

Facility: Braidwood Unit 1 & 2 Date of Exam: 10/23/00 Scenario Numbers: 00-1/ 00-2/ 00-5 Operating Test No.:1					
QUALITATIVE ATTRIBUTES		Initials			
		a	b	c	
1.	The initial conditions are realistic, in that some equipment and/or instrumentation may be out of service, but it does not cue the operators into expected events.	✓	JCS	MGB	
2.	The scenarios consist mostly of related events.	✓	JCS	MGB	
3.	Each event description consists of <ul style="list-style-type: none"> the point in the scenario when it is to be initiated the malfunction(s) that are entered to initiate the event the symptoms/cues that will be visible to the crew the expected operator actions (by shift position) the event termination point (if applicable) 	✓	JCS	MGB	
4.	No more than one non-mechanistic failure (e.g., pipe break) is incorporated into the scenario without a credible preceding incident such as a seismic event.	✓	JCS	MGB	
5.	The events are valid with regard to physics and thermodynamics.	✓	JCS	MGB	
6.	Sequencing and timing of events is reasonable, and allows the examination team to obtain complete evaluation results commensurate with the scenario objectives.	✓	JCS	MGB	
7.	If time compression techniques are used, the scenario summary clearly so indicates. Operators have sufficient time to carry out expected activities without undue time constraints. Cues are given.	✓	JCS	MGB	
8.	The simulator modeling is not altered.	✓	JCS	MGB	
9.	The scenarios have been validated.	✓	JCS	MGB	
10.	Every operator will be evaluated using at least one new scenario. All other scenarios have been modified in accordance with Section D.4 of ES-301.	✓	JCS	MGB	
11.	All individual operator competencies can be evaluated, as verified using Form ES-301-6 (submit the form along with the simulator scenarios).	✓	JCS	MGB	
12.	Each applicant will be significantly involved in the minimum number of transients and events specified on Form ES-301-5 (submit the form along with the simulator scenarios).	✓	JCS	MGB	
13.	The level of difficulty is appropriate to support licensing decisions for each crew position.	✓	JCS	MGB	
TARGET QUANTITATIVE ATTRIBUTES (PER SCENARIO)		Actual Attributes			
1.	Total malfunctions (5-8)	5 / 7 / 8	✓	JCS	MGB
2.	Malfunctions after EOP entry (1-2)	2 / 2 / 2	✓	JCS	MGB
3.	Abnormal events (2-4)	3 / 5 / 4	✓	JCS	MGB
4.	Major transients (1-2)	2 / 1 / 2	✓	JCS	MGB
5.	EOPs entered/requiring substantive actions (1-2)	2 / 3 / 1	✓	JCS	MGB
6.	EOP contingencies requiring substantive actions (0-2)	2 / 0 / 0	✓	JCS	MGB
7.	Critical tasks (2-3)	3 / 2 / 2	✓	JCS	MGB

Facility: Braidwood Unit 1 & 2 Date of Exam: 10/23/00 Scenario Numbers: 00-4/ 00-3/ 00-6 Operating Test No. 2					
QUALITATIVE ATTRIBUTES		Initials			
		a	b	c	
1.	The initial conditions are realistic, in that some equipment and/or instrumentation may be out of service, but it does not cue the operators into expected events.	✓	JAS	MCB	
2.	The scenarios consist mostly of related events.	✓	JAS	MCB	
3.	Each event description consists of <ul style="list-style-type: none"> the point in the scenario when it is to be initiated the malfunction(s) that are entered to initiate the event the symptoms/cues that will be visible to the crew the expected operator actions (by shift position) the event termination point (if applicable) 	✓	JAS	MCB	
4.	No more than one non-mechanistic failure (e.g., pipe break) is incorporated into the scenario without a credible preceding incident such as a seismic event.	✓	JAS	MCB	
5.	The events are valid with regard to physics and thermodynamics.	✓	JAS	MCB	
6.	Sequencing and timing of events is reasonable, and allows the examination team to obtain complete evaluation results commensurate with the scenario objectives.	✓	JAS	MCB	
7.	If time compression techniques are used, the scenario summary clearly so indicates. Operators have sufficient time to carry out expected activities without undue time constraints. Cues are given.	✓	JAS	MCB	
8.	The simulator modeling is not altered.	✓	JAS	MCB	
9.	The scenarios have been validated.	✓	JAS	MCB	
10.	Every operator will be evaluated using at least one new scenario. All other scenarios have been modified in accordance with Section D.4 of ES-301.	✓	JAS	MCB	
11.	All individual operator competencies can be evaluated, as verified using Form ES-301-6 (submit the form along with the simulator scenarios).	✓	JAS	MCB	
12.	Each applicant will be significantly involved in the minimum number of transients and events specified on Form ES-301-5 (submit the form along with the simulator scenarios).	✓	JAS	MCB	
13.	The level of difficulty is appropriate to support licensing decisions for each crew position.	✓	JAS	MCB	
TARGET QUANTITATIVE ATTRIBUTES (PER SCENARIO)		Actual Attributes	---	---	
1.	Total malfunctions (5-8)	6 / 6 / 8	✓	JAS	MCB
2.	Malfunctions after EOP entry (1-2)	1 / 2 / 3	✓	JAS	MCB
3.	Abnormal events (2-4)	4 / 3 / 4	✓	JAS	MCB
4.	Major transients (1-2)	2 / 2 / 2	✓	JAS	MCB
5.	EOPs entered/requiring substantive actions (1-2)	1 / 2 / 3	✓	JAS	MCB
6.	EOP contingencies requiring substantive actions (0-2)	0 / 2 / 0	✓	JAS	MCB
7.	Critical tasks (2-3)	4 / 2 / 2	✓	JAS	MCB

OPERATING TEST NO.: 2

Applicant Type	Evolution Type	Minimum Number	Scenario Number			
			00-4	00-3	00-6	Spare
			1	2	3	4
RO	Reactivity	1	1/	1,4/	1/	1/
	Normal	1	/1	/1	/1	/1
	Instrument	2	3/4	3/2	3/4	2/3
	Component	2	2/5	6/6	2,5,9/8	4,7/8
	Major	1	6,7/6,7	5,6/5,6	6,7/6,7	5,6/5,6
As RO	Reactivity	1	1	1,4	1	1
	Normal	0				
	Instrument	1	3	3	3	2
	Component	1	2	6	2,5,9	4,7
	Major	1	6,7	5,6	6,7	5,6
SRO-I	Reactivity	0				
	Normal	1	1	1	1	1
	Instrument	1	3,4	2,3	3,4	2,3
	Component	1	2,5	5	2,5,8,9	4,7,8
	Major	1	6,7	5,6	6,7	5,6
As SRO	Reactivity	0	N/A	N/A	N/A	N/A
	Normal	1	N/A	N/A	N/A	N/A
	Instrument	1	N/A	N/A	N/A	N/A
	Component	1	N/A	N/A	N/A	N/A
	Major	1	N/A	N/A	N/A	N/A

- Instructions: (1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.
- (2) Reactivity manipulations must be significant as defined in Appendix D.

NOTE: Scenario Number 4 is a "spare" scenario and is represented for comparison purposes only in Examination Outline submittal.

The "/" in the cells for the "RO" applicant type represents the position the applicant is expected to fill during the scenario. The events are listed for the identified position: RO / BOP.

Author: 

Chief Examiner: _____

Operating Test: 2

Competencies	Applicant #1 RO/SRO-I/SRO-U				Applicant #2 RO/SRO-I/SRO-U				Applicant #3 RO(BOP)/SRO-I/SRO-U			
	SCENARIO				SCENARIO				SCENARIO			
	04	03	06	S	04	03	06	S	04	03	06	S
Understand and Interpret Annunciators and Alarms	2-7	2-6	2-9	2-8	2,3,6 ,7	3-6	2,3,5 ,6,7, 9	2,4,5 ,6,7	4-7	2,5,6	4,6,7 ,8	3,5,6 ,8
Diagnose Events and Conditions	2-7	2-6	2-9	2-8	2,3,6 ,7	3-6	2,3,5 ,6,7, 9	2,4,5 ,6,7	4-7	2,5,6	4,6,7 ,8	3,5,6 ,8
Understand Plant and System Response	1-7	1-6	1-9	1-8	1,2,3 ,6,7	1,3-6	1,2,3 ,5,6, 7,9	1,2,4 ,5,6, 7	1,4-7	1,2,5 ,6	1,4,6 ,7,8	1, 3,5,6 ,8
Comply With and Use Procedures (1)	1-7	1-6	1-9	1-8	1,2,3 ,6,7	1,3-6	1,2,3 ,5,6, 7,9	1,2,4 ,5,6, 7	1,4-7	1,2,5 ,6	1,4,6 ,7,8	1, 3,5,6 ,8
Operate Control Boards (2)	1-7	1-6	1-9	1-8	1,2,3 ,6,7	1,3-6	1,2,3 ,5,6, 7,9	1,2,4 ,5,6, 7	1,4-7	1,2,5 ,6	1,4,6 ,7,8	1, 3,5,6 ,8
Communicate and Interact With the Crew	1-7	1-6	1-9	1-8	1-7	1-6	1-9	1-8	1-7	1-6	1-9	1-8
Demonstrate Supervisory Ability (3)	1-7	1-6	1-9	1-8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Comply With and Use Tech. Specs. (3)	1,4,5	3	3	2,4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Notes: (1) Includes Technical Specification compliance for an RO. (2) Optional for an SRO-U. (3) Only applicable to SROs.												

Instructions:

Circle the applicant's license type and enter the event numbers that test the competency for each scenario in the set.

NOTE: **OPERATING TEST NO.: 2.** Scenario Number 4 is a "spare" scenario and is represented for comparison purposes only in Examination Outline submittal. The order of listing for candidates is SRO, RO and BOP by position.

Author: _____

Chief Examiner: _____

OPERATING TEST NO.: 1

Applicant Type	Evolution Type	Minimum Number	Scenario Number			
			00-1	00-2	00-5	Spare
			1	2	3	4
RO	Reactivity	1	1/	1/	1,3/	1/
	Normal	1	/1	/1	/1,3	/1
	Instrument	2	3/2	2/3	5/4	2/3
	Component	2	4/4	4,6,8/4,5	2,6/6	4,7/8
	Major	1	5,6/5,6	7/7	7,8/7,8	5,6/5,6
As RO	Reactivity	1	1	1	1,3	1
	Normal	0				
	Instrument	1	3	2	5	2
	Component	1	4	4,6,8	2,6	4,7
	Major	1	5,6	7	7,8	5,6
SRO-I	Reactivity	0				
	Normal	1	1	1	1,3	1
	Instrument	1	2,3	2,3	4,5	2,3
	Component	1	4	4,5,6,8	2,6	4,7,8
	Major	1	5,6	7	7,8	5,6
As SRO	Reactivity	0	N/A	N/A	N/A	N/A
	Normal	1	N/A	N/A	N/A	N/A
	Instrument	1	N/A	N/A	N/A	N/A
	Component	1	N/A	N/A	N/A	N/A
	Major	1	N/A	N/A	N/A	N/A
SRO-U	Reactivity	0	N/A	N/A	N/A	N/A
	Normal	1	N/A	N/A	N/A	N/A
	Instrument	1	N/A	N/A	N/A	N/A
	Component	1	N/A	N/A	N/A	N/A
	Major	1	N/A	N/A	N/A	N/A

- Instructions: (1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.
- (2) Reactivity manipulations must be significant as defined in Appendix D.

