT makeup* o *Proper flow indicated on PW/Total Flow (1FT-0111) and Boric Acid Flow (1FT-0110).* o *Restore PZR level to program*	
		Initiate the next event when the lead examiner approves.	

Comments: _____

_____

_____

Scenario No:	**NRC 09-5**	Event No.	4
Event Description:	Loss of DC to instrument inverter 113		
Time	Position	Applicant's Actions or Behavior	
	CUE	• Annunciator BUS 113 INVERTER TROUBLE (1-4-C5)	
	RO/ BOP	• Determine instrument inverter 113 trouble. • Reference BwAR.	
	CREW	• Dispatch operators to investigate status of inverter and instrument bus.	
	US	o Notify SM of plant status.	
	US	• Determines TS 3.8.7 condition A is applicable. • Contact SM to perform risk assessment, initiate IR, and contact additional personnel to investigate/correct instrument failure. o Perform "what if" brief for loss of inverter	
		EVALUATOR NOTE: After the tech spec entry is complete and with lead examiner concurrence, insert the next event.	

Comments: _____

_____

_____

Scenario No:	**NRC 09-5**	Event No.	5
Event Description:	Pressurizer pressure channel 1PT-455 fails low.		

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator PZR PRESS LOW RX TRIP STPT ALERT (1-12-A1) • Annunciator PZR PRESS LOW (1-12-B1) • Annunciator PZR PRESS CONT DEV LOW HTRS ON (1-12-C1) • Annunciator OTΔT HIGH ROD STOP C-3 (1-10-C5) • Annunciator OTΔT HIGH RX TRIP ALERT (1-14-B1) • PZR pressure indicators 456/457/458 rising • Master PZR pressure controller demand lowering
	RO	• Identify/report failure of 1PT-455 o Take manual control to restore PZR pressure o Place 1PK-455A in manual and raise demand prior to PZR PORVs automatically opening
	CREW	o Refer to BwARs as time permits. • Identify entry conditions for 1BwOA INST-2, "OPERATION WITH A FAILED INSTRUMENT CHANNEL".
	US	• Notify SM of plant status and procedure entry. o Request evaluation of Emergency Plan conditions. • Enter/Implement "1BwOA INST-2, "OPERATION WITH A FAILED INSTRUMENT CHANNEL", Attachment B, "PRESSURIZER PRESSURE CHANNEL FAILURE" and direct operator actions of 1BwOA INST-2 to establish the following conditions: o Direct BOP/RO to stop load ramp/boration.
	RO	• Check PZR pressure at 1PM05J: o PZR pressure – normal on 1PI-456, 457, & 458. • Manually restore PZR pressure using 1PK-455A. o Select operable PZR pressure control channel o Place 1PK-455A in manual and restore PZR pressure to normal. • Place PZR pressure control select C/S to CH-457/CH-458.

Comments: _____

_____

_____

Scenario No:	**NRC 09-5**	Event No.	5
Event Description:	Pressurizer pressure channel 1PT-455 fails low.		
Time	Position	Applicant's Actions or Behavior	

	RO	• Check PZR PORVS, spray valves, and heaters at 1PM05J:
		  • PZR PORVs closed.
		  • PZR spray valves normal for plant conditions.
		  • PZR heaters normal for plant conditions.
		• Check PZR pressure control in auto at 1PM05J:
		  • Check the following components in AUTO:
		  • PZR PORV 1RY455A
		  • PZR PORV 1RY456
		  • PZR spray valve 1RY455B
		  • PZR spray valve 1RY455C
		  • Master PZR pressure controller 1PK-455A.
		• Select operable recorders at 1PM05J:
		  • Place PZR pressure select switch to CH-456, CH-457, or CH-458.
		  • Place loop ΔT recorder select switch to 1B, 1C, or 1D.	

	RO	• Check P11 interlock at 1PM05J: • RCS pressure >1930 psig – P11 NOT LIT.	
	US	• Determine TS 3.3.1, conditions A, E, and K, 3.3.2, conditions A and D, and 3.3.4, condition A are applicable. • Contact SM to perform risk assessment, initiate IR, and contact additional personnel to investigate/correct instrument failure. o May reference 1BwOSR 3.3.4.1 as part of channel applicability determination.	
		EVALUATOR NOTE: After the actions for the pressurizer pressure channel failure are complete and with lead examiner concurrence, insert the next event.	

