Simulation Facility: Braidwood		Scenario No.: **NRC 04-1**	Operating Test No.: **2004301**
Examiners: _____		Applicant: _____	SRO
_____		_____	RO
_____		Surrogate	BOP

LOSS OF HEAT SINK

Initial Conditions: IC-21

Turnover: 100% power, BOL, equilibrium Xenon, steady state. PRT Gas sampling in progress. 1B CV pump is running. 0 CC pump is aligned to Bus 142. Unit 2 SAC is tagged out due to high vibration problems, Diesel Backup air compressor will be on site tomorrow. 1B AF pump was tagged out for turbocharger replacement (TS 3.7.5 condition A was entered 68 hours ago), a test run has just failed. Unit 1 shutdown has been ordered by the OCC. On line risk status is YELLOW.

Event No.	Malf. No.	Event Type*	Event Description
Preload	IMF FW43 IMF RP01 IRF CC07 RI IRF CC42 RO IRF RP52 OUT IOR ZDI1IA065 OPEN IOR ZDI1IA066 OPEN IOR ZDI1RY8026 OPEN IOR ZDI1AF01PB PTL IOR ZLO1AF01PBC OFF IOR ZDI2SA01C PTL		1A AF pp Fail to start Failure of automatic Reactor Trip 0 CC pump aligned to bus 142 K606 Failure Cont Isolation Valves 1RY8026 failed open 1B AF pp OOS Unit 2 SAC OOS
1	NONE	R(RO, US) N(BOP)	Power Change
2	IMF RX21A 1700	I(RO, US)	PZR press channel 1PT455 fails low
3	IOR ZDI0WO01PB PTL	C(BOP, US)	0B VC Chill Water pump trip (**This event was run concurrently with Event 1 during the examination.)**
4	IMF CV23A 30	C(ALL)	30 GPM 1A Letdown HX leak
5, 6, & 7 Remote Remote Remote	IMF ED05A Preload Preload, IMF MS07B 4 IRF FW150 REMOVED IRF FW151 REMOVED IRF FW149 START	M (ALL) C (RO, US) C/M (ALL)	6.9KV bus 156 Faults Rx does not auto trip, manual Rx Trip will work. 1A AF pump fails to start. Loss of Heat Sink, 1B MS Line Faults inside containment 30 seconds after pump trip. Remove fuses Defeat FW isolation A Train Remove fuses Defeat FW isolation B Train Starts S/U Feedwater pump Aux Oil Pump
8	Preload, CAEPs NRC 04-1 EVENT 7 and 7A	C(ALL)	K606 fails to operate Cont Isolation valves fail to auto close, 1RY8026 cannot be closed from the control room

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

SCENARIO OVERVIEW

100% power, BOL, equilibrium Xenon, steady state. PRT Gas sampling in progress. 1B CV pump is running. 0 CC pump is aligned to Bus 142. Unit 2 SAC is tagged out due to high vibration problems, Diesel Backup air compressor will be on site tomorrow. 1B AF pump was tagged out for turbocharger replacement (TS 3.7.5 condition A was entered 68 hours ago), a test run has just failed. Unit 1 shutdown has been ordered by the OCC. On line risk status is YELLOW.

About 30 minutes into the scenario, the crew should commence a power decrease at 3-6mw/min (4.5 ideally).

About 40 minutes into the scenario the controlling PZR pressure channel 1PT455 will fail low, the RO should identify the failure and take manual control of the PZR pressure master controller. US should enter 1BwOA INST 2. TS's 3.3.1 conditions A, E, and K, 3.3.2 conditions A and D, and 3.3.4 condition A should be entered.

About 60 minutes into the scenario, 0B VC Chill Water pump will trip. Local operator will identify that the breaker is tripped. US should enter TS 3.7.11 Cond A. ORAM should be evaluated. Extra Unit 2 NSO will swap VC trains.

About 65 minutes into the scenario, a 30 gpm tube leak will occur in the 1A Letdown Hx. High Radiation in the CC system will provide the initial indication. High CC surge tank level will occur, 1BwOA PRI-6 CC System Malfunction will be entered. RO should be able to identify the leak due to reduced letdown flow. Upon identification US should order letdown isolated. 1A Letdown HX CC side should be isolated and 1B letdown HX placed in service. TS 3.4.13 condition A should be entered and exited due to identified leakage.

About 90 minutes into the scenario, 6.9KV bus 159 will fault. A red "first out" will annunciate implying a reactor trip is warranted due to RCP low flow above P-8, however the reactor trip signal will not automatically open the reactor trip breakers. The RO should identify the "red first out" and immediately initiate a reactor trip. 30 seconds after the 1B RCP trip, 1B MS line will fault inside containment. An auto SI and Main Steam Isolation will occur (Manual operation is possible). 1A AF pump will fail to start. 1BwEP-0 will be entered, and at step 15 the crew will transition to 1BwFR-H.1 due to the failure of the 1A AF pump (pump seizure) and the unavailability of the 1B AF pump and S/G levels less than 31% NR. Failure of both valves in the PRT to Waste gas sampling system containment penetration will require manual closure of 1RY8025. The inside containment valve (1RY8026) will fail in mid position. The outside containment isolation (1RY8025) will stay open due to slave relay failure until manually closed.

Completion Criteria: Scenario will end when FW flow is obtained from the U1 Startup Feedwater pump.

Critical Tasks

1. **E-0 - - A:** Manually trip the reactor from the control room before reaching RCS pressure of 2335 psig and all S/Gs <10% WR level. Failure to trip the reactor at this point would make bleed and feed ineffective.
2. **E-0 - - O:** Close containment isolation valves such that at least one valve is closed on each critical phase-A penetration before the end of the scenario. (1RY8025 must be manually closed)
3. **FR-H.1 - - A:** Establish feedwater flow into at least one SG before RCS bleed and feed is required (<43% Wide range on all 3 intact S/G levels). NOTE: In this scenario if the manual reactor trip is delayed greater than 1 minute this critical task may not be applicable since bleed and feed may be required upon entry to 1BwFR H.1.
   --OR--
   FR-H.1 - - B: Establish bleed and feed before PORVs open automatically. Bleed and feed must be established before the PORVs open due to a loss of RCS HEAT SINK. NOTE: In this scenario, it is expected that RCS pressure may rise to the PORV setpoint(s) due to CV pump injection following an SI, however for this critical task to be considered not met, RCS heat up must have caused the PZR PORVs to open (This will generally not occur until the S/Gs have dried out). On the Braidwood simulator for this set, Core Exit Thermocouples above 600°F without bleed and feed established (no CV injection, RCPs running, full spray flow) were required to cause the first PORV to open.

SIMULATOR OPERATOR NOTES:

Simulator Setup:	Completed
Reset to IC 21, reset rods, and allow simulator to run	
Place 1B AF pump and Unit 2 SAC in PTL and place Danger tags on the control switches	
Open 1RY8025	
Start 1B CV pp, shutdown 1A.	
Place 141 C/S for 0CC pump in PTL, place 142 C/S for 0CC pump in NAT, IRF CC07 RI, CC42 RO	
Run CAEP on disk for "NRC 04-1 SETUP PRELOAD" or enter preload items manually	
Place yellow at risk placard. Ensure ORAM updated.	
Ensure Delta I limits and Delta I band are correct for 100% power.	
Ensure turnover sheets, GP flowchart, REMA and Load swing instruction sheet are filled out.	