NOTE: Scenario Number 4 is a "spare" scenario and is represented for comparison purposes only in Examination Outline submittal.

The "/" in the cells for the "RO" applicant type represents the position the applicant is expected to fill during the scenario. The events are listed for the identified position: RO / BOP.

Author: _____

Chief Examiner: _____

Operating Test: 1

Competencies	Applicant #1 RO/SRO-I/SRO-U				Applicant #2 RO/SRO-I/SRO-U				Applicant #3 RO(BOP)/SRO-I/SRO-U			
	SCENARIO				SCENARIO				SCENARIO			
	01	02	05	S	01	02	05	S	01	02	05	S
Understand and Interpret Annunciators and Alarms	2-6	2-8	2-8	2-8	3-6	2,4,6 ,7,8	2,5,6 ,7,8	2,4,5 ,6,7	2,4,5 ,6	3,4,5 ,7,8	3,4,6 ,7,8	3,5,6 ,8
Diagnose Events and Conditions	2-6	2-8	2-8	2-8	3-6	2,4,6 ,7,8	2,5,6 ,7,8	2,4,5 ,6,7	2,4,5 ,6	3,4,5 ,7,8	3,4,6 ,7,8	3,5,6 ,8
Understand Plant and System Response	1-6	1-8	1-8	1-8	1,3-6	1,2,4 ,6,7, 8	1,2,3 ,5,6, 7,8	1,2,4 ,5,6, 7	1,2,4 ,5,6	1,3,4 ,5,7, 8	1,3,4 ,6-8	1, 3,5,6 ,8
Comply With and Use Procedures (1)	1-6	1-8	1-8	1-8	1,3-6	1,2,4 ,6,7, 8	1,2,3 ,5,6, 7,8	1,2,4 ,5,6, 7	1,2,4 ,5,6	1,3,4 ,5,7, 8	1,3,4 ,6-8	1, 3,5,6 ,8
Operate Control Boards (2)	1-6	1-8	1-8	1-8	1,3-6	1,2,4 ,6,7, 8	1,2,3 ,5,6, 7,8	1,2,4 ,5,6, 7	1,2,4 ,5,6	1,3,4 ,5,7, 8	1,3,4 ,6-8	1, 3,5,6 ,8
Communicate and Interact With the Crew	1-6	1-8	1-8	1-8	1-6	1-8	1-8	1-8	1-6	1-8	1-8	1-8
Demonstrate Supervisory Ability (3)	1-6	1-8	1-8	1-8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Comply With and Use Tech. Specs. (3)	2,3	4	4,5	2,4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Notes: (1) Includes Technical Specification compliance for an RO. (2) Optional for an SRO-U. (3) Only applicable to SROs.												

Instructions:

Circle the applicant's license type and enter the event numbers that test the competency for each scenario in the set.

NOTE: **OPERATING TEST NO.: 1.** Scenario Number 4 is a "spare" scenario and is represented for comparison purposes only in Examination Outline submittal. The order of listing for candidates is SRO, RO and BOP by position.

Author: _____

Chief Examiner: _____

Simulation Facility	<u>Braidwood</u>	Scenario	<u>00-3</u>	Operating Test No.: 2
Examiners:	_____	Applicant:	_____	<u>SRO</u>
	_____		_____	<u>RO</u>
	_____		_____	<u>BOP</u>
Objectives:	To evaluate the applicants ability to use Normal, Abnormal, Emergency and alarm response procedures to respond to a PT-508 high failure, a Power Range NI failure, an inadvertent dilution, a reactor trip due to a failed open RTB, and a Loss of All AC.			
Initial Conditions:	IC-21; 100% power BOL, Equilibrium Xenon			
Turnover :	Unit 1 is at 100% power. Unit 2 is in MODE 5. The 1A DG is OOS to replace a leaking fuel injection line on the 2R cylinder. The 1A DG is expected back in 3 to 4 hours. Currently in LCO 3.8.1 Condition B with 12 hours into 72 hour LCO.			

Event No.	Malf. No.	Event Type*	Event Description
Preload	MRF EG03 MAINT_0 IOR ZDIHSAP078 ASIS		Place the 1A DG & output breaker in PTL and tag OOS Prevents ESF Bus 142 cross tie to U-2
Preload	MRF FW160 STOP	C BOP RO SRO	Prevent the 1B AFW pump from starting (NOTE 3)
Preload	CAE! 1BDGAUTO Link MRF EG09 REMOTE to TRG 6	C BOP SRO	Failure of the 1B DG to Auto Start
1		N BOP SRO R RO	Ramp the unit down in power to 900 MW at 5Mw/min
2	FW16, 1500	I BOP SRO	PT-508 (Feedwater Header Pressure Transmitter) fails high
3	NI08A, 500	I RO SRO	NI-41 Power Range Upper Detector Failure High (NOTE 1)
4	MRF CV13, 100	R RO SRO	Inadvertent Dilution Event
5	MRF RP01 TRIP	M BOP RO SRO	Reactor Trip (NOTE 2)
6	ED04A EG09B	M BOP RO SRO	Loss of All AC DG 1B Seizure (insert after crew manually starts)

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

NOTE 1: RP20 (Open/Close) RX013 (Trip) RX135 (Trip)

NOTE 2: If the crew trips the reactor due to the inadvertent dilution, this event does not need to be initiated.

NOTE 3: When directed as local operator to attempt to start the 1B AFW pump **MRF FW160 START**

SCENARIO 00-3 OVERVIEW

Unit 1 is at 100% power, BOL. Unit 2 is in MODE 5. The 1A Diesel Generator is OOS to replace a leaking fuel injection line on the 2R cylinder. Currently in LCO 3.8.1 Condition B with 12 hours into 72 hour LCO.

After the crew takes the shift, the crew will reduce power to 900 MW at 5Mw/min.

Following clearly observable plant response from the reactivity changes, feedwater header pressure instrument, PT-508 will fail high. The operator is expected to recognize this condition, take manual control of the Master FW Pumps Speed Controller and restore FW discharge pressure to within its normal band.

After the actions for the failed PT-508 instrument are complete, N-41 Power Range Upper Detector will fail high. The crew will enter BwOA INST-1 Attachment A and take actions to stabilize the plant. After the crew has defeated the failed N-41, the crew will place rods back into Auto and trip bistables associated with the failed Power Range NI. Tech Specs will be referenced.

After the actions of BwOA INST-1 are complete, an inadvertent dilution will occur. The crew should enter BwOA PRI-12 to attempt to determine and correct the cause of the inadvertent dilution. The crew may enter BwOA PRI-2 to commence emergency boration. The crew may trip the reactor due to the inadvertent dilution. If the crew does not trip the reactor, an inadvertent reactor trip will occur due to the opening of the 1A reactor trip breaker.

Once the immediate actions of BwEP E-0 are complete a Loss of All AC will occur. The 1B DG will not auto-start. When the crew attempts to manually start the 1B DG, it will seize and trip. Re-powering the ESF Buses from U-2 will also be unsuccessful. The crew will transition from E-0 to BwCA-0.0 and then transition to BWCA-0.2. While in ECA-0.0 the 1A DG will become available to restore power to Bus 141.

NOTE: The crew may transition to BwCA-0.1 if SI is not required.

During the crews actions in BwCA-0.0 the crew will recognize the failure of the 1B AFW pump to auto start. The crew will have to manually start (locally) the 1B AFW pump to restore AFW to the steam generators.

Critical Tasks

1. ECA-0.0--B: Establish the minimum required AFW flow rate (500 gpm) to the SGs before dryout occurs.
2. ECA-0.0--H: Isolate RCP seal injection before a charging pump starts or is started.

Scenario No: 00-3		Event No. 1
Event Description: Perform Load Decrease to 900 MW at 5MW/min		
Time	Position	Applicant's Actions or Behavior
	US	Implement actions of 1BwGP 100-4, "Power Descension"
	US	Direct load reduction
	CREW	Review applicable Precautions, and Limitations and Actions.
	RO	<p>Verify rod position and boron concentration.</p> <p>Initiate boration, if required to maintain ΔI within target band. (BwOP CV-6)</p> <ul style="list-style-type: none"> • Determine boric acid flow rate • Set 1FK-110 BA Flow Cont to desired boration rate. • Set 1FY-0110 BA Blender Preset Counter to desired volume. • Place MU MODE CONT SWITCH to STOP position. • Set MU MODE SELECT to BOR position. • Place MAKE-UP CONTROL Switch to START • Verify proper operation of valves & BA transfer pump (CV110B open, BA pump is running, CV110A throttles open) • Verify BA flow on recorder
	BOP	<p>Initiate turbine load reduction:</p> <ul style="list-style-type: none"> • Depress LOAD RATE MW/MIN • Enter 5 MW/min • Depress REF • Enter power level • When ready to begin load reduction, depress GO • Verify load decreases.

Comments: _____

Scenario No: 00-3		Event No. 1
Event Description: Perform Load Decrease to 900 MW at 5MW/min		
Time	Position	Applicant's Actions or Behavior
	RO	<p>Monitor power decrease:</p> <ul style="list-style-type: none"> • Monitor reactor power, Tave, ΔI • Verify rods more in AUTO to maintain Tave within $\pm 1.0^\circ\text{F}$ of Tref. <p>If borating:</p> <ul style="list-style-type: none"> • Monitor VCT level • Monitor BA Blender counter countdown. • Verify boration auto stops at preset value. • Return Reactor Makeup System to blended flow at current blended flow.
		Note: Following clearly observable plant response from the reactivity changes, Event 2 is entered.

Comments: _____

Scenario No: 00-3		Event No. 2
Event Description: PT-508 (Feedwater Header Pressure Transmitter) fails high		
Time	Position	Applicant's Actions or Behavior
	CUE	MFP decrease in speed Decreasing SG water level Low SG Level alarms FW-SF mismatch alarms
	BOP	Diagnose failure of PT-508 failure high
	US	Direct actions to stabilize plant
	BOP	Take manual control of the Master FW Pumps Speed Controller Restore FW discharge pressure to normal band Restore SGWL to normal operating band
	US	Notify SM/ Maintenance of failure
		NOTE: Call as Electric Generation and request the ramp secured. Ensure that the ramp is secured prior to initiating next event.
		NOTE: After the actions for the failure of PT-508 have been completed, Event 3 may be started.