Comments: _____

_____

_____

Scenario No:	**NRC 09-5**	Event No.	6
Event Description:	Generator voltage regulator failure		
Time	Position	Applicant's Actions or Behavior	
	CUES	• Annunciator GENERATOR FIELD FORCING (1-19-B6) • 1IIMP023, Exciter Field Current, rising. • 1VIMP006, Main Generator Output VARS, rising.	
	CREW	• Refer to BwARs • Determine generator voltage regulator failing.	
	US	• Direct/Ensure BOP takes manual control of generator voltage regulator and lowers generator field current. o Inform SM of voltage regulator failure. o Direct BOP/RO to stop load ramp/dilution	
	BOP	• Perform the following at 1PM01J: • Place voltage regulator to off. • Place base adjuster to lower. • Lower exciter field to < 100 amps prior to main generator trip.	
	CREW	• Refer to 1BwGP 100-3A6 and 1BwGP 100-3A7 for generator MW, and generator VARS within limits	
	BOP	• Maintain generator field current, generator MW, and generator VARS within limits by operating the base adjuster.	
	US	• Contact SM to perform risk assessment, initiate IR, and contact additional personnel to investigate/correct instrument failure. • Notify Power Team of voltage regulator failure.	
		EVALUATOR NOTE: After the actions for voltage regulator failure are complete and with lead examiner concurrence, enter next event.	

Comments: _____

_____

_____

Scenario No:	**NRC 09-5**	Event No.	7 & 8
Event Description:	Loss of bus 141/Rx trip/SI/1D SGTR		

Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciator OT DT RX TRIP (1-11-B4) o Annunciator PZR PRESS LOW SI/RX TRIP (1-11-C1) • Annunciator BUS 141 FD BRKR1412 TRIP (1-21-A7) • Breaker 1412 open light lit at 1PM01J. • Bus 141 "bus alive" light NOT lit at 1PM01J. • Reactor trip indications at 1PM05J.
	CREW	Identify entry conditions for 1BwEP-0, "REACTOR TRIP OR SAFETY INJECTION".
	US	• Notify SM of plant status and procedure entry. • Request evaluation of Emergency Plan conditions. • Enter/Implement 1BwEP-0 and direct operator actions of 1BwEP-0 to establish the following conditions:

	RO	Perform immediate operator actions of 1BwEP-0 at 1PM05J:
		• Verify reactor trip:
		  • Rod bottom lights - ALL LIT.
		  • Reactor trip & Bypass breakers – OPEN.
		  • Neutron flux – DROPPING.

	BOP	Perform immediate operator actions of 1BwEP-0 at 1PM02J:
		• Verify Turbine Trip:
		  • All Turbine throttle valves –CLOSED.
		  • All Turbine governor valves –CLOSED.

	BOP	Perform immediate operator actions of 1BwEP-0 at 1PM01J:
		• Verify power to 4KV busses:
		  • ESF bus 141 – DEENERGIZED.
		  o Perform 1BwOA ELEC-3 (bus 141 faulted).
		  • ESF bus 142 – ENERGIZED.

Comments: _____

_____

_____

Scenario No:	**NRC 09-5**	Event No.	7 & 8
Event Description:	Loss of bus 141/Rx trip/SI/1D SGTR		
Time	Position	Applicant's Actions or Behavior	
		EVALUATOR NOTE: The US may direct the BOP to perform 1BwOA ELEC-3 while continuing in 1BwEP-0.	

	CREW	• Check SI Status at 1PM05J:
		  • SI First OUT annunciator – LIT.
		  • SI ACTUATED Permissive Light – LIT.
		  • SI Equipment – AUTOMATICALLY ACTUATED
		• Manually actuate SI at 1PM05J & 1PM06J.	

		EVALUATOR NOTE: US and RO will continue in 1BwEP-0 while BOP is performing Attachment B:	

	BOP	▪ Verify FW isolated at 1PM04J:
		  • FW pumps – TRIPPED.
		  • Isolation monitor lights – LIT.
		  • FW pumps discharge valves - CLOSED (or going closed) 1FW002A-C.
		• Verify DGs running at 1PM01J:
		  • DGs – BOTH RUNNING.
		  • 1SX169A/B OPEN.
		  • Dispatch operator locally to check operation
		• Verify Generator Trip at 1PM01J:
		  • OCB 1-8 and 7-8 open.
		  • PMG output breaker open.
		• Trip all running HD pumps.
		• Verify Control Room ventilation aligned for emergency operations at 0PM02J:
		  • VC Rad Monitors – LESS THAN HIGH ALARM SETPOINT.
		  • Operating VC train equipment – RUNNING.
		  • 0B Supply fan
		  • 0B Return fan
		  • 0B M/U fan
		  • 0B Chilled water pump
		  • 0B Chiller
		  • Operating VC train dampers – ALIGNED.
		  • M/U fan outlet damper – 0VC08Y NOT FULLY CLOSED.
		  • 0B VC train M/U filter light – LIT.
		  • 0VC09Y - OPEN
		  • 0VC313Y - CLOSED	

Comments: _____

_____

_____

Scenario No:	**NRC 09-5**	Event No.	7 & 8
Event Description:	Loss of bus 141/Rx trip/SI/1D SGTR		