Event 1: Power Decrease at 4.5 Mw/min
Acknowledge Ramp as load dispatcher.

Event 2: Insert **IMF RX21A 1700** for 1PT455 failing low when requested by examiner. As SM acknowledge the failure, LCO 3.3.1 conditions A, E, K and 3.3.2 conditions A, and D, and 3.3.4 condition A should be entered. Acknowledge WR's and CR/IR requests. Ensure phone is used when tripping bistables (NOT radio).

- **IRF RP20 OPEN** to open protection cabinet 1 door
- **IRF RX032 TRIP** for PB455A C1-153 BS-1 Hi Press Rx Trip
- **IRF RX034 TRIP** for PB455C C1-153 BS-4 Low Press Rx Trip
- **IRF RX035 TRIP** for PB455D C1-153 BS-3 Pzr Lo Press SI
- **IRF RX033 TRIP** for PB455B C1-153 BS-2 P-11
- **IRF RX013 TRIP** for TB411C C1-124 BS-5 OT DT Rx Trip
- **IRF RX135 TRIP** for TB411D C1-124 BS-4 OT DT Runback
- **IRF RP20 CLOSE** to close protection cabinet 1

Event 3: Insert **IOR ZDI0WO01PB PTL** to trip the 0B VC chill water pump when requested by examiner. If dispatched as local operator report back that the pump breaker is tripped, if breaker closure is attempted report that breaker will not stay closed. As SM acknowledge entry into TS 3.7.11 Cond A. Report back to US that U2 assist NSO will swap VC trains. To swap VC trains: stop 0B VC supply and return fans, place 0B MCR chiller in PTL. Start 0A VC supply, then 0A VC Return, start 0A VC Chill Water pump. Prior to the starting chiller inform US, that 0A VC chiller trouble is expected and start 0A VC chiller. Be ready to acknowledge alarm, report alarm as expected. When chiller actually starts inform US that 0A VC train is running. **IRF HV01 RESET** will clear Chiller trouble annunciator when chill water temperature is low enough (10 minutes later).

Event 4: Insert **IMF CV23A 30** when requested by examiner.

- Acknowledge entry as SM into 1BwOA PRI-6, E-Plan eval request TS 3.4.13 cond A should be entered and exited due to identified leakage.
- When dispatched as NLO to isolate the 1A Letdown Hx place **IRF CC40 0** (SIM DIAG CC6)and **IRF CC37 0** to close 1CC9452B and 1CC9452A.
- To place the 1B letdown HX in service **IRF CC39 100** (SIM DIAG CC6) (1CC9452C)**.** Acknowledge CC problems as SM Issue request. If requested to drain Unit 1 CC surge tank insert **IRF CC15 100** SIM DIAG CC2 (1CC2020B)**.** When draining is complete (U1 CC surge tank at 56%) **IRF CC15 0**.

Events 5, 6, 7, 8: Insert **IMF ED05A** to trip 6.9 KV bus 156 when requested by examiner. **30** seconds later insert **IMF MS07B 4** to fault 1B MS line in containment. Failure of Rx trip, Slave relay for 1RY8025, 1RY8026 stuck open, and 1A AF pump failing to start are preloaded. **RUN** CAEPs: **NRC 04-1 EVENT 7 and 7A** immediately after SI initiation. (These simulate air operated valves in containment failing normally). If asked: Bus 156 is damaged, UAT feeder breaker door is blown open, no fire. AF pump status: report that 1B AF pump is taken apart (turbocharger has been removed), 1A AF pump is seized. When requested to remove fuses FU 24 and 27 in 1PA27J and 28J: **IRF FW150 REMOVED** and **IRF FW151 REMOVED**. To start the SU feed water pump Aux Oil pump **IRF FW149 START**
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Scenario No: **NRC 04-1** Event No. 1		
Event Description: Power decrease at 4.5 Mw/min		
Time	Position	Applicant's Actions or Behavior
	CUE	o Turnover/Load reduction brief.
	CREW	• Review applicable Precautions, Limitations and Actions of 1BwGP 100-4 • Participate in shutdown brief.
	US	• Implement actions of 1BwGP 100-4
	US	Direct load reduction to 620 Mwe at 3-6 MW/min (4.5 Mw/min is expected) • Refers to GP flowchart 1BwGP 100-4T1/2
	RO	Verify rod position and boron concentration: Initiate boration, if required. (BwOP CV-6): • Determine required boric acid volume ° ReMa Form (This is the preferred method.) ° Effects of previously performed borations ° Boration / Dilution tables • Determine required boric acid flow rate Automatic method: • Set 1FK-110 BA Flow Control to desired boration rate • Set 1FY-0110 BA Blender Preset Counter to desired volume. • Place MAKE-UP MODE CONT SWITCH to STOP position • Set MU MODE SELECT to BOR position • Place MAKE-UP MODE CONT Switch to START • Verify proper operation of valves and BA transfer pump (1CV110B open, BA Pump running, 1CV110A throttles open, BA flow indicated on recorder.) OR Batch addition of BA: • 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 boron by opening 1CV111A for 5-20 gallons.

Comments: _____

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Scenario No: **NRC 04-1** Event No. 1 (cont)		
Event Description:	Power decrease at 4.5 Mw/min	
Time	Position	Applicant's Actions or Behavior
	BOP	Initiate turbine load reduction: o May Place Turbine in "MW IN" • Depress LOAD RATE MW/MIN • Enter desired value for rate (4.5 MW/min) • Depress REF • Enter desired final turbine loading (620 MW) • When ready to begin load decrease, depress GO • Verify load reduction occurring
	RO/ BOP	Monitor reactor power and load decrease • Monitor NI's, Tave, ΔI, Pzr press/level • Monitor Mwe, turb loading, EHC
	RO	During Boration: • Monitor VCT Level and pressure • Monitor BA boric acid counter and flow • Verify boration stops at preset value
		After a measurable response and with lead examiner's concurrence, initiate the next event:

Comments: _____

Scenario No: **NRC 04-1**		Event No. 2
Event Description:		1PT455 fails low **IMF RX21A 1700**
Time	Position	Applicant's Actions or Behavior
	CUE	Annunciators: • 1-12-A1 PZR LOW RX TRIP STPT ALERT • 1-12-B1 PZR PRESS LOW • 1-12-C1 PZR PRESS CONT DEV LOW HTRS ON • 1-10-C5 OT DT HIGH ROD STOP C-3 • 1-14-B1 OT DT HIGH RX TRIP ALERT • 1PI-455A indicates 1700 psig • Master pressure controller 1PK-455A output fails low, spray valves close, all PZR heaters on.
	RO	• Identifies 1PI-455A indicates low. • Informs US. • Takes manual control of 1PK-455A, raises output in manual to stabilize RCS pressure rise. (examinee may wait for direction by US) • Selects operable channel for controlling channel (when directed by US). • Selects operable channel for PZR press and OT DT recorders (when directed by US). • Returns PZR press control to auto (when directed by US) and PZR pressure approximately stable at 2235 psig. • Coordinates bistable tripping with NSO's in AEER.
	BOP/RO	• References BwARs.
	US	• Enters 1BwOA INST-2 Attachment B • Notifies SM of 1BwOA INST-2 entry: • Communicates 1PT455 failed low • Requests SM evaluate for Emergency Plan conditions o Asks for WR and CR/IR • Requests additional NSOs for bistable tripping • Directs actions in BwOA o Directs BOP to Stop ramp • Briefs RO and additional NSO's on bistable tripping • Determines LCO 3.3.1 conditions A, E, K, 3.3.2 conditions A, D, and 3.3.4 condition A should be entered. • Informs SM of TS entries. o May restart ramp.
	RO/Add	RO and additional NSO coordinate to Trip the following bistables in protection cabinet 1:

Comments: _____

Scenario No: **NRC 04-1**		Event No. 2
Event Description:		1PT455 fails low **IMF RX21A 1700**
Time	Position	Applicant's Actions or Behavior
	NSOs	• **IRF RP20 OPEN** to open protection cabinet 1 door • **IRF RX032 TRIP** for PB455A C1-153 BS-1 Hi Press Rx Trip • **IRF RX034 TRIP** for PB455C C1-153 BS-4 Low Press Rx Trip • **IRF RX035 TRIP** for PB455D C1-153 BS-3 Pzr Lo Press SI • **IRF RX033 TRIP** for PB455B C1-153 BS-2 P-11 • **IRF RX013 TRIP** for TB411C C1-124 BS-5 OT DT Rx Trip • **IRF RX135 TRIP** for TB411D C1-124 BS-4 OT DT Runback • **IRF RP20 CLOSE** to close protection cabinet 1
		With lead examiner's concurrence, enter next event.

Comments: _____

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Scenario No: **NRC 04-1**		Event No. 3
Event Description:		OB VC chill water pump trips
Time	Position	Applicant's Actions or Behavior
	CUE	Annunciator: • 0-33-C6 MCR CHLR Unit Trouble
	BOP	• Refers to BwAR • Identifies 0B Chill water pump tripped • Informs US

	US	• Acknowledges 0B chill water pump trip.
		• Directs local investigation of pump.
		• Determines TS 3.7.11 Cond A is applicable.
		• Directs VC trains be swapped
		• Informs SM:
		  • 0B VC Chill Water pump trip
		  • TS entry
		  • Requests WR and CR/Issue.
		• Directs On Line Risk Assessment.
		o May stop Turbine ramp, & restart.

		With lead examiner's concurrence, enter next event.

Comments: _____

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Scenario No: **NRC 04-1** Event No. 4		
Event Description: 1A CV letdown Hx Leak **IMF CV23A 30**		
Time	Position	Applicant's Actions or Behavior
	CUE	Annunciators: • 1-2-A5 CC SURGE TANK LEVEL HIGH LOW • 1PR09J CC rad monitor in Alarm on RM-11 • Rising Unit 1CC Surge Tank Level • Lowered letdown flow rate on 1FI-132 • Lowering VCT level • CC surge tank vent valve, 1CC017, closed
	BOP	• Refers to BwAR for 1PR09J CC rad monitor o Refers to BwAR for CC surge tank Level • Checks CC surge tank level rising.
	RO	• Identifies reduced letdown flowrate o Identifies lowering VCT level o Isolates Letdown o Diverts letdown to RHUT o Restores letdown when 1A HX isolated and CC aligned to 1B
	US	• Implements 1BwOA PRI-6 "COMPONENT COOLING MALFUNCTION" Att. A • Informs SM of Emergency plan evaluation, requests WR and CR/IR o TS 3.4.13 condition A should be entered and exited (once A letdown HX is isolated) due to excessive identified leakage. • May stop and restart ramp
	BOP	• Checks CC surge tank level rising (when directed)
	US	• Transitions to attachment B
	BOP/RO	Check for leakage from RCP thermal barriers: • Verifies 1-7-E4 is not lit. • No seal injection flow abnormally high. Isolate CC System Inleakage • Verifies 1PR09J or 0PR09J in alarm on RM-11 • Notifies chemistry to sample CC system for activity • Locate inleakage from 1A Letdown Heat Exchanger.
	US	One of the following will be performed:

Comments: _____

Scenario No: **NRC 04-1**		Event No. 4
Event Description:		1A CV letdown Hx Leak **IMF CV23A 30**
Time	Position	Applicant's Actions or Behavior
		o May direct letdown be isolated or o May direct swapping of in-service Letdown Hx with letdown in service o May direct 1CV112A be placed in Divert • Determine from P&IDs that 1CC9452A and B must be closed. Directs these valves be closed. o May direct 1CV8467A be closed • Informs SM of 1A letdown Hx problem, CR and AR/IR o Inform MM Dept. of the 1A Letdown HX failure o Notify Rad Protection of elevated radiation levels in the CC system • IF letdown isolated, directs normal or excess letdown be restored
	RO/BOP	Isolates letdown (IF directed) • Closes 1CV8149A, B, and C o May close 1CV459 and 460 Swaps in-service letdown heat exchangers (per procedure) IF directed. • Opens 1CV8401B, closes 1CV8401A • Asks NLO to open 1CC9452D • Restores letdown or excess letdown (if isolated) as directed.
		With lead examiner's concurrence, enter next event.

Comments: _____

Scenario No: **NRC 04-1**		Event No. 5-8
Event Description:		Loss of Heat Sink.
Time	Position	Applicant's Actions or Behavior
	RO **E-0 - - A**	(**SIM OPERATOR**: After ensuring preloads are set, insert **IMF ED05A**, 156 Trip. 30 seconds later, regardless of Reactor Trip status insert **IMF MS07B 4** to fault 1B MS line in containment. Immediately following SI actuation RUN CAEPs: **NRC 04-1 Event 7 and 7A** to simulate IA valves in containment failing normally. Do NOT silence back panel alarms until after RO has performed Cont Isolation steps.) Performs Immediate Actions of 1BwEP-0, Reactor Trip or SI: • Notes Red First Out: RCP LOW FLOW ABOVE P8 RX TRIP. • Initiates manual Reactor Trip. Verify Reactor Trip: •All Rod Bottom Lights Lit. •Reactor Trip and Bypass Breakers Open. •Neutron Flux Decreasing. o May determine SI is required, and manually actuates SI. o May determine MS is required, manually actuates MS isolation.
	US	• Directs actions of 1BwEP-0 Reactor Trip or SI
	BOP	Performs Immediate Actions of 1BwEP-0: Verify Turbine Trip: •Verify all Turbine Throttle Valves are closed. •Verify all Turbine Governor Valves are closed. Verify Power to 4KV ESF Buses: •Buses 141 and 142 Bus Alive Lights both LIT.
	RO	Performs Immediate Actions of 1BwEP-0, Reactor Trip or SI: • Verifies SI has been actuated, manually initiates SI.
	US	• Informs SM of 1BwEP-0 entry, requests STA, and Emergency Plan evaluation
	BOP	Verify FW Isolation: •FW Pumps Tripped. •FW Isolation Monitor Lights LIT. •FW Pump Discharge Valves (1FW002A, B, C) Closed. **(Examiner NOTE**: At this point BOP will silence RM-11 and proceed to back panels to silence alarms and will remain unavailable until RO has performed Cont Isolation steps. If BOP is directed to return, BOP will attempt to steer RO toward his own panel by stating that he will close 1RE9160B and 1RE9170 on 1PM11J when Containment isolation step is directed by US)
	RO	Verify ECCS Pumps running:

Comments: _____

Scenario No: **NRC 04-1**		Event No. 5-8
Event Description:		Loss of Heat Sink.
Time	Position	Applicant's Actions or Behavior
		• Both CV pumps. • Both RH pumps. • Both SI pumps.
	RO **[CT]** **E-0 - - O**	Verify RCFCs running in Accident Mode: •Group 2 RCFC Accident Mode status lights lit. Verify Cnmt Isolation Phase A: •Group 3 Cnmt Isol monitor lights are not all lit: • RE9169B, RE9170, RY8025, RY8026, RY8033. •Manually closes 1RE9169B, 1RE9170, 1RY8025, 1RY8033, attempts to manually close 1RY8026 •1RY8025 must be manually closed to meet critical task, closure attempt on 1RY8026 should be made. (**Examiner NOTE: BOP may assist anytime after this is done.)** Verify Cnmt Ventilation Isolation: •Group 6 Cnmt Vent Isol monitor lights lit.
	BOP US BOP/RO	Verify AF system: •Reports Neither AFW pump is running. o 1AF013A through D all Open o 1AF005A through D all Throttled/Open. • Directs personnel check on AF pump status • Verify 1A and 1B CC pumps are running. • Verify 1A and 1B SX pumps are running. Check Main Steamline Isolation Not Required: • Reports 1B S/G pressure is less than 640 psig or Containment pressure is greater than 8.2 psig. • Verifies all MSIVs and all MSIV Bypass valves are closed. (May use Bistable status lights or direct valve indication)
	BOP/RO	Check if CS is required: •Reports Containment Pressure has exceeded 20 psig and CS is required. (**Examiner NOTE:** CS may not be actuated when this step is reached initially. CS will actuate approx 5 minutes

Comments: _____

Scenario No: **NRC 04-1**		Event No. 5-8
Event Description:		Loss of Heat Sink.
Time	Position	Applicant's Actions or Behavior
		after steam line faults) •RO stops all RCPs •BOP checks Group 6 CS and Phase B monitor lights •BOP verifies eductor suction and additive flows satisfactory
	BOP	Verify Total AF Flow • Reports No AFW flow is available and all SG narrow range levels are < 31% (adverse)
	US	Transitions to 1BwFR H.1, Loss of Secondary Heat Sink, from 1BwEP-0, due to No AFW flow and low inventory levels in all SGs • Announces procedure transition and asks for peer check from RO/BOP • Informs SM of plant Status, procedure entry and that Emergency Plan evaluation is required • Directs actions of 1BwFR-H.1, Loss of Secondary Heat Sink
		Note: Upon entry into 1BwFR-H.1, if at any time the Operator Action Summary page item for Bleed and Feed Initiation is met the Crew may immediately go to step 13 of 1BwFR-H.1. If this occurs go to "♦" page 15
	RO	Check if Secondary Heat Sink is Required, Check Cent CHG Pump Status: • Checks RCS pressure and temperature • Checks CV pump status (both running)
	BOP/RO	Check if feed and bleed is required: • Verifies Wide range S/G levels are greater than 43% • Verifies RCS pressure is greater than 2335 psig due to loss of heat sink **Note: If Bleed and Feed Initiation is required, the Crew may immediately go to step 13 of 1BwFR-H.1. If this occurs go to "♦" page 15**
	BOP US BOP	Attempts to establish AF flow • Verifies 1SD002A-H closed, 1SD005A-D closed. • Reviews attachment B prior to feeding S/Gs • AF PUMP SX SUCT VLS ARMED NOT lit.

Comments: _____

Scenario No: **NRC 04-1** Event No. 5-8		
Event Description: Loss of Heat Sink.		
Time	Position	Applicant's Actions or Behavior
		• 1AF004A and B both OPEN. Note: US should have directed closure of 1AF013B and F and should not be directing that these valves are verified open. • 1AF013A, C, D, E, G, H all OPEN • 1AF005A, C, D, E, G, H all OPEN • Neither AF pump is running. • Dispatches operator to attempt to start AF pumps, US may after reading this step decide that this is not appropriate based on reports by field operators on AF pump status. • Verifies AF flow is NOT greater than 500 gpm.
	RO	Reduce RCP Heat Input: • Verify all RCPs stopped. (RCPs should have been stopped earlier due to high containment pressure)
	BOP/RO US	Prepare FW System for Restoration • Check CD/CB pumps at least one running. • Place FW REG valves, bypass valves, tempering flow control valves in manual at zero demand • Checks FW isolation Aux relay lights lit • Checks SI is actuated. • Dispatches operator to pull fuses in 1PA27J and 1PA28J. • Opens 1FW035A, C, D when FW actuated lights are clear. • Verifies SU feedwater pump or 1A FW pp is available • Verifies CD/CB pumps running. • Checks BUS 159 energized. • Dispatches operator to start SU feedwater pump aux oil pump. • Opens discharge valve for SU feedwater pump • Verifies SU Recirc Valve Open • Verifies Main FW pump Recirc Valves Closed. • Starts the SU feedwater pump
	US	• Verifies Attachment B has been reviewed • Directs BOP/RO to feed at least two S/Gs (NOT 1B), may direct all three be fed.
	BOP **FR-H.1 - - A:**	• Feeds at least two Non dry S/Gs (B S/G should not be fed, all others may be fed at max rate available with tempering lines) Feed lines should not be voided, e.g. has not been greater than 75minutes since feed has been isolated.

Comments: _____

Scenario No: **NRC 04-1**		Event No. 5-8
Event Description:		Loss of Heat Sink.
Time	Position	Applicant's Actions or Behavior
		Once Feed is initiated to intact S/Gs: END SCENARIO.
♦	RO	**NOTE: These steps are only performed if Feed and Bleed is initiated.** Establish RCS Feed Path: • Verifies all RCPs stopped and SI actuated.
	RO **FR-H.1 - - B:**	Verify RCS Feed Path: • Checks that a CV or SI pump are running (All four are running.) • Checks group 2 cold leg injection alignment. Establish RCS Bleed Path: • Verifies PORV block valves energized and open. • Opens both PZR PORVs. Verify Adequate RCS Bleed Path: • Verifies both PZR PORVs and Block Valves Open.
	US	• Checks that ESF actuation Steps of 1BwEP-0 have been completed.
	BOP/RO	Reset SI if Necessary: • Resets SI, verifies SI reset. **END SCENARIO**. (Scenario cannot go farther due to overrides necessary to cause 1RY8026 to fail open.