Comments: _____

Scenario No: 00-3		Event No. 3
Event Description: N-41 Power Range Upper Detector Failure High		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciators: 1-10-A3 "PWR RNG HIGH STPT RX TRIP ALERT" 1-10-A4 "PWR RNG UPPER DET FLUX DEV HIGH" 1-10-B5 "PWR RNG FLUX HIGH ROD STOP" 1-10-C3 "PWR RNG FLUX RATE RX TRIP ALERT" 1-10-C4 "PWR RNG CHANNEL DEV"
	RO	Identify/report failed N-41
	US	Transition to 1BwOA INST-1 "Nuclear Instrumentation Malfunction" Attachment A "PR Channel Failure" Direct actions of 1BwOA INST-1
	RO	Check Rod Control Status <ul style="list-style-type: none"> Place the ROD BANK SELECT switch in MANUAL Check for Rod Stop <ul style="list-style-type: none"> PWR RNG FLUX HIGH ROD STOP – NOT LIT (It is lit) <ul style="list-style-type: none"> Place the ROD STOP BYPASS switch for the affected channel on the 1PM07J in BYPASS. Check Tave-Tref Deviation <ul style="list-style-type: none"> Restore Tave-Tref to within 1°F by using <ul style="list-style-type: none"> Control Rods Turbine Load RCS boron concentration
	BOP	Check SG Levels – Normal and Stable
	RO/BOP	Bypass/Defeat PR Channel Functions at 1PM07J <ul style="list-style-type: none"> Select affected channel for following functions on 1PM07J <ul style="list-style-type: none"> Detector Current Comparator <ul style="list-style-type: none"> Upper Section Lower Section Miscellaneous Control and Indication section <ul style="list-style-type: none"> Power Mismatch Bypass Rod Stop Bypass Comparator and Rate panel <ul style="list-style-type: none"> Comparator Channel Defeat

Comments: _____

Scenario No: 00-3		Event No. 3
Event Description: N-41 Power Range Upper Detector Failure High		
Time	Position	Applicant's Actions or Behavior
	US	<p>Remove Control Power Fuses on 1PM07J for affected channel to trip bistables:</p> <ul style="list-style-type: none"> Lo RX Trip NC41P Hi RX Trip NC41R Positive/Negative Rate Trip NC41U/K <p>Locally trip Bistables for Affected Channel by Placing Indicated switches to TEST</p> <ul style="list-style-type: none"> OTΔT Trip TB411C OTΔT Runback TB411D
	RO	<p>Select Operable Channel – Loop ΔT recorder</p> <p>Check if Rod Control System can be Placed in Automatic</p> <ul style="list-style-type: none"> TURBINE LOW POWER INTLK C5 – Not Lit Tave-Tref deviation – Stable and within 1°F <p>Place ROD BANK SELECT switch in – AUTO</p>
	US	<p>Reference Tech Specs</p> <p>3.3.1</p> <p>3.2.4</p>
		NOTE: Initiate Event 4 after the Unit Supervisor has completed Tech. Spec. review.

Comments: _____

Scenario No: 00-3		Event No. 4
Event Description: Inadvertent Dilution Event		
Time	Position	Applicant's Actions or Behavior
	CUE:	RCS Temperature increase Power increase VCT Divert Valve to HUT Emergency Boration flow >100 gpm VCT Level increase
	RO/US	Determine inadvertent dilution is occurring
		NOTE: The crew may trip the reactor if they can not determine/control the inadvertent dilution.
	US	Transition to 1BwOA PRI-12 "Uncontrolled Dilution" Direct actions of 1BwOA PRI-12
	RO	Check all dilution paths isolated Place Makeup Control switch in OFF Check valves closed <ul style="list-style-type: none"> • 1CV111A • 1CV111B • 1CV110A • 1CV110B Verify BTRS Mode Selector switch in OFF
	US	Dispatch operator to verify dilution paths isolated <ul style="list-style-type: none"> • 1CV8441 Locked Closed— Report valve is found open. When directed to close MRF CV13, 0. • 1CV8435 Locked Closed • 1CV8453 Locked Closed • 1AB8629A Closed

Comments: _____

Scenario No: 00-3		Event No. 4
Event Description: Inadvertent Dilution Event		
Time	Position	Applicant's Actions or Behavior
	RO	<p>Check Letdown Temperature greater than 80°F</p> <p>Check Seal Water HX Tubes Intact</p> <ul style="list-style-type: none"> • VCT level – no unexpected increase • CC Surge Tank Level – no unexpected decrease <p>Check status of CV Demins</p> <ul style="list-style-type: none"> • Check CV Demin recently placed in service (Has not recently been placed in service) • Check if dilution has been terminated <ul style="list-style-type: none"> - Check Unit in MODE 1 or 2 - Check dilution terminated (Local operator reports 1CV8441 was found open)
	RO	<p>Check CV Pump Suction Aligned to the VCT</p> <ul style="list-style-type: none"> • BDPS ACTUATED CHG SUCT SWITCH OVER – Not Lit • RWST to CENT CHG pumps isolation valves Closed <ul style="list-style-type: none"> - 1CV112D - 1CV112E <p>Verify Reactor Makeup Control System Aligned for Auto Operation</p> <ul style="list-style-type: none"> • Boric acid flow controller set for current RCS boron concentration • Boric acid flow controller in Auto • MODE SELECT switch in AUTO • Control Valve switches in AUTO <ul style="list-style-type: none"> - 1CV110A - 1CV110B - 1CV111A - 1CV111B • Makeup Control switch in START <p>Check Shutdown Margin adequate</p>

Comments: _____

Scenario No: 00-3		Event No. 4
Event Description: Inadvertent Dilution Event		
Time	Position	Applicant's Actions or Behavior
	US	Refer to Tech Specs <ul style="list-style-type: none"> • 3.1.1 • 3.1.6 • 3.9.1 • 3.9.2 • TRM 3.1.i
		NOTE: If the crew does not trip the reactor during the dilution event, initiate the reactor trip after the crew references Tech Specs.

Comments: _____

Scenario No: 00-3		Event No. 5
Event Description: Reactor Trip		
Time	Position	Applicant's Actions or Behavior
	CUE	RX Trip breakers open Turbine Trip Numerous alarms All Rod Bottom Lights Lit
	US	Implement 1BwEP-0 "Reactor Trip or Safety Injection" Direct actions of 1BwEP-0
	RO	Perform immediate operator actions of 1BwEP-0 Verify reactor trip <ul style="list-style-type: none"> • Rod bottom lights LIT • Reactor trip & bypass breakers open • Neutron flux decreasing
	BOP	Verify Turbine Trip <ul style="list-style-type: none"> • Turbine throttle valves closed • Turbine governor valves closed Verify power to 4KV busses <ul style="list-style-type: none"> • Bus 141 alive light lit • Bus 142 alive light lit
	CREW	Determine SI needed/actuated <ul style="list-style-type: none"> • If needed <ul style="list-style-type: none"> • Pzr pressure <1829 psig • Steamline pressure <640 psig • Cnmt pressure >3.4 psig • Pzr level can not be maintained >4%
		NOTE: Initiate Loss of All AC Event as the crew transitions to 1BwEP ES-0.1

Comments: _____

Scenario No: 00-3		Event No. 6
Event Description: Loss of All AC Power		
Time	Position	Applicant's Actions or Behavior
	CUE	No Bus energized lights lit Bus 141 & 142 de-energize
	US	Transition to 1BwCA-0.0 "Loss of All AC Power" Direct actions of 1BwCA-0.0
	RO	Verify Reactor Trip <ul style="list-style-type: none"> Reactor trip and bypass breakers open Neutron flux decreasing
	BOP	Isolate Steamlines <ul style="list-style-type: none"> Actuate Main Steamline Isolation Verify all MSIVs and MSIV bypass valves are Closed
	CREW	Actuate SI
	BOP [CT] ECA- 0.0--B	Verify AF Flow <ul style="list-style-type: none"> Total AF flow greater than 500 GPM (determine that no AF pumps are running) Dispatch local operator to attempt to start the 1A/1B AF Pump MRF FW160 START

Comments: _____

Scenario No: 00-3		Event No. 6
Event Description: Loss of All AC Power		
Time	Position	Applicant's Actions or Behavior
	RO	<p>Verify RCS Isolated</p> <ul style="list-style-type: none"> PZR PORVs closed <ul style="list-style-type: none"> 1RY455A 1RY456 Letdown orifice isolation valves closed <ul style="list-style-type: none"> 1CV8149A 1CV8149B 1CV8149C Letdown line isolation valves closed <ul style="list-style-type: none"> 1CV459 1CV460 Excess letdown isolation valves closed <ul style="list-style-type: none"> 1CV8153A 1CV8153B
	BOP	<p>Try to restore Power to Any/Both Unit 1 4KV ESF Buses</p> <ul style="list-style-type: none"> Check DGs both running <ul style="list-style-type: none"> Reset SI Manually start any non-running DG (none will start) <p>Prepare for ESF Bus Crosstie</p> <ul style="list-style-type: none"> Dispatch local operator to depress emergency stop pushbutton on both DGs MRF EG20 TRIP <i>Do not do this to the 1A DG.</i> Reset CNMT Isolation Phase A Reset SI if necessary
	US	<p>Check Status of Unit 2 ESF Buses</p> <ul style="list-style-type: none"> Any Unit 2 4KV ESF Bus energized Notify Unit 2 to enter 2BwCA-0.3 Inform crew that Bkr 2414 will not stay closed. Both Unit 2 4KV ESF busses energized
	CREW	Crosstie Bus 141 to Unit 2

Comments: _____

Scenario No: 00-3		Event No. 6
Event Description: Loss of All AC Power		
Time	Position	Applicant's Actions or Behavior
	BOP	<p>Crosstie Bus 142 to Unit 2</p> <ul style="list-style-type: none"> • Notify Unit 2 that Bus 142 will be used for crosstie • Check Bus 142 not faulted • Place breakers in Pull Out <ul style="list-style-type: none"> - ACB 1421 - ACB 1422 - ACB 1424 • Verify following Train B loads available <ul style="list-style-type: none"> - Bus 132X - CENT CHG pump 1B - CC Pump 1B or 0 - SX pump 1B - MCR chiller 0B • Place loads in Pull Out <ul style="list-style-type: none"> - Cent Chg pumps - RH pumps - SI pumps - AF pump 1A - RCFCs (Hi and Low) - CS pumps - CC pumps (1A, 1B, 0) - SX pumps - MCR chillers • Check Unit 2 reserve feed breaker closed <ul style="list-style-type: none"> - ACB 2424 <p>NOTE: MRF ED007 CLOSE when directed to close ACB 2424.</p> <ul style="list-style-type: none"> • Synch and close Bus 242/142 reserve feed breaker <ul style="list-style-type: none"> - ACB 1424 (breaker will not close) - Check Bus 142 energized <ul style="list-style-type: none"> - Open ACB 1424 - Open ACB 2424
	US	Transition to Attachment B
	CREW	<p>Inhibit Automatic Loading on 4KV ESF Busses</p> <ul style="list-style-type: none"> • Place loads in Pull Out • Verify loads available for DG support