Time	Position	Applicant's Actions or Behavior

		• Operating VC train Charcoal Absorber aligned for train B.
		  • 0VC44Y - CLOSED
		  • 0VC05Y - OPEN
		  • 0VC06Y - OPEN
		  • Control Room pressure greater than +0.125 inches water on 0PDI-VC038.
		• Verify Auxiliary Building ventilation aligned at 0PM02J:
		  • Two inaccessible filter plenums aligned.
		  • Plenum A:
		  • 0VA03CB - RUNNING
		  • 0VA023Y - OPEN
		  • 0VA436Y - CLOSED
		  • Plenum C:
		  • 0VA03CF - RUNNING
		  • 0VA072Y - OPEN
		  • 0VA438Y - CLOSED
		• Verify FHB ventilation aligned at 0PM02J:
		  • 0VA04CB - RUNNING
		  • 0VA055Y - OPEN
		  • 0VA062Y - OPEN
		  • 0VA435Y – CLOSED
		• Notify US Attachment B complete

		NOTE: For the "A" train pumps and valves that have lost power the crew should acknowledge that they are not in the required position, but cannot correct.

	RO/ BOP	• Verify ECCS pumps running at 1PM05J/1PM06J:
		  • CV pumps – 1B RUNNING.
		  • RH pumps – 1B RUNNING.
		  • SI pumps – 1B RUNNING.

	RO/ BOP	• Perform the following at 1PM06J:
		• RCFCs running in accident mode (1B train ONLY running)
		  • RCFC accident mode status light lit
		• CNMT Phase A valves closed (train A valves not all closed)
		  • Dispatch EO to close de-energized valves outside containment

Comments: _____

_____

_____

Scenario No:	**NRC 09-5**	Event No.	7, 8 & 9
Event Description:	Loss of bus 141/Rx trip/SI/1D SGTR/1B SX pump fail to auto start		

Time	Position	Applicant's Actions or Behavior
	RO/ BOP **[CT] E-0--L**	• Perform the following at 1PM06J: • Verify Cnmt Vent isolation: • Group 6 Cnmt Vent Isol monitor lights – LIT. • Verify AF system: • AF pumps – 1B AF pump RUNNING. • AF isolation valves – 1AF13A-H OPEN. (1AF013A-D are deenergized) • AF flow control valves - 1AF005A-D are OPEN (no flow), 1AF005E-H are THROTTLED. • Verify CC pumps running: • 1B CC pump - RUNNING • Verify SX pumps running: • NONE RUNNING. • Start 1B SX pump.
	RO/ BOP	• Check if Main Steamline Isolation required: o S/G pressures > 640 psig at 1PM04J (if turbine tripped prior to setpoint). o CNMT pressure < 8.2 psig at 1PM06J.
	RO/ BOP	• Check CS not required: • CNMT pressure remained < 20 psig.
	RO/ BOP	• Verify Total AF flow: • AF flow > 500 gpm o If 1D SG levels > 10% and tube rupture is recognized then: o Cannot CLOSE 1AF013D (no power available) o CLOSE 1AF005D and dispatch operator to gag valve closed. o CLOSE 1AF013H
	RO/ BOP	• Verify ECCS valves aligned • Group 2 cold leg injection monitor lights lit (1B train valves LIT). • Verify ECCS FLOW • > 100 gpm on indicator 1FI-917

Comments: _____

_____

_____

Scenario No:	**NRC 09-5**	Event No.	7, 8 & 9
Event Description:	Loss of bus 141/Rx trip/SI/1D SGTR/1B SX pump fail to auto start		

Time	Position	Applicant's Actions or Behavior
	RO	• Check PZR PORVs and SPRAYs: • PORVs CLOSED. • PORV isolation valves – 1RY8000B ENERGIZED • PORV relief paths – PORVs in AUTO, PORV isolation valves OPEN • Normal Spray valves CLOSED.
	RO/ BOP	• Check RCS Temperature o RCPs running o Tave at or trending to 557°F o RCPs NOT running o Tcold at or trending to 557°F o Throttle AF to control cooldown.
	RO/ BOP	• Verify RCPs running. • Verify RCP trip criteria NOT met.
	RO/ BOP	• Check if SG secondary boundaries are intact. • Verify NO SG depressurizing uncontrollably or completely depressurized.
	RO/ BOP	• Check if SG tubes are intact. • Recognize 1PR27J and 1AR23J indicate high rads.
	CREW	Identify entry conditions for 1BwEP-3, "STEAM GENERATOR TUBE RUPTURE".
	US	• Notify SM of plant status and procedure entry. • Request evaluation of Emergency Plan conditions. • Request STA evaluation of status trees.