EAL CALL: **FS1** Due to potential loss of Fission Product and RCS Barriers. (Entry into 1BwFR-H.1)

Comments: _____

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Simulation Facility	Braidwood	Scenario No.: **NRC 04-2**	Operating Test No.: **2004301**
Examiners:	_____	Applicant: _____	SRO
	_____	_____	RO
	_____	Surrogate	BOP

ATWS/ Tube Rupture

Initial Conditions: IC-16

Turnover: 52% Steady State MOL, 1B FW pp turbine rebuilding in progress, 1A SI pump tagged (TS 3.5.2 cond A was entered 24 hours ago) to replace oil cooler, expected back tomorrow. RCS activity is elevated (below TS limits for continuous operation). National security threat level has just been raised to Orange due to a non-specific threat against a United States nuclear plant. System Power has requested an 80 Mw reduction in Unit 1 Load as soon as possible. Chemistry has requested the Unit 1 Cation bed be placed in-service for 25 minutes. A NLO is being briefed by the WEC on placing the Cation bed in service and will contact the U1 control room when ready. On line risk status is YELLOW.

Event No.	Malf. No.	Event Type*	Event Description
Preload	IMF RP02A IMF RP02B IOR ZDI1SI01PA PTL IRF MS69 0 IRF MS71 0 IRF FW025 0 IOR ZDI1FW002B CLS IOR ZDI1FW012B CLS IOR ZDI1FW01PBA PTL IOR ZDI1FW01PBB PTL IOR ZDI1FW01PPC PTL IOR ZLO1ES095A2 OFF IOR ZLO1ES095A1 ON IOR ZDI1FW01PBE STOP		RTA fails to operate RTB fails to operate 1A SI pump OOS 1B FW pp OOS
1	NONE	R(RO, US) N(BOP)	Power Change
2	IMF RM02U	I(US)	1PR11J (Cont Atmos Rad Monitor) Fails
3	IMF RX10A 0	I(ALL)	1PT505 failure
4	IMF RX13A 100	I(RO, US)	1LT459 fails High
5, 6, 7	IMF RD09 0 IOR ZDI1MS001D CLS Preload	I(RO, US) C(BOP, US) M(ALL)	Rod speed fails to zero 1D MSIV fails closed ATWS
8	IMF TH03A 400	M(ALL)	Tube Rupture 1A S/G

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

SCENARIO OVERVIEW

52% Steady State MOL, 1B FW pp turbine rebuilding in progress, 1A SI pump tagged (TS 3.5.2 cond A was entered 24 hours ago) to replace oil cooler, expected back tomorrow. RCS activity is elevated (below TS limits for continuous operation). National security threat level has just been raised to Orange due to a non-specific threat against a United States nuclear plant. System Power has requested an 80 Mw reduction in Unit 1 Load as soon as possible. Chemistry has requested the Unit 1 Cation bed be placed in-service for 25 minutes. A NLO is being briefed by the WEC on placing the Cation bed in service and will contact the U1 control room when ready. On line risk status is YELLOW.

About 30 minutes into the scenario, the crew should commence a power decrease at 2 mw/min.

About 35 minutes into the scenario, 1PR11J will fail, the BOP should refer to the BwAR, US should enter TS 3.4.15 Cond B.

About 45 minutes into the scenario 1PT505 will fail low, the RO should take manual control of rods after verifying turbine load stable. 1BwOA INST-2 should be entered. TS 3.3.1 conditions A and P should be entered. Rods must be returned to "Auto" before continuing.

About 60 minutes into the scenario 1LT459 will fail High. Charging flow will drop to minimum. Upon RO diagnosis, US should direct the Master PZR level/1CV121 controller be placed in manual and enter 1BwOA INST-2. TS 3.3.1 conditions A and K should be entered.

About 75 minutes into the scenario 1D MSIV will fail closed, BOP or RO may diagnose, US should order reactor trip. RO will attempt to trip from both panels and declare ATWS, RO will be forced to manually insert rods due to failure of automatic rod speed. As soon as RO begins manual rod insertion (and immediate actions are completed) RTA will open automatically. At RCS pressure peak 1A S/G will rupture (400 gpm). Crew should identify leak due to rad monitors, RCS, and S/G level response.

Completion criteria occurs when step 17 of 1BwEP-3 is completed (S/G and RCS pressure are equalized).

Critical Tasks

1. **FR-S.1 - - C** Insert negative reactivity into the core by at least one of the following methods before completing the immediate-action steps of FR-S.1:
    - De-energize the control rod drive MG sets
    - Insert RCCAs
    - Establish emergency boration flow to the RCS
2. **E-3 - - A:** Isolate feedwater flow into and steam flow from the ruptured SG before a transition to ECA-3.1 occurs.

SIMULATOR OPERATOR NOTES:

Simulator Setup:	Completed
Reset to IC-16, reset rods, and allow simulator to run.	
Place 1A SI pump in PTL and place a Danger Tag on the control switch.	
Shutdown the 1B FW Pump, place danger tags on the 1B FW pump controls. Dot appropriate alarms.	
Run CAEP on disk for "NRC 04-2 SETUP PRELOAD" or enter preload items manually.	
Place yellow at risk placard. Update ORAM.	
Ensure Delta I limits and Delta I band are correct for 52% power.	
Ensure turnover sheets, REMA, and Load swing instruction sheet are filled out.	

Event 1: Power Decrease at 2 Mw/min

Event 2: Insert **IMF RM02U** to fail 1PR11J. As SM acknowledge the failure, LCO 3.4.15, Cond B Entry, WR and CR/IR. As RP report back that 1PR11J Logic Selector has been placed in bypass (when requested). Report back as RP that the 1PR11J pump appears broken. Acknowledge request as RP to take U1 containment air samples.

Event 3: Insert **IMF RX10A 0** for 1PT505 failing Low. As SM acknowledge the failure, LCO 3.3.1 Conditions A and P, On Line Risk assessment, WR's and CR/IR requests. **IRF RP20 OPEN** to open protection set 1 door, **IRF RX143** TRIP to trip (BS-1 C1-742) bistable, **IRF RP20 CLOSE** to shut protection set 1 door. **IMF PN0470 ON** will simulate OPERATING BYPASS (SW-12) to TIP 1, **IRF RX149 TRIP** will place the OPERATING BYPASS SWITCH TEST INPUT (SW11) to TEST-TRIP,. Do not continue until Rods are returned to AUTO.

Event 4: Insert **IMF RX13A 100** to fail 1LT459 High. As SM acknowledge the failure, LCO 3.3.1 Conditions A and K should be entered, WR's and CR/IR requests. **IRF RP20 OPEN** to open protection set 1 door. Insert **RX029 TRIP** to trip bistable LB459A (BS-1), **IRF RP20 CLOSE.**

Events 5-8: Insert the following on one trigger **IMF RD09 0** and **IOR ZDI1MS001D CLS** to fail rod speed and close the 1D MSIV. The ATWS is preloaded. When RCS pressure peaks, insert **IMF TH03A 400** to rupture the 1A S/G. Delete **DMF RP02A** when the immediate actions of 1BwFR-S.1 are complete. If RTA does not automatically open insert **IRF RP01 TRIP**. If dispatched as NLO report back that RTA was already open and delete **DMF RP02B, IRF RP02 TRIP** to open RTB. As SM acknowledge entry into 1BwFR-S.1, 1BwEP-0, and 1BwEP-3, Emergency Plan evaluations, and STA request.