Comments: _____

Scenario No: 00-3		Event No. 6
Event Description: Loss of All AC Power		
Time	Position	Applicant's Actions or Behavior
	US	Attempt to Restore Power <ul style="list-style-type: none"> Dispatch local operators to start DG Notify Electric Operations to implement an emergency AC restoration program Notify IMs to obtain individual CETC readings from heated junction thermocouple cabinets in the AEER
	US [CT] ECA- 0.0--H	Locally isolate RCP Seals (dispatch local operators to close the following valves): <ul style="list-style-type: none"> 1CV8384A MRF CV41 0 1CV8384B MRF CV42 0 1CC685 1CV8100
		NOTE: Return the 1A DG to the crew at this time. Inform the crew that you are ready to clear the tags off of the 1A DG. Once tags are cleared, you will take the Control Mode Selector switch to Remote. MRF EG03 REMOTE
	US	Transition to step 20 of Attachment B when Bus 141 becomes energized per the Operator Action Summary Page.
	BOP	Verify SX System Operation <ul style="list-style-type: none"> SX pump 1A running Verify SX pump crosstie valves open – 1SX033/034 Verify Following Equipment Loaded on Energized 4KV ESF Bus <ul style="list-style-type: none"> Check 480V ESF Busses energized Check associated battery charger energized Check associated instrument inverters energized Check VC fans- one train running <ul style="list-style-type: none"> Supply Fan Return Fan M/U Fan Consult TSC for restoration of DC and AC instrument loads on Energized Trains if previously shed.
	BOP	Stabilize SG Pressures

Comments: _____

Scenario No: 00-3		Event No. 6
Event Description: Loss of All AC Power		
Time	Position	Applicant's Actions or Behavior
	US	Select Proper Recovery Procedure <ul style="list-style-type: none"> • Check RCS subcooling acceptable • Check PZR level greater than 12% (28%) • Check if any SI equipment has automatically actuated upon AC power restoration Transition to 1BwCA-0.2 "Loss of All AC Power Recovery With SI Required"
	US	Direct actions of 1BwCA-0.2
	RO	Check RWST Level greater than 46%
	BOP/RO	Manually Establish ECCS Injection Alignment On Energized Train(s) <ul style="list-style-type: none"> • Verify RH pump miniflow valves open. • Verify RH HX bypass flow control valve in manual with zero demand. • Open Chg pump to cold leg injection isol valves. • Open RWST to Chg pumps suction valves. • Close VCT outlet isol valve. • Close chg line Cnmt isol valves. Check CC Pumps all stopped Check CC from RCPs thermal barrier isol valves closed <ul style="list-style-type: none"> • 1CC9438 or 1CC685 Load Safeguards Equipment as Necessary on Energized ESF Bus <ul style="list-style-type: none"> • CC pump • RH pump • SI pump • RCFCs Lo speed • SX pump • Place chiller in operation for operating VC Train.

Comments: _____

Scenario No: 00-3		Event No. 6
Event Description: Loss of All AC Power		
Time	Position	Applicant's Actions or Behavior
	CREW [CT] ECA- 0.0--H	Check if Charging Pumps should be started <ul style="list-style-type: none"> • Check Chg pumps all stopped • Check RCP seal injection isolation valves energized ICV8355A ICV8355B ICV8355C ICV8355D • Dispatch operator to close RCP Seal Injection filter inlet isol vlvs. May have previously completed. ICV8384A ICV8384B Start Charging Pump(s)
		NOTE: Scenario may be terminated at this point

Comments: _____

Simulation Facility	<u>Braidwood</u>	Scenario No.: 00-4	Operating Test No.: 2
Examiners:	_____	Operators:	<u>SRO</u>
	_____		<u>RO</u>
	_____		<u>BOP</u>
Objectives:	To evaluate the applicants ability to use Normal, Abnormal, Emergency and alarm response procedures to respond to pre-loaded SGTL, a power decrease, an auto rod speed controller failure, a VCT level transmitter failure, a SG level transmitter failure, actuation of deluge to the in service Control Room Vent Charcoal Filter, a SGTR.		
Initial Conditions:	IC-16, 49% power. Steady State Equilibrium Xenon.		
Turnover:	Circuit breaker 1423 (DG-1B feeder to bus 142) was declared OOS late last shift and is being replaced. DG-1B has been declared Out of Service. Breaker 1423 is expected to return to service in 3 to 4 hours. Currently in LCO 3.8.1 Condition B with 12 hours left on the completion time. Chemistry has just confirmed the 1B SG has a tube leak of 15 gpm.		

Event No.	Malf. No.	Event Type*	Event Description
Preload	TH03B, 2	RO SRO	SG B Tube leak – 2 gpm small enough to give alarms. Large enough to cause a power reduction
Preload	1B DG in PTL 1423 in PTL MRF EG09 MAINT_0		1B DG OOS
Preload			Setup with the A Train MCR VC running and the OB Train secured. Secure the 1C MFP (first step of shutdown).
1		N BOP SRO	Ramp down turbine power at directed MW/min
		R RO	Lower reactor power using rods and/or boration
2	RD09, 72	C RO SRO	Auto Rod Speed controller failure – 72 steps/min when rod motion is initiated
3	CV17, 100	I RO SRO	VCT level transmitter LT-185 fails high on a 180 sec ramp.
4	RX06G, 0	I BOP SRO	SG B level transmitter (controlling) fails low on a 180 sec ramp (LT-529) (NOTE 1)
5	FP01C TRG 1 FP02G TRG 1	C BOP SRO	Inadvertent deluge of MCR VC Charcoal filter (trips running supply & exhaust fans) (NOTE 2)
6	TC02	M BOP RO SRO	Turbine trip on sensed low load
7	TH03B, 400	M BOP RO SRO	SG B tube rupture – (300 sec ramp)

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

NOTE 1 RP20 (OPEN/CLOSE) RX057 (TRIP) RX058 (TRIP)

NOTE 2 When directed to reset deluge **DMF FP01C** **DMF FP02G** **IOR SE:PN0750 OFF**

When directed to secure OA Fire Pump **MRF FP09 STOP**

SCENARIO 00-4 OVERVIEW

Unit 1 is at 50% power. It will be discussed in the turnover that the SGTL has been discovered. Power decrease should be directed following turnover.

Following clearly observable plant response from the reactivity changes, an auto rod speed failure will cause rods to insert at 72 steps/min when demanded. It is expected that the RO will recognize improper rod motion for this condition and place rod control in manual. BwOA ROD-1 may be entered, but is NOT required, in response to the rod control problem. I&C will not be able to repair the rod speed problem and manual rod control will be the only way to move control rods at proper speed.

After actions for the rod failure are complete, a VCT level transmitter LT-185 will fail high. VCT level will have to be controlled manually to allow letdown flow to the VCT or divert as necessary. LT-112 indication will be available.

After control of VCT level is regained, a SG level channel will fail low. SG level control will be placed in manual and normal level restored. Entry is made into BwOA INST-2 (Attachment E); the level control is transferred to an operable channel and the FRV control returned to auto. The SRO will address Tech Specs for applicability and actions for the failed SG level instrument.

After the SG level channel bistables have been tripped, the deluge valve to the Control Room Vent Charcoal Filter opens when inadvertently kicked by a painter. The actuation of the deluge results in trip of the running "A" Train Control Room Ventilation Supply and Return fans and the "A" Train Chiller. The operator will be required to start the "B" Train equipment and direct local actions to isolate the deluge.

After Control Room Ventilation is restored, the main turbine will trip 60 seconds following failure of the load sensor. Coincident with the turbine trip the SGTR will occur on SG B. 1BwEP-0 will be entered and the crew will transition to E-3. The scenario terminates after depressurization is complete in E-3..

Critical Tasks

- E-3--A: Isolate feedwater flow into and steam flow from the ruptured SG before a transition to ECA-3.1 occurs.
- E-3--B: Establish/maintain RCS temperature so that transition from E-3 does not occur because the RCS temperature is in either of the following conditions:
- Too high to maintain minimum required subcooling (per ICONICS or Att. A)
- OR
- Below the RCS temperature that causes an extreme or severe challenge to the subcriticality and/or the integrity CSF (240°F).
- E-3--C: Depressurize RCS to meet SI termination criteria before water release from the ruptured SG PORV or Safety valve occurs.
- E-3--D: Terminate SI before ruptured SG overfill occurs and control RCS pressure and makeup flow so that primary and secondary inventory are stable before the end of the scenario.

Scenario No: 00-4		Event No. 1
Event Description: SG tube leak resulting in a power decrease.		
Time	Position	Applicant's Actions or Behavior
		NOTE: Per turnover, the crew continues with 1BwOA SEC-8 "Steam Generator Tube Leakage" at step 10.b.
	US	<ul style="list-style-type: none"> • Implement OA SEC-8 "STEAM GENERATOR TUBE LEAK" and direct operator action. • Refer to Tech Specs 3.4.13 – MODE 3 in 6 hours, MODE 5 in 36 hours • Suspend leak rate trending
	US	<ul style="list-style-type: none"> • Initiate Power reduction/Unit shutdown • Implement actions of 1BwGP 100-4. • Direct load reduction
	CREW	Review applicable Precautions, and Limitations and Actions.
	RO	<p>Verify rod position and boron concentration.</p> <p>Initiate boration, if required to maintain ΔI within target band. (BwOP CV-6)</p> <ul style="list-style-type: none"> • Determine boric acid flow rate • Set 1FK-110 BA Flow Cont to desired boration rate. • Set 1FY-0110 BA Blender Preset Counter to desired volume. • Place MU MODE CONT SWITCH to STOP position. • Set MU MODE SELECT to BOR position. • Place MAKE-UP CONTROL Switch to START • Verify proper operation of valves & BA transfer pump (CV110B open, BA pump is running, CV110A throttles open) • Verify BA flow on recorder
	BOP	<p>Initiate turbine load reduction:</p> <ul style="list-style-type: none"> • Depress LOAD RATE MW/MIN • Enter _ MW/min (determined to adequately meet Tech Spec times) • Depress REF • Enter power level • When ready to begin load reduction, depress GO • Verify load decreases.