Comments: _____

_____

_____

Scenario No:	**NRC 09-5**	Event No.	8
Event Description:	1D SGTR		

Time	Position	Applicant's Actions or Behavior
	US	• Enter/Implement 1BwEP-3, "STEAM GENERATOR TUBE RUPTURE", and direct operator actions of 1BwEP-3 to establish the following conditions:
	RO/ BOP	• Check Status of RCPs: • RCPs – running.
	RO/ BOP **[CT] E-3--A**	• Identify ruptured SG 1D o 1D Main steam line rad monitor ABNORMAL for plant conditions o 1D SG level rising uncontrollably. • Isolate ruptured SG • Verify 1MS018D CLOSED (controller de-energized) • Verify 1SD002C & D CLOSED • CLOSE MSIV and MSIV bypass valves for 1D SG • Check ruptured SG level - Narrow Range > 10% • Verify/close 1AF013H - may have already been closed in 1BwEP-0. • Set controller for 1AF005D to 0% • Dispatch equipment operator to locally close 1AF005D
	RO/ BOP	• Check ruptured SG pressure > 320 psig
	US	• Specify RCS temperature to which the RCS must be cooled down to allow depressurization of the RCS to ruptured SG pressure.
	RO/ BOP	• Dump steam at maximum rate via: o Steam dumps in steam pressure mode o Intact SG PORVs • Block MS Isolation after P-11 reached • Bypass Steam Dump P-12 interlock when setpoint is reached by holding steam dump off/reset switch in bypass.
	RO/ BOP	• Check intact SG levels • Control Aux feed flow to maintain intact SG levels Between 30% and 50%
	RO/ BOP	• Check PZR PORVs and ISOL Valves: • PORVs CLOSED. • PORV isolation valves – 1RY8000B ENERGIZED • PORV isolation valves OPEN
	RO/ BOP	• Reset SI • Depress BOTH SI Reset Pushbuttons at 1PM06J

Comments: _____

Scenario No:	**NRC 09-5**	Event No.	8
Event Description:	1D SGTR		
Time	Position	Applicant's Actions or Behavior	
		• Verify SI ACTUATED BP light NOT lit at 1PM05J • Verify AUTO SI BLOCKED BP light lit at 1PM05J	

Comments: _____

Scenario No:	**NRC 09-5**	Event No.	8
Event Description:	1D SGTR		

Time	Position	Applicant's Actions or Behavior
	RO/ BOP	• Reset Phase A • Depress BOTH Phase A Reset Pushbuttons at 1PM06J

	RO/ BOP	• Restore IA to Cnmt
		  • Verify a station air compressor is running at 0PM01J
		  • OPEN 1IA065 and 1IA066 at 1PM11J

	RO/ BOP	• Check if RH pumps should be stopped
		  • Check RCS pressure > 325 psig
		  • Stop 1B RH pump

	RO/ BOP	• Check if RCS cooldown should be stopped
		  • Check CETCs < required temperature
		  • Reduce steam flow from steam dumps or intact SG PORVs
		  • Maintain CETCs < required temperature
		• Check ruptured SG pressure stable or rising
		• Check RCS subcooling acceptable

	RO/ BOP **[CT] E-3--C**	• Depressurize RCS to refill Pzr
		  • OPEN PZR sprays/1 PZR PORV at 1PM05J until any of the following are met:
		  o RCS press < ruptured SG press and PZR level > 14%
		  o PZR level > 68%
		  o RCS subcooling is unacceptable
		  • CLOSE PZR sprays/1 PZR PORV at 1PM05J
		  • Check RCS pressure rising

	RO/ BOP	• Check if ECCS flow should be terminated
		  • Check subcooling acceptable
		  • Check Aux feed flow >500 gpm OR NR level in 1 intact SG >10% level
		  • Check RCS pressure rising
		  • Check Pzr level >14%
		• Stop ECCS pumps
		  • Stop 1B SI pump

	RO/ BOP	• Terminate high-head ECCS & establish charging flow
		  • Depress BOTH SI recirc sump reset pushbuttons at 1PM06J
		  • Depress BOTH CV pump recirc valve reset pushbuttons at 1PM05J
		  • Check CV pump recirc valves OPEN at 1PM05J
		  • 1CV8110, 1CV8111, 1CV8114, 1CV8116

Comments: _____

_____

_____

Scenario No:	**NRC 09-5**	Event No.	8
Event Description:	1D SGTR		
Time	Position	Applicant's Actions or Behavior	
	RO/ BOP	• CLOSE 1SI8801B at 1PM05J (1SI8801A did not open, no power) • Place 1CV182 controller demand at 0% (controller is de-energized) • OPEN 1CV8105 at 1PM05J (1CV8106 did not close, no power) • Adjust 1CV121 and 1CV182 to maintain desired charging and seal injection flow.	
		NOTE: Scenario may be terminated at this point	

(Final)

Comments: _____

_____

_____