Scenario No: **NRC 04-2** Event No. 1		
Event Description:	Power decrease at 2 Mw/min to 535 Mwe	
Time	Position	Applicant's Actions or Behavior
	CUE	o Turnover. (Reviews and Load Swing Instruction Sheet may have been initiated in classroom) o If asked, Nuclear Engineering does not have a beacon prediction (ReMa) available for the down power.
	US	• Implement actions of 1BwGP 100-4
	US	Direct load reduction to 535 Mwe at 2 MW/min: • Initiate load swing instruction sheet, 1BwGP 100-4T2
	CREW	Review applicable Precautions, Limitations and Actions of 1BwGP 100-4
	RO	Verify rod position and boron concentration: Initiate boration, if required. (BwOP CV-6): • Determine required boric acid volume ° Effects of previously performed borations ° Boration / Dilution tables • Determine required boric acid flow rate Automatic method: • Set 1FK-110 BA Flow Control to desired boration rate • Set 1FY-0110 BA Blender Preset Counter to desired volume. • Place MAKE-UP MODE CONT SWITCH to STOP position • Set MU MODE SELECT to BOR position • Place MAKE-UP MODE CONT Switch to START • Verify proper operation of valves and BA transfer pump (1CV110B open, BA Pump running, 1CV110A throttles open, BA flow indicated on recorder.) OR Batch addition of BA: • 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

Comments: _____

Scenario No: **NRC 04-2**		Event No. 1 (cont)
Event Description:		Power decrease at 2 Mw/min to 535Mwe
Time	Position	Applicant's Actions or Behavior
	BOP	Initiate turbine load reduction: • Depress LOAD RATE MW/MIN • Enter desired value for rate (2 MW/min) • Depress REF • Enter desired final turbine loading (US may elect to go to 620 MWe first vice 535 MWe) • When ready to begin load decrease, depress GO • Verify load reduction occurring
	RO/ BOP	Monitor reactor power and load decrease: • Monitor NI's, Tave, ΔI, Pzr press/level • Monitor Mwe, turb loading, EHC
	RO	During Boration: • Monitor VCT Level and pressure • Verify RCS boron concentration increasing • Monitor BA blender counter • Verify boration stops at preset value
		After a measurable response and with lead examiner's concurrence, initiate the next event.

Comments: _____

Scenario No: **NRC 04-2**		Event No. 2
Event Description:		1PR11J (Cont Atmos Rad Monitor) Fails **IMF RM02U**
Time	Position	Applicant's Actions or Behavior
	CUE	• RM-11 ALARM
	BOP	• Identifies 1PR11J has failed due to loss of sample flow • Refers to BwAR • Dispatches RP to check CASP panel. (Report back that 1PR039, 1PR041, 1PR043, 1PR044, 1PR035 are closed) • Informs RP to locally place 1PR11J Logic selector switch in bypass (**SIM OPERATOR NOTE**: Report back as RP that the pump appears broken) • Refers to BwOP AR/PR-11, BwOP AR/PR-11A-5 • Informs RP to take Containment samples • Informs US to consult TS 3.4.15
	US	• Determines TS 3.4.15 condition B is applicable • Informs SM, requests WR and CR/IR, engineering support o Fills out LCOAR paperwork
		After a measurable response and with lead examiner's concurrence, initiate the next event.

Comments: _____

Scenario No: **NRC 04-2** Event No. 3		
Event Description: 1PT505 fails low **IMF RX10A 0**		
Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciators: (1-14-D1) TAVE CONT DEV HIGH (1-12-D1) PZR PRESS CONT DEV LOW HTRS ON Annunciator • Rods stepping in at 72 steps/min
	RO	• Recognizes 1PT505 has failed • Informs US • Places rods in Manual o Informs US if DNB tech spec met • Defeats 1PT505 when directed
	BOP	• Places steam dumps in steam pressure mode when directed
	US	o Directs Load Ramp placed in HOLD. May direct Rods stepped out. • Acknowledges 1PT505 failure • Enters 1BwOA INST-2 attachment D • Informs SM of problem, requests WR and CR/IR, Emergency-Plan evaluation • Directs actions per BwOA • Determines TS 3.3.1 Cond A and P apply and informs SM of TS entry. • Enters Tech Spec 3.4.1 (DNB), if required • Briefs RO and spare NSOs for bistable tripping (**SIM OPERATOR NOTE**: • **IRF RP20 OPEN** to open protection set 1 door • **IRF RX143 TRIP** to trip (BS-1 C1-742) bistable • **IRF RP20 CLOSE** to shut protection set 1 door) • **IMF PN0470 ON** will simulate OPERATING BYPASS (SW-12) to TIP 1 • **IRF RX149 TRIP** will place the OPERATING BYPASS SWITCH TEST INPUT (SW11) to TEST-TRIP
		After a measurable response and with lead examiner's concurrence, initiate the next event.

Comments: _____

Scenario No: **NRC 04-2**		Event No. 4
Event Description:		1LT459 fails High. **IMF RX13A 100**
Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciators: (1-12-A3) PZR LEVEL HIGH RX TRIP STPT ALERT (1-12-C1) PZR PRESS CONT DEV LOW HTRS ON (1-12-C3) PZR LEVEL CONT DEV HIGH HTRS ON (1-9-D3) CHG LINE FLOW HIGH LOW • Charging flow control CV-121 throttles closed to decrease flow
	RO/US	Identify/report failed PZR level channel: • LT-459
	US	• Implement BwOA INST-2, Attachment C and direct operator action. • Informs SM, requests WR & CR/IR.
	RO/US	Check PZR Level: • Verify level normal (60%) • If NOT take manual control of either the master level controller (LK-459) OR CV121 controller (FK-121) and increase charging flow to normal while maintaining RCP seal injection flow within required limits. • Select Operable Channel on LEVEL CHANNEL SELECTOR by placing to **461**/**460** position (when directed). • Verify Channel 460 or 461 selected on PZR level recorder. (when directed)

	US	• Enters TS 3.3.1 Cond A & K
		• Briefs RO and spare NSOs for bistable tripping.
		(SIM OPERATOR NOTE:
		  • Insert **IRF RP20 OPEN** to open protection set 1 door.
		  • Insert **IRF RX029 TRIP** to trip bistable LB459A (BS-1)
		  • Insert **IRF RP20 CLOSE** to close protection set 1 door.)

		After a measurable response and with lead examiner's concurrence, initiate the next event.