Comments: _____

Scenario No: 00-4		Event No. 1
Event Description: SG tube leak resulting in a power decrease.		
Time	Position	Applicant's Actions or Behavior
	RO	<p>Monitor power decrease:</p> <ul style="list-style-type: none"> • Monitor reactor power, Tave, ΔI • Verify rods move in AUTO to maintain Tave within $\pm 1.0^\circ\text{F}$ of Tref. <p>If borating:</p> <ul style="list-style-type: none"> • Monitor VCT level • Monitor BA Blender counter countdown. • Verify boration auto stops at preset value. • Return Reactor Makeup System to blended flow at current blended flow.
		Note: Following clearly observable plant response from the reactivity changes, Event 2 is entered.

Comments: _____

Scenario No: 00-4		Event No. 2
Event Description: Auto Rod speed controller failure – 72 steps/min.		
Time	Position	Applicant's Actions or Behavior
	CUE	When rod motion is called for, rods step at 72 steps/min.
	RO/SRO	Identify/report rod motion too fast for conditions.
	RO	Place rod control in manual and stabilize reactor power.
	BOP/US	May stop turbine down power evolution until rod control problem is evaluated.
		NOTE: 1BwOA ROD-1 "UNCONTROLLED ROD MOTION, may be entered for reference but is not required.
	US	Notify SM/MAINT of rod speed controller malfunction NOTE: I&C will be unable to repair the rod speed controller.
	CREW	Determine actions needed to coordinate Unit S/D with rods in manual
		NOTE: After actions for rod speed problem have been completed, Event 3 may be started.

Comments: _____

Scenario No: 00-4		Event No. 3
Event Description: VCT level transmitter LT-185 fails high		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciators: 1-9-A2 "VCT LEVEL HIGH LOW" 1-9-D2 "LTDWN FLOW DIVERTED TO HUT" 1CV112A in full divert LT-112 indicates normal VCT level
	RO	Identify/report failed transmitter <ul style="list-style-type: none"> • Evaluation of operable VCT level indications • LT-112 remains available.
	RO	Control VCT level manually to allow letdown flow to the VCT.
	US	Inform SM/Maint of VCT level transmitter LT-185 failure.
		NOTE: Initiate Event 4 after VCT level is regained and under manual control.

Comments: _____

Scenario No: 00-4		Event No. 4
Event Description: Steam Generator B level transmitter (controlling) fails low		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciators 1-15-B3 "S/G 1B FLOW MISMATCH STM FLOW LOW" 1-15-B5 "SG 1B LVL LO-2 RX TRIP ALERT" 1-15-B9 "SG 1B LEVEL DEVIATION HIGH LOW" <ul style="list-style-type: none"> • FT-529 indication reading low • Feed reg. valve throttling open • FW flow increasing • SG level increasing above program
	BOP/US	Identify/report Steam Generator Level channel LT-529 failure <ul style="list-style-type: none"> • Take MANUAL control of Feed reg. valve and balance Feed flow with Steam flow to stabilize SG level, as necessary.
	US	Direct that the turbine ramp be slowed or stopped during troubleshooting.
	US	Implement BwOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL", Attachment E "NARROW RANGE SG LEVEL CHANNEL FAILURE" and direct operator action.
	BOP/US	Check affected SG levels normal <ul style="list-style-type: none"> • If NOT, <ul style="list-style-type: none"> • Place feed reg. valve in manual • Restore SG level to a stable condition Select operable SG level channel Establish AUTO level control
	US	Locally trip bistables for failed channel <ul style="list-style-type: none"> • SG 1B – 1LT-529 – P14 LB529A • Lo-2 Rx Trip/AF Pump Start LB529B
	BOP	Check status of AMS <ul style="list-style-type: none"> • Not failed

Comments: _____

Scenario-No: 00-4		Event No. 4
Event Description: Steam Generator B level transmitter (controlling) fails low		
Time	Position	Applicant's Actions or Behavior
	US	Refer to Tech Spec <ul style="list-style-type: none"> • 3.3.1 • 3.3.2 • 3.3.3
	US	Inform SM/Maint of failure of SG 1B Level Transmitter LT-529
		NOTE: After Tech Specs are referenced, proceed to event 5.

Comments: _____

Scenario No: 00-4		Event No. 5
Event Description: Inadvertent deluge of MCR VC Charcoal filter		
Time	Position	Applicant's Actions or Behavior
	CUE	<p>Annunciators: 0-33-A8 "MCR SUP FAN 0A TRIP DELTA P HIGH LOW 0-33-A9 "MCR RTRN FAN 0A TRIP DELTA P HIGH LOW 0-38-B7 "FIRE PUMP OA RUNNING" 0-33-C6 "MCR CHLR UNIT TROUBLE"</p> <p>Trip of running A Train Control Room Ventilation Supply and Return fans Trip of A Train Chiller. OA Fire Pump Running Unit 1 Fire Alarm</p>
	RO	<p>Identify/report trip of supply and return fans</p> <p>Diagnose inadvertent deluge of filter</p> <p>Start A train equipment as necessary</p> <p>Note: If asked, Fire Suppression Alarm is in Zone 1S-4.</p>
	US	<p>Direct isolation of deluge.</p> <p>Check SER printout to determine cause of alarm</p> <p>Direct securing of OA Fire Pump</p>
	US	Report to SM/Maint status of control room fire suppression system
		NOTE: After the Control room Ventilation has been restored, Proceed to event 6 and 7.

Comments: _____

Scenario No: 00-4		Event No. 6, 7
Event Description: Automatic turbine trip (6) SG B Tube Rupture (7)		
Time	Position	Applicant's Actions or Behavior
	CUE	Turbine trip Reactor trip Power decreasing
	BOP/US	Identify/report turbine trip/reactor trip
	US	Implement EP-0 "Reactor Trip or Safety Injection"
	RO	Perform immediate operator actions of EP-0 Verify reactor trip <ul style="list-style-type: none"> • Rod bottom lights LIT • Reactor trip & bypass breakers open • Neutron flux decreasing
	BOP	Verify Turbine Trip <ul style="list-style-type: none"> • Turbine throttle valves closed • Turbine governor valves closed Verify power to 4KV busses <ul style="list-style-type: none"> • Bus 141 alive light lit • Bus 142 alive light lit
	CREW	Determine SI needed/actuated <ul style="list-style-type: none"> • If actuated <ul style="list-style-type: none"> • SI First OUT annunciator lit • SI ACTUATED lit • SI Equipment

Comments: _____

Scenario No: 00-4		Event No. 6, 7
Event Description: Automatic turbine trip (6) SG B Tube Rupture (7)		
Time	Position	Applicant's Actions or Behavior
	BOP	Verify FW isolated <ul style="list-style-type: none"> FW pumps tripped Isolation monitor lights lit FW pumps disch valves closed (FW002A-C)
	RO	Verify ECCS pumps running <ul style="list-style-type: none"> CENT Chg pumps RH pumps SI pumps
	BOP	Verify RCFCs running in LOW SPEED Verify Phase A isolation -- Group 3 Monitor lights lit Verify CNMT Ventilation isolation - Group 6 Monitor lights lit Verify AF system: <ul style="list-style-type: none"> AF pumps running. AF isolation valves open (AF13A-H) AF flow control valves throttled (AF005A-H) Verify CC Pumps running Verify SX Pumps running
	BOP	Check Main Steamline Isolation <ul style="list-style-type: none"> Check SG pressure > 640 psig Check CNMT pressure <8.2

Comments: _____

Scenario No: 00-4		Event No. 6, 7
Event Description: Automatic turbine trip (6) SG B Tube Rupture (7)		
Time	Position	Applicant's Actions or Behavior
	BOP	<p>Check if CNMT Spray is required</p> <ul style="list-style-type: none"> • CNMT pressure > 20 psig <p>NOTE: Containment spray may not be actuated at this time. When it does, do the following:</p> <ul style="list-style-type: none"> • Stop all RCPs • Group 6 CS monitor lights – LIT • Group 6 Phase B Isolation monitor lights – LIT • Check CS eductor suction flow on running pumps – Greater than 15 GPM • Check CS eductor additive flow on running pumps – Greater than 5 GPM.
	BOP	<p>Verify AF flows</p> <ul style="list-style-type: none"> • AF flow > 500 gpm available • SG levels maintained between 10% (31%) and 50% <ul style="list-style-type: none"> • Close AF isolation valves on SG 1B (due to SGTR) <ul style="list-style-type: none"> 1AF013B 1AF013F
	RO/BOP	<p>Verify ECCS valve alignment & flows</p> <ul style="list-style-type: none"> • Group 2 CL Inj monitor lights lit • High Head Injection flow > 100 gpm • Safety Injection flow > 200 gpm (if RCS pressure < 1700 psig)
	RO	<p>Check at least One PZR PORV Relief Path Available</p> <ul style="list-style-type: none"> • PORV isol valves – ENERGIZED • PORV relief path – AVAILABLE
	BOP	<p>Verify Generator Trip</p> <ul style="list-style-type: none"> • OCB 1-8 open • OCB 7-8 open
	BOP	<p>Verify DG running</p> <ul style="list-style-type: none"> • SX valves open (SX169A/B) • Dispatch operator locally to check operation

Comments: _____

Scenario No: 00-4		Event No. 6, 7
Event Description: Automatic turbine trip (6) SG B Tube Rupture (7)		
Time	Position	Applicant's Actions or Behavior
	BOP	Ventilation systems aligned for emergency <ul style="list-style-type: none"> • Control Room • Aux Bldg. • Fuel Handling Bldg.
	RO	Check PZR sprays & PORVs closed Maintain RCS temperature control <ul style="list-style-type: none"> • Throttle AFW. Maintain total AFW flow >500 GPM until Steam Generator narrow range level >10% (31%). Check RCP status <ul style="list-style-type: none"> • High Head SI Flow • RCS pressure
	BOP	Check SG secondary boundary <ul style="list-style-type: none"> • Check Steam Generator Tubes Intact (1B SG Ruptured)
	US	Transition to BwEP-3 "STEAM GENERATOR TUBE RUPTURE"
	US	Direct actions of BwEP-3
	RO	Check status of RCPs If any running, apply trip criteria <ul style="list-style-type: none"> • High Head Injection flow >100 gpm • Safety Injection Pump Disch flow > 200 gpm • RCS pressure < 1425 psig • Controlled C/D not in progress or previously initiated.

Comments: _____

Scenario-No: 00-4		Event No. 6, 7
Event Description: Automatic turbine trip (6) SG B Tube Rupture (7)		
Time	Position CREW	Applicant's Actions or Behavior
		Identify ruptured SG <ul style="list-style-type: none"> o Unexpected rise in level o High activity for any SG sample <ul style="list-style-type: none"> • Reset CNMT Isol Phase A • Notify Chem to locally sample • Open SG blowdown sample valves at Chem request
	CREW	Identify/report 1B SG as ruptured
	BOP	Isolate flow from ruptured SG <ul style="list-style-type: none"> • SG PORV 1MS018B in AUTO • Check SG PORV 1MS018B closed
	BOP [CT] E-3--A	Verify SG blowdown valves closed unless open for sampling <ul style="list-style-type: none"> • 1SD002E • 1SD002F Close MSIV and MSIV bypass valves for 1B SG
	BOP	Check PORVs on 1A, 1C & 1D SGs available for cooldown
	BOP	Check ruptured SG level <ul style="list-style-type: none"> • If < 10% (31%) Maintain feed flow to 1B S/G until >10% (31%) • If > 10% (31%) Verify AF valves closed on SG 1B Check ruptured SG pressure >320 psig.