Comments: _____

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Scenario No: **NRC 04-2**		Event No. 5-8
Event Description:		Rod speed fails to zero, 1D MSIV fails closed, ATWS, 1A S/G SGTR. **IMF RD09 0, IOR ZDI1MS001D CLS, IMF TH03A 400**
Time	Position	Applicant's Actions or Behavior
	CUE	• Annunciators: 1-15-E8 MSIV NOT FULL OPEN 1-15-D3 S/G 1D FLOW MISMATCH STM FLOW LOW 1-1-A5 MSIV NOT FULL OPEN 1-1-E5 MSIV 1D HYD/PNEU PRESS HIGH LOW (**SIM OPERATOR NOTE**: Insert **IMF RD09 0**, **ZDI1MS001D CLS** on one trigger, when RCS pressure peaks (after Main Turbine Trip) insert **IMF TH03A 400**)
	CREW	• Identify closure of 1D MSIV • Determine that a Reactor Trip is required
	RO **[CT] FR-S.1 - - C**	Performs immediate actions of 1BwFR-S.1 ATWS: • Manually attempts reactor trip from 1PM05J and 1PM06J RX Trip Switches • Determines rods should be auto inserting but are NOT moving • Manually inserts control rods o Dispatches operator to locally trip Unit 1 Reactor Trip Breakers
	US	Announces ATWS, enters, and directs actions of 1BwFR-S.1: • Informs SM, requests Emergency Plan evaluation • Requests STA to monitor Status Trees (**SIM OPERATOR NOTE**: delete malfunction **DMF RP02A** and insert **IRF RP01 TRIP** (if necessary) when immediate actions of 1BwFR-S.1 are complete. When dispatched as NLO, delete **DMF RP02B** and insert **IRF RP02** to trip, report that U1 RTA was already open)
	BOP	Performs immediate actions of 1BwFR-S.1 ATWS: • Trips Turbine • Verifies AF pumps running
	RO	Initiates emergency boration: • Checks CV pump running • Opens 1CV8104 • Starts Boric Acid Transfer pump • Checks emergency boration flow greater than 30 gpm • Checks charging flow greater than 30 gpm • Checks PZR pressure less than 2335 psig
	BOP	• Verifies Containment Vent Isolation
	RO	Verifies Reactor Subcritical

Comments: _____

Scenario No: **NRC 04-2**		Event No. 5-8
Event Description:		Rod speed fails to zero, 1D MSIV fails closed, ATWS, 1A S/G SGTR. **IMF RD09 0, IOR ZDI1MS001D CLS, IMF TH03A 400**
Time	Position	Applicant's Actions or Behavior
		• PR channels Less than 5% • IR channels have a negative startup rate
	US	Transitions to 1BwEP-0: • Asks for peer check (from RO/BOP) • Informs SM, requests Emergency Plan evaluation
	RO	Verifies Reactor Trip: • Rod bottom lights – ALL Lit • Reactor trip and bypass breakers open o If RTB still closed re-initiates trip • Neutron flux - Dropping
	BOP	Verifies Turbine Trip: • All turbine throttle valves CLOSED • All turbine governor valves CLOSED Verify Power to 4KV ESF Busses: •Both ESF busses energized
	CUE CREW	1A Steam generator tube rupture. (This malfunction was placed when RCS pressure peaked) • 1A S/G level rising • RCS pressure dropping • PZR level dropping • Main Steam line rad monitors in alarm Check SI Status: (**Examiner NOTE**: The crew may have manually Safety Injected based on previous indications or an automatic SI may have occurred) • Check SI actuated. • Check if SI required: •Check PZR pressure •Check steam line pressure •Check containment pressure •Check PZR level. (RO should determine that PZR level and pressure cannot be maintained)
	BOP	Verify FW isolated: • FW pumps tripped (all three) • FW Isolation monitor lights lit • FW pps disch vlvs, 1FW002A and C closed (or going closed, 2B is already closed).
	RO	Verify ECCS pumps running: • Both CV

Comments: _____

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Scenario No: **NRC 04-2**		Event No. 5-8
Event Description:		Rod speed fails to zero, 1D MSIV fails closed, ATWS, 1A S/G SGTR. **IMF RD09 0, IOR ZDI1MS001D CLS, IMF TH03A 400**
Time	Position	Applicant's Actions or Behavior
	RO/ BOP	• Both RH • 1B SI pump (1A is OOS)
	BOP	Verify RCFC Accident Mode lights lit Verify Phase A isolation - Group 3 monitor lights lit Verify CNMT Ventilation isolation - Group 6 CNMT Vent Isol monitor lights lit Verify AF system: • AF pumps both running • AF isolation valves open 1AF13A-H • AF flow control valves throttled 1AF005A-H Verify both CC pumps running Verify both SX pumps running
	RO/ BOP	Check/verify Main Steamline Isolation not required: • All S/G pressures > 640 psig • CNMT pressure < 8.2 psig
	BOP/ RO	Check CS not required: • CNMT pressure remained < 20 psig Verify Total AF flow: • AF flow > 500 gpm • SG levels maintained • Check status of S/G NR levels o SG levels NOT increasing in an uncontrolled manner, then continue o IF 1A S/G is determined to be increasing in an uncontrolled manner, THEN • Close 1AF013A and E
	RO/ BOP	Verify ECCS valve alignment: • Determine Group 2 Cold Leg Injection monitor lights are lit Verify ECCS flow • HHSI flow >100 gpm • RCS pressure NOT <1700 psig
	RO	Check at least ONE PZR PORV relief path available: • PORV isol valves – (Both) ENERGIZED • PORV relief paths – (Both) AVAILABLE and in AUTO • (Both) Isolation valves open

Comments: _____

Scenario No: **NRC 04-2**		Event No. 5-8
Event Description:		Rod speed fails to zero, 1D MSIV fails closed, ATWS, 1A S/G SGTR. **IMF RD09 0, IOR ZDI1MS001D CLS, IMF TH03A 400**
Time	Position	Applicant's Actions or Behavior
	BOP	Verify Generator Trip: • OCB 1-8 and 7-8 open • PMG output breaker open
	BOP	Verify both DG's running: • SX valves open 1SX169A/B • Dispatch operator locally to check operation
		Examiners note: US and RO will continue in 1BwEP-0 while BOP is performing the next 3 ventilation steps:

	BOP	Verify Control Room ventilation aligned for emergency operations:
		• Dispatch NLO to trip VV, VL and VW fans
		• Operating VC train equipment running:
		  • Supply fan
		  • Return fan
		  • M/U fan
		  • Chilled water pump
		• Verify MCR chiller 0B running
		• Operating VC train dampers:
		  • M/U fan outlet damper NOT full closed 0VC08Y
		  • VC train M/U filter light LIT
		  • 0VC09Y open
		  • 0VC313Y closed
		• Operating VC train Charcoal Adsorber aligned for train B
		  • 0VC44Y closed
		  • 0VC05Y open
		  • 0VC06Y open
		• Control Room pressure greater than +0.125 inches water on 0PDI-VC038

	BOP	Verify Auxiliary Building ventilation aligned:
		• Two inaccessible filter plenums aligned
		  • Plenum A fan 0VA03CB running
		  • Damper 0VA023Y open
		  • Damper 0VA436Y closed