Comments: _____

Scenario No: 00-4		Event No. 6, 7
Event Description: Automatic turbine trip (6) SG B Tube Rupture (7)		
Time	Position	Applicant's Actions or Behavior
	CREW	Initiate RCS cooldown <ul style="list-style-type: none"> Determine target temperature based on 1B SG pressure (Normal CNMT)
	[CT] E-3--B	<ul style="list-style-type: none"> Check PZR pressure < 1930 psig <ul style="list-style-type: none"> If so, block Steamline SI Dump steam from intact SGs at maximum rate <ul style="list-style-type: none"> Steam dumps in STEAM PRESSURE Mode If steam dumps NOT available, SG PORVs Check average CETC temperatures < value determined above Stop RCS Cooldown Maintain CETC < value determined above.
	BOP	Check intact SG levels <ul style="list-style-type: none"> NR level >10% (31%) Maintain level between 23% (31%) and 50% Narrow range levels not increasing in an uncontrolled manner
	RO	Check PZR PORVs and Isolation Valves <p>PORVs energized</p> <p>PORVs closed</p> <ul style="list-style-type: none"> RY455A RY456 <p>At least ONE PORV Block valve OPEN</p> <ul style="list-style-type: none"> RY8000A RY8000B

Comments: _____

Scenario No: 00-4		Event No. 6, 7
Event Description:		Automatic turbine trip (6) SG B Tube Rupture (7)
Time	Position	Applicant's Actions or Behavior
	RO	Reset SI Reset CNMT isolation <ul style="list-style-type: none"> • ϕA • ϕB • Containment Ventilation • Restore IA to containment
	BOP	Verify all AC buses energized
	RO	Check if RH pumps should be stopped <ul style="list-style-type: none"> • RH Suction aligned to RWST • RCS pressure >325 psig • Stop RH pumps and place in standby
	CREW	Check if RCS Cooldown Should be Stopped
	CREW	Check ruptured SG pressure – STABLE OR INCREASING
	CREW	Check RCS subcooling acceptable

Comments: _____

Scenario No: 00-4		Event No. 6, 7
Event Description: Automatic turbine trip (6) SG B Tube Rupture (7)		
Time	Position RO [CT] E-3-C	<p>Applicant's Actions or Behavior</p> <p>Depressurize RCS using Pzr spray to minimize break flow and refill Pzr.</p> <p>Use PZR sprays</p> <ul style="list-style-type: none"> • Spray at maximum rate until ONE of the following met <ul style="list-style-type: none"> ◦ BOTH <ul style="list-style-type: none"> • RCS pressure < 1B SG pressure • PZR level > 12% (28%) ◦ PZR level > 69% (62%) ◦ RCS subcooling NOT acceptable • Close spray valves <p>If sprays are not adequate, use one PZR PORV may use both</p> <ul style="list-style-type: none"> • Open one PZR PORV until ONE of the following met <ul style="list-style-type: none"> ◦ BOTH <ul style="list-style-type: none"> • RCS pressure < 1B SG pressure • PZR level > 12% (28%) ◦ PZR level > 69% (62%) ◦ RCS subcooling NOT acceptable • Close PORVs • Close spray valves <p>Check RCS pressure increasing</p>
	CREW	<p>Check if ECCS flow should be terminated</p> <ul style="list-style-type: none"> • Subcooling acceptable • Secondary Heat Sink • RCS pressure stable or increasing • Pzr level greater than 12% (28%)
	CREW	<p>Stop ECCS Pumps and Place in Standby</p> <ul style="list-style-type: none"> • SI pumps • All but one Chg pump

Comments: _____

Scenario No: 00-4		Event No. 6, 7
Event Description: Automatic turbine trip (6) SG B Tube Rupture (7)		
Time	Position	Applicant's Actions or Behavior
	CREW [CT] E-3--D	Terminate High-Head ECCS <ul style="list-style-type: none"> • Check Chg pumps suction aligned to RWST • Reset SI recirc sump isol valves if necessary <ul style="list-style-type: none"> - 1SI8811A/1CV8110 - 1SI8811B/1CV8111 • Reset SI Cent Chg Pump miniflow isol vlvs <ul style="list-style-type: none"> - 1CV8114 - 1CV8116 • Verify Chg pump miniflow isol vlvs open <ul style="list-style-type: none"> - 1CV8110 - 1CV8111 - 1CV8114 - 1CV8116 • Close Chg pumps to cold legs injection isol vlvs <ul style="list-style-type: none"> - 1SI8801A - 1SI8801B Establish Charging Flow Control Charging Flow to Maintain Pzr Level
		NOTE: Scenario may be terminated at this point

Comments: _____

Simulation Facility Braidwood Scenario No.: 00-6 Operating Test No.: 2

Examiners: _____ Operators: _____ SRO
 _____ RO
 _____ BOP

Objectives: To evaluate the applicants ability to use Normal, Abnormal, Emergency and alarm response procedures to respond to normal power reduction, a plugged boric acid filter, a Tcold RTD failing high, a steam flow detector failure, a RCP thermal barrier leak, a steam break causing a reactor trip, a RCS Small Break LOCA with a failure of automatic start of both Auxiliary Feedwater (AF) pump but manual start available for the 1A AF Pump, and failure of the High Head SI discharge valves to auto open.

Initial Conditions: IC-21; 100% power BOL. Equilibrium. Xenon

Turnover: Unit is at 100% power. Circuit breaker 1423 (DG-1B feeder to bus 142) was declared OOS late last shift and is being replaced. DG-1B has been declared Out of Service. Breaker 1423 is expected to return to service in 3 to 4 hours. Currently in LCO 3.8.1 Condition B with 12 hours left on the completion time.

Event No.	Malf. No.	Event Type*	Event Description
Preload (NOTE 1)	FW44 MRF EG09 MAINT_O	C BOP SRO	1B AF Pump fails to start 1B DG OOS
Preload (NOTE 1)	IMF RP15B IMF FW43 MRF RP90 OPEN MRF RP91 TEST IORs SE:PN0470 OFF SE:PN0468 OFF	C BOP SRO	1A AF Pump fails to auto start
Preload (NOTE 1)	MRF RP75 OUT IOR ZDI1SI8801A CLS	C RO SRO	SI8801A fails close and SI8801B fails to auto open
1		N BOP SRO	Ramp down turbine power to 800MW at 5 MW/min
		R RO	Lower reactor power using rods and/or boration
2	RF CV33, 0	C RO SRO	Boric Acid filter plugged. (Insert after boration has started) (NOTE 2)
3	RX18D, 630	I RO SRO	Loop 4 Tcold fails high (NOTE 3)
4	RX03E, 0	I BOP SRO	Steam Flow C (control) detector fails low. (360 sec ramp) FT-532A
5	CC07C, 25	C RO SRO	Loop C RCP thermal barrier leak. (25 gpm)
6	MS08C, 4	M BOP RO SRO	Main Steam Line Break Outside Containment (Results in reactor trip)
7	TH06C, 200 -900	M BOP RO SRO	RCS leak on Loop C at 200 gpm (increase to 900 gpm after 5 min.)
8	Preload	C BOP SRO	AF pumps fail to auto start with 1A manual start capable
9	Preload	C RO SRO	High Head SI discharge valves to RCS fail to open automatically with 1SI8801A

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

NOTE 1: Run BATCH FILE for all Preload **BAT ES1.2**

NOTE 2: MRF CV34, 100 when directed to bypass filter.

NOTE 3: MRF RP23 (OPEN/CLOSE)

MRF RX026 (TRIP)

MRF RX141 (TRIP)

MRF RX142 (TRIP)

MRF RX028 (TRIP)

MRF RX025 (TRIP)

MRF RX027 (TRIP)

SCENARIO 00-6 OVERVIEW

Unit 1 is at 100 % power BOL. Following turnover, the crew will reduce power to 800MW at 5MW/min.

Following clearly observable plant response from the reactivity changes, the boric acid filter will become plugged causing a complete loss of boric acid flow. The operators will troubleshoot the lack of boric acid flow and will eventually open the filter bypass valve. The crew may use 1BwOP AB-26 "Changing a Boric Acid Filter" or the P&ID to bypass around the clogged filter.

After the boric acid filter bypass is opened, Loop 4 Tcold RTD will fail high. BwOA INST-2 (Attachment A) will be entered to address the failed Tcold RTD. The SRO will address ITS for actions for the failed Tcold instrument.

When I&C has tripped the bistables, a steam flow detector will fail low. This will cause the BOP to go to manual on the FWRV and control the feed pump speed manually. Entry into BwOA INST-2 (Attachment H) is required. The failed channel will be selected out and after control of SG level is attained, control will be switched back to auto. The turbine ramp should be slowed or stopped during troubleshooting and plant stabilized.

Two minutes following return of the SG level control to auto, a RCP will develop a thermal barrier leak. Entry into BwOA PRI-1 may occur and entry into PRI-6 will occur. The operators must diagnose the leak and expected radiation alarms, and manually isolate the leak.

After the RCP thermal barrier leak is isolated, a main steam break outside of containment will occur. This will result in a reactor trip and main steam isolation. The crew will enter BwEP E-0 and transition to BwEP ES-1.1. While the crew is in ES-1.1, an RCS leak of 200 gpm occurs. This leak will increase to 900 gpm after approx. 5 min. Upon AFW actuation, the 1A motor driven AF pump and the 1B diesel driven AF pump will fail to start. The operator will manually start the 1A AF pump (the 1B AFW pump will not be able to be started). The high head SI discharge valve SI8801A & B will fail to open with the SI8801B capable of being manually open. The operator will manually open SI8801B for high head injection flow. Transition is made to E-1 based on RCS and containment conditions. Cooldown will be required and transition is made to ES-1.2. The scenario is terminated when at step 6 when determination of cooldown is required.

Critical Tasks

E-0--F: Establish the minimum required AFW flow rate to the SGs before transition out of E-0.

E-0--I: Establish flow from at least one high-head ECCS pump before transition out of E-0.

Scenario No: 00-6		Event No. 1
Event Description: Power decrease at 5 MW/min.		
Time	Position	Applicant's Actions or Behavior
	US	Implement actions of 1BwGP 100-4, "Power Descension"
	US	Direct load reduction to 800Mw.
	CREW	Review applicable Precautions, and Limitations and Actions.
	RO	<p>Verify rod position and boron concentration.</p> <p>Initiate boration, if required to maintain ΔI within target band. (BwOP CV-6)</p> <ul style="list-style-type: none"> • Determine boric acid flow rate • Set 1FK-110 BA Flow Cont to desired boration rate. • Set 1FY-0110 BA Blender Preset Counter to desired volume. • Place MU MODE CONT SWITCH to STOP position. • Set MU MODE SELECT to BOR position. • Place MAKE-UP CONTROL Switch to START • Verify proper operation of valves & BA transfer pump (CV110B open, BA pump is running, CV110A throttles open) • Verify BA flow on recorder
	BOP	<p>Initiate turbine load reduction:</p> <ul style="list-style-type: none"> • Depress LOAD RATE MW/MIN • Enter 5 MW/min • Depress REF • Enter power level • When ready to begin load reduction, depress GO • Verify load decreases.

Comments: _____

Scenario No: 00-6		Event No. 1
Event Description: Power decrease at 5 MW/min.		
Time	Position	Applicant's Actions or Behavior
	RO	<p>Monitor power decrease:</p> <ul style="list-style-type: none"> • Monitor reactor power, Tave, ΔI • Verify rods more in AUTO to maintain Tave within $\pm 1.0^\circ\text{F}$ of Tref. <p>If borating:</p> <ul style="list-style-type: none"> • Monitor VCT level • Monitor BA Blender counter countdown. • Verify boration auto stops at preset value. • Return Reactor Makeup System to blended flow at current blended flow.
		Note: Following clearly observable plant response from the reactivity changes, Event 2 is entered.

Comments: _____

Scenario No: 00-6		Event No. 2
Event Description: Boric Acid filter plugged		
Time	Position	Applicant's Actions or Behavior
	CUE	No Boric Acid flow is indicated. Boric Acid flow counter slowly stops
	RO/SRO	Identify /Report lack of boric acid flow
	RO	Check other indications in an attempt to identify why there is no boric acid flow.
	RO	Report that there are no abnormal valve lineups.
	RO/SRO	Determine that the boric acid filter is plugged. Recommend opening the filter bypass valve (1AB8458).
	US	Direct opening of boric acid filter bypass valve (1AB8458).
		NOTE: After boric acid filter bypass valve is opened, Event 3 may be started.

Comments: _____

Scenario No: 00-6		Event No. 3
Event Description: Loop D Tcold fails high		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciators: 1-14-A3 "LOOP 1A TAVE DEV LOW" 1-14-B1 "OTΔT HIGH RX TRIP ALERT" 1-14-B3 "LOOP 1B TAVE DEV LOW" 1-14-C3 "LOOP 1C TAVE DEV LOW" Loop 4 ΔT Tcold fails high Tave Loop D increase ΔT Loop D decrease
	RO	Identify/Report failed Tave & ΔT <ul style="list-style-type: none"> Determine Tcold failed high on Loop D Place 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.
	RO	Manually defeat failed RTD channel <ul style="list-style-type: none"> Select failed Tave channel with Tave DEFEAT switch Select failed ΔT channel with ΔT DEFEAT switch Select operable channel for ΔT recorder
	RO	Check if rod control can be returned to AUTO <ul style="list-style-type: none"> TURB LOW POWER INTLK C5 not lit Check Tave-Tref stable and within 1°F <ul style="list-style-type: none"> Restore to within 1°F <ul style="list-style-type: none"> Adjust rods Adjust turbine load Adjust RCS boron concentration Place ROD BANK SELECT switch in AUTO Check PZR Level normal & stable

Comments: _____

Scenario No: 00-6		Event No. 3
Event Description: Loop D Tcold fails high		
Time	Position	Applicant's Actions or Behavior
	RO	Locally trip bistables for Loop D by placing in TEST <ul style="list-style-type: none"> • OP ΔT Trip TB441G • OPΔT Runback TB441H • OTΔT Trip TB441C • OTΔT Runback TB441D • Low Tave TB442G • Lo-Lo Tave TB442D
	RO	Check P12 interlock <ul style="list-style-type: none"> • LO-2 TAVE STM DUMP INTLK P12 not lit
	US	Check Technical Specifications: <ul style="list-style-type: none"> • 3.3.1 • 3.3.2
	US	Inform SM/Maint of Loop 1D Tcold RTD failure.
		NOTE: Initiate Event 4 after the Unit Supervisor references Tech Specs.

Comments: _____

Scenario No: 00-6		Event No. 4
Event Description: Steam Flow C (controlling) detector fails low		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciator 1-15-C3 "S/G 1C FLOW MISMATCH STM FLOW LOW" <ul style="list-style-type: none"> • FT-532 indication reading low • Feedwater Regulating Valve throttling closed • FW flow decreasing • SG level decreasing below program
	BOP/US	Identify/Report steam flow channel FT-532 failure Take MANUAL control of Feed reg. valve and balance Feed flow with Steam flow to stabilize SG level, as necessary.
	US	Direct that the turbine ramp be slowed or stopped during troubleshooting.
	US	Implement 1BwOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL", Attachment H "STEAM FLOW CHANNEL FAILURE" and direct operator action.
	BOP/US	Check affected SG levels normal <ul style="list-style-type: none"> • Place feed reg. valve in manual • Verify adequate feedwater ΔP • Restore SG level to a stable condition Select operable steam flow channel Establish AUTO level control Verify steam pressure channels PT-534 and PT-535 normal
	US	Inform SM/Maint of failure of SG 1C steam flow channel FT-532
		NOTE: Two minutes following return of SG level control to auto, Proceed to Event 5

Comments: _____

Scenario No: 00-6		Event No. 5
Event Description: Loop C RCP Thermal Barrier leak.		
Time	Position	Applicant's Actions or Behavior
	CUE	CCW Surge Tank Level increase CCW activity levels increase (Radiation monitor alarm) CCW surge tank vent valve will close on high activity. Pressurizer level decreasing Charging flow increasing
		NOTE: 1BWOA PRI-1 may be entered. BWOA Pri-6 will be entered.
	US	Implement 1BWOA PRI-6, "Component Cooling Malfunction" and direct operator action.
	BOP	Check CC Surge Tank Level <ul style="list-style-type: none"> Level is increasing
	US	Direct operations to 1BWOA PRI-6, ATT. A "Abnormal CC Surge Tank Level"
	BOP	Check CC Surge Tank Level <ul style="list-style-type: none"> Level is increasing Note: Utilize RF CC15/CC16 100 to drain surge tank when asked
	RO	Check for Leakage from RCP Thermal Barrier <ul style="list-style-type: none"> RCP THERM BARR CC WTR FLOW HIGH/LOW (1-7-E4) – LIT Seal Injection flow – any indicating abnormally high Manually throttle 1CV121 and 1CV182 to maintain seal injection flow between 8-13 GPM per pump. Check 1CC685 – CLOSED Manually close 1CC685.
	US	Restore CC to unaffected RCPs at Shift Manager discretion Direct local operator to locally close RCP thermal barrier CC outlet valve to isolate affected pump <ul style="list-style-type: none"> 1CC9496C MRF CC46 0
	US	Refer to Tech Specs: <ul style="list-style-type: none"> 3.7.7
		NOTE: After the RCP thermal barrier is isolated, Proceed to Event 6.

Comments: _____

Scenario No: 00-6		Event No. 6
Event Description: Main Steam Break Outside Containment (isolated by MSIV closure).		
Time	Position	Applicant's Actions or Behavior
	CUE	MSIV closure Reactor Trip
		NOTE: Main Steam break will be isolated when MSIVs close.
	US	Implement 1BwEP-0 "Reactor Trip or Safety Injection"
	RO	Perform immediate operator actions of 1BwEP-0 Verify reactor trip <ul style="list-style-type: none"> • Rod bottom lights LIT • Reactor trip & bypass breakers open • Neutron flux decreasing
	BOP	Verify Turbine Trip <ul style="list-style-type: none"> • Turbine throttle valves closed • Turbine governor valves closed Verify power to 4KV busses <ul style="list-style-type: none"> • Bus 141 alive light lit • Bus 142 alive light lit
	CREW	Determine SI needed/actuated <ul style="list-style-type: none"> • If needed <ul style="list-style-type: none"> • Pzr pressure <1829 psig • Steamline pressure <640 psig • Cnmt pressure >3.4 psig • Pzr level can not be maintained >4%
	BOP	Verify FW isolated <ul style="list-style-type: none"> • FW pumps tripped • Isolation monitor lights lit • FW pumps disch valves closed (FW002A-C)

Comments: _____

Scenario No: 00-6		Event No. 6
Event Description: Main Steam Break Outside Containment (isolated by MSIV closure).		
Time	Position RO	Applicant's Actions or Behavior
		Verify ECCS pumps running <ul style="list-style-type: none"> • CENT Chg pumps • RH pumps • SI pumps
	BOP [CT] E-0--F	Verify RCFCs running in LOW SPEED Verify Phase A isolation – Group 3 Monitor lights lit Verify CNMT Ventilation isolation - Group 6 Monitor lights lit Verify AF system: <ul style="list-style-type: none"> • AF pumps running. Must manually start the 1A AFW pump • AF isolation valves open (AF13A-H) • AF flow control valves throttled (AF005A-H) Verify CC Pumps running Verify SX Pumps running
	BOP	Check Main Steamline Isolation <ul style="list-style-type: none"> • Check SG pressure > 640 psig • Check CNMT pressure <8.2
	BOP	Check if CNMT Spray is required <ul style="list-style-type: none"> • CNMT pressure > 20 psig NOTE: Containment spray may not be actuated at this time. When it does, do the following: <ul style="list-style-type: none"> • Stop all RCPs • Group 6 CS monitor lights – LIT • Group 6 Phase B Isolation monitor lights – LIT • Check CS eductor suction flow on running pumps – Greater than 15 GPM • Check CS eductor additive flow on running pumps –Greater than 5 GPM.