Comments: _____

Scenario No: **NRC 04-2**		Event No. 5-8
Event Description:		Rod speed fails to zero, 1D MSIV fails closed, ATWS, 1A S/G SGTR. **IMF RD09 0, IOR ZDI1MS001D CLS, IMF TH03A 400**
Time	Position	Applicant's Actions or Behavior
		• Plenum C fan 0VA03CF running • Damper 0VA072Y open • Damper 0VA438Y closed
	BOP	Verify FHB ventilation aligned: • Train B fan 0VA04CB running: • 0VA055Y open • 0VA062Y open • 0VA435Y closed
	RO	Check PZR sprays & PORVs closed: • Normal spray valves closed 1RY455B and 1RY455C • PORVs closed: • 1RY455A • 1RY456
	RO	Maintain RCS temperature control: • Check RCP's running • Verify RCS average temperature stable at or trending to 557°F
	RO	Check if RCP's should be stopped: • Any RCP's running • Check if trip criteria applies: o HHSI flow >100 gpm OR o SI pump discharge flow >200 gpm • RCS pressure < 1425 psig • Trip RCP's if controlled cooldown NOT in progress and above criteria met
	BOP/ RO	Check if SG secondary pressure boundaries are intact: • Check pressure in all SGs: • None decreasing in an uncontrolled manner • None completely depressurized
	CREW	Determine S/G tubes are NOT intact: • RM-11 Rad Monitor ALERT/HI RAD Alarms o 1PR08J SG Blowdown o 1PR27J SJAE/GS o 1AR 22/23 1A Mainsteam Line

Comments: _____

Scenario No: **NRC 04-2**		Event No. 5-8
Event Description:		Rod speed fails to zero, 1D MSIV fails closed, ATWS, 1A S/G SGTR. **IMF RD09 0, IOR ZDI1MS001D CLS, IMF TH03A 400**
Time	Position	Applicant's Actions or Behavior
	US/RO	Transitions to 1BwEP-3, 'STEAM GENERATOR TUBE RUPTURE, has RO/BOP perform peer check.
	US	• Notifies SM of plant status and procedure entry • Requests evaluation of Emergency Plan conditions • Enter/Implement 1BwEP-3 and direct operator actions of 1BwEP–3
	RO	Check Status of RCPs: • All RCPs running • High Head SI Flow >100 gpm • RCS Pressure >1425 psig (RCP Trip criteria NOT met)
	CREW **[CT] E-3--A**	• Identify ruptured SG 1A o Unexpected rise in S/G Level 1A o 1A Mainsteam line rad monitor NOT NORMAL for plant conditions • Isolate ruptured SG: o Verify SG PORV 1MS018A in AUTO o Verify closed when SG pressure < 1115 psig o US informs SM to dispatch environs teams o Verify SG blowdown isolation valves closed o 1SD002A o 1SD002B • Close MSIV and MSIV bypass valves for 1A SG o Check PORVs on intact (1B, 1C, & 1D) SGs available for RCS cooldown o Check ruptured SG level: o Narrow Range >10% • Verify/close 1A SG AF isol valves • 1AF013A (should have been closed in 1BwEP-0) • 1AF013E (should have been closed in 1BwEP-0)
	BOP	Check Ruptured SG pressure: • Determine ruptured SG pressure greater than 320 psig
	CREW US	Initiate RCS Cooldown: • Determine required core exit temperature from table based on current ruptured SG pressure • Check PZR pressure < 1930 psig • PZR LOW PRESS SI BLOCK PERMISSIVE P-11 Lit • If NOT continue with procedure until P-11 Lit before blocking STM LINE SI

Comments: _____

Scenario No: **NRC 04-2**		Event No. 5-8
Event Description:		Rod speed fails to zero, 1D MSIV fails closed, ATWS, 1A S/G SGTR. **IMF RD09 0, IOR ZDI1MS001D CLS, IMF TH03A 400**
Time	Position	Applicant's Actions or Behavior

	RO
	
	BOP
	
	BOP
		• Block Steamline Isol SI
		  • Place STM LINE SI BLOCK switches to BLOCK for train A and B (when P-11 reached)
		• Dump Steam to condenser from intact SGs at maximum rate
		• Check average of ten highest CETCs less than required temperature
		  • If NOT continue with procedure and stop cooldown when less than required temperature
		• Stop RCS cooldown (continuous action in effect)

	BOP	Check intact SG levels: • Narrow range levels > 10% • Control feed flow to maintain narrow range levels between 23% and 50% • Check narrow range levels not increasing in an uncontrolled manner

	RO	Check PZR PORVs and isolation valves:
		• Power to PORV Isol valves
		  • 1RY8000A, 1RY8000B
		• PORV closed
		  • 1RY455A and 1RY456 closed
		• At least ONE PORV Isol valve OPEN
		  • Both are open 1RY8000A, B

	BOP/RO	Reset SI: • Depress both SI Reset P/B's • Verify SI ACTUATED permissive light not lit • Verify AUTO SI BLOCKED lit

	BOP	Reset CNMT Isolation:
		• Reset CNMT Isolation Phase A
		• Check SACs – any running
		• Open instrument air CNMT isolation valves:
		  • 1IA065
		  • 1IA066
		Verify All Ac busses energized:
		• 141, 142, 143, 144, 156, 157, 158, 159

Comments: _____

Scenario No: **NRC 04-2**		Event No. 5-8
Event Description:		Rod speed fails to zero, 1D MSIV fails closed, ATWS, 1A S/G SGTR. **IMF RD09 0, IOR ZDI1MS001D CLS, IMF TH03A 400**
Time	Position	Applicant's Actions or Behavior
		Check if RH pumps should be stopped: • RH pump suction aligned to RWST • RCS pressure greater than 325 psig • Stops both RH pumps
	RO/ BOP	Check if RCS cooldown should be stopped: • Check average of ten highest CETCs less than required temperature • If NOT then do NOT proceed until required temperature achieved • Stop RCS cooldown • Maintain average of ten highest CETCs less than required temperature
	BOP	Check ruptured SG pressure: • Stable or increasing
	RO/US	Check RCS subcooling: • Acceptable per Attachment A and Figure 1BwEP 3-2 (+20°F)
	RO/US	Depressurize RCS Using PZR spray to minimize break flow and refill PZR: • Determine Normal PZR Spray is available • Spray PZR with maximum available spray until any of the following conditions – satisfied: Both • RCS pressure less than ruptured SG pressure • PZR level greater than 12% OR

Comments: _____

Scenario No: **NRC 04-2**		Event No. 5-8
Event Description:		Rod speed fails to zero, 1D MSIV fails closed, ATWS, 1A S/G SGTR. **IMF RD09 0, IOR ZDI1MS001D CLS, IMF TH03A 400**
Time	Position	Applicant's Actions or Behavior
		• PZR level greater than 69% OR • RCS subcooling not acceptable • Transition to step 17 since spray flow will not be adequate Depressurize RCS using PZR PORVs • Verify one PZR PORV available (both are available) • Open on PZR PORV until above conditions are met • Closes both spray valves and PZR PORV once 1A S/G and RCS pressure are equalized and PZR level is greater than 12%
		Note: At this point the scenario may be terminated

EAL CALL: **MS3** Auto and manual Trip not successful.

Comments: _____