Comments: _____

Scenario No: 00-6		Event No. 6
Event Description: Main Steam Break Outside Containment (isolated by MSIV closure).		
Time	Position	Applicant's Actions or Behavior
	BOP	Verify AF flows <ul style="list-style-type: none"> • AF flow > 500 gpm available • SG levels maintained between 10% (31%) and 50%
	RO [CT] E-0--I	Verify ECCS valve alignment & flows <ul style="list-style-type: none"> • Group 2 CL Inj monitor lights lit • High Head Injection flow >100 gpm Must manually open 1SI8801B • Safety Injection flow > 200gpm (if RCS pressure <1700 psig)
	RO	Check at least One PZR PORV Relief Path Available <ul style="list-style-type: none"> • PORV isol valves – ENERGIZED • PORV relief path – AVAILABLE
	BOP	Verify Generator Trip <ul style="list-style-type: none"> • OCB 1-8 open • OCB 7-8 open
	BOP	Verify DG running <ul style="list-style-type: none"> • SX valves open (SX169A/B) • Dispatch operator locally to check operation
	BOP	Ventilation systems aligned for emergency <ul style="list-style-type: none"> • Control Room • Aux Bldg. • Fuel Handling Bldg.
	RO	Check PZR sprays & PORVs closed Maintain RCS temperature control <ul style="list-style-type: none"> • Throttle AFW. Maintain total AFW flow >500 GPM until Steam Generator narrow range level >10% (31%). Check RCP status

Comments: _____

Scenario No: 00-6		Event No. 6
Event Description: Main Steam Break Outside Containment (isolated by MSIV closure).		
Time	Position	Applicant's Actions or Behavior
	BOP	Check SG secondary boundary <ul style="list-style-type: none"> • Check Steam Generator Tubes Intact
	RO	Check if RCS is Intact <ul style="list-style-type: none"> • CNMT area radiation monitors • CNMT pressure • CNMT floor water level
		Check if ECCS Flow Should be Terminated <ul style="list-style-type: none"> • RCS subcooling • Secondary Heat Sink • RCS pressure stable or increasing • Pzr level greater than 12%
	SRO	Transition to 1BwEP ES-1.1 "SI Termination"
	CREW	Reset SI if Necessary <ul style="list-style-type: none"> • Depress both SI reset pushbuttons Reset Containment Isolation <ul style="list-style-type: none"> • Reset Phase A • Reset Phase B • Check SACs running • Open instrument air Cnmt isolation valves <ul style="list-style-type: none"> - 1IA065 - 1IA066

Comments: _____

Scenario No: 00-6		Event No. 6
Event Description: Main Steam Break Outside Containment (isolated by MSIV closure).		
Time	Position	Applicant's Actions or Behavior
	RO	<p>Realign Cent Chg Pumps</p> <ul style="list-style-type: none"> • Stop all but 1 Chg pump <p>Check RCS pressure stable or increasing</p> <p>Terminate High-Head ECCS</p> <ul style="list-style-type: none"> • Check Chg Pump suction aligned to RWST • Reset SI recirc sump isol valves if necessary • Reset Chg pump miniflow isol valves • Verify Chg pump miniflow isolation valves open • Close Chg pumps to Cold Leg injection isol valves
	RO	<p>Establish Charging Flow</p> <ul style="list-style-type: none"> • Place 1CV182 controller at 0% demand • Open charging line Cnmt isol valves <ul style="list-style-type: none"> - 1CV8105 - 1CV8106 • Throttle 1CV182 to maintain RCP seal injection flow between 8 and 13 gpm per pump. <p>Control Charging Flow to Maintain Pzr Level</p> <ul style="list-style-type: none"> • Throttle 1CV121 to maintain Pzr level greater than 12% (28%) <p>Check if SI Pumps Should be Stopped</p> <ul style="list-style-type: none"> • Check RCS pressure stable or increasing and greater than 1700 psig. <p>Check If RH Pumps Can Be Stopped</p> <ul style="list-style-type: none"> • Check RH pumps suction aligned to RWST • Stop RH pumps and place in standby
		NOTE: After step 9 of 1BwEP ES-1.1 is complete, initiate Event 7

Comments: _____

Scenario No: 00-6		Event No. 7
Event Description: RCS Leak on C Loop		
Time	Position	Applicant's Actions or Behavior
	CUE	Pzr level decreasing Pzr pressure decreasing Radiation monitor alarms Containment sump level increasing
	US	Transition to BwEP-1 "LOSS OF REACTOR OR SECONDARY COOLANT" Direct actions of BwEP-1
	CREW	Check Status of RCPs If any RCP is running check if RCPs should be stopped: <ul style="list-style-type: none"> • High head SI flow greater than 100 GPM • SI pump discharge flow greater than 200 GPM • RCS temperature less than 1425 psig • Controlled RCS cooldown not in progress or previously initiated
	BOP/US	Check SG secondary pressure boundaries intact Check pressure in all SGs <ul style="list-style-type: none"> • No SG pressure decreasing in uncontrolled manner • No SG completely depressurized Check intact SG levels <ul style="list-style-type: none"> • Narrow range levels >10% (31%). If not flow is maintain > 500 gpm o Control feed flow to maintain intact SG levels between 10% (31%) and 50% • Check narrow range levels NOT increasing in an uncontrolled manner.
	BOP	Check secondary radiation normal
	RO/US	Check PZR PORVs and Isolation Valves <ul style="list-style-type: none"> • PORV Isol valves energized 1RY8000A/B • PORVs closed RY455A & RY456 • PORV isolation valves at least one open

Comments: _____

Scenario No: 00-6		Event No. 7
Event Description: RCS Leak on C Loop		
Time	Position CREW	Applicant's Actions or Behavior
		<p>Check if ECCS flow should be reduced</p> <ul style="list-style-type: none"> • RCS Subcooling acceptable • Secondary heat sink Total feed flow to SGs > 500 gpm available OR NR level in at least ONE intact SG > 10% (31%) • RCS Pressure stable or increasing • PZR level > 12% (28%) <p>Determine ECCS reduction criteria NOT met (subcooling likely)</p>
	CREW	<p>Check if CNMT Spray should be stopped</p> <ul style="list-style-type: none"> • CS Pumps running • Reset CS signal • When Spray Additive tank LO-2 level lights LIT, close eductor spray additive valves 1CS019A/B <p>When CNMT pressure is < 15 psig AND CS has operated for at least 2 hours, continue with steps to secure CS</p>

Comments: _____

Scenario No: 00-6		Event No. 7
Event Description: RCS Leak on C Loop		
Time	Position	Applicant's Actions or Behavior
	RO/US	<p>Check if RH Pumps should be stopped</p> <ul style="list-style-type: none"> • Reset SI • Depress BOTH SI RESET pushbuttons • Verify SI ACTUATED permissive light NOT lit • Verify AUTO SI BLOCK permissive light LIT <p>Check RH pumps suction aligned to RWST</p> <p>Check RCS pressure > 325 psig</p> <ul style="list-style-type: none"> • If NOT, DO NOT stop RH pumps • If > 325 psig AND pressure stable or increasing Stop RH pumps and place in standby
	CREW	<p>Check RCS and SG pressures</p> <p>Check pressure in ALL SGs stable or increasing</p> <p>Check RCS pressure stable or decreasing</p>
	BOP/US	<p>Check if DG should be stopped</p> <p>Bus 141 & 142 energized</p> <p>Bus 143 & 144 energized</p> <p>Stop 1A & 1B DG per 1BwOP DG-12 "Diesel Generator Shutdown"</p>

Comments: _____

Scenario No: 00-6		Event No. 7
Event Description: RCS Leak on C Loop		
Time	Position	Applicant's Actions or Behavior
	CREW	<p>Evaluate plant status</p> <ul style="list-style-type: none"> • Verify Cold Leg Recirc capability • Check Aux Building Radiation monitors • Reset Containment Isolation Phase A if necessary • Place H2 monitors in service per 1BwOP PS-9 • Obtain samples <ul style="list-style-type: none"> RCS activity and boron concentration Containment sump and atmosphere • Evaluate plant equipment • Trip all Heater Drain Pumps • Shutdown Feedwater pumps, Condensate pumps and Circulating Water Pumps • Shutdown chiller on non-operating VC train
	RO/US	<p>Check if RCS cooldown and depressurization is required</p> <ul style="list-style-type: none"> • RCS pressure > 325 psig • Transition to 1BwEP ES-1.2, "Post LOCA Cooldown and Depressurization".
	US	Transition to 1BwEP ES-1.2 "POST LOCA COOLDOWN AND DEPRESSURIZATION"
	US	Direct actions of 1BwEP ES-1.2

Comments: _____

Scenario No: 00-6		Event No. 7
Event Description: RCS Leak on C Loop		
Time	Position	Applicant's Actions or Behavior
	RO	Reset SI if necessary <ul style="list-style-type: none"> Depress both SI reset pushbuttons Verify SI ACTUATED permissive light – NOT LIT Verify AUTO SI BLOCKED permissive light – LIT
	RO/BOP	Reset Containment Isolation <ul style="list-style-type: none"> Reset CNMT Isol Phase A Reset CNMT Isol Phase B Reset CNMT Vent Isol Check SACs – ANY RUNNING Open instrument air CNMT isol valves. 11A065 11A066
	BOP	Verify ALL AC busses energized <ul style="list-style-type: none"> Bus 141 & 142 Bus 143 & 144 Bus 156, 157, 158, 159
	RO	Check if RH pumps should be stopped <p>Check RH pumps suction aligned to RWST</p> <p>Check RCS pressure > 325 psig</p> <ul style="list-style-type: none"> If NOT, DO NOT stop RH pumps If > 325 psig AND pressure stable or increasing Stop RH pumps and place in standby
	BOP	Check Intact SG levels <ul style="list-style-type: none"> Narrow range levels >10% (31%) Control feed flow to maintain levels – BETWEEN 10% (31%) and 50% Narrow range levels - NOT increasing in an uncontrolled manner
	CREW	Initiate RCS cooldown to 200 F
		NOTE: Scenario may be terminated at this point

Comments: _____

Facility: Braidwood Unit 1 & 2 Date of Exam: 10/23/00 Scenario Numbers: 00-7/ 00-8/ 00-9 Operating Test No. 3					
QUALITATIVE ATTRIBUTES		Initials			
		a	b	c	
1.	The initial conditions are realistic, in that some equipment and/or instrumentation may be out of service, but it does not cue the operators into expected events.	✓	JS	MEB	
2.	The scenarios consist mostly of related events.	✓	JS	MEB	
3.	Each event description consists of <ul style="list-style-type: none"> the point in the scenario when it is to be initiated the malfunction(s) that are entered to initiate the event the symptoms/cues that will be visible to the crew the expected operator actions (by shift position) the event termination point (if applicable) 	✓	JS	MEB	
4.	No more than one non-mechanistic failure (e.g., pipe break) is incorporated into the scenario without a credible preceding incident such as a seismic event.	✓	JS	MEB	
5.	The events are valid with regard to physics and thermodynamics.	✓	JS	MEB	
6.	Sequencing and timing of events is reasonable, and allows the examination team to obtain complete evaluation results commensurate with the scenario objectives.	✓	JS	MEB	
7.	If time compression techniques are used, the scenario summary clearly so indicates. Operators have sufficient time to carry out expected activities without undue time constraints. Cues are given.	✓	JS	MEB	
8.	The simulator modeling is not altered.	✓	JS	MEB	
9.	The scenarios have been validated.	✓	JS	MEB	
10.	Every operator will be evaluated using at least one new scenario. All other scenarios have been modified in accordance with Section D.4 of ES-301.	✓	JS	MEB	
11.	All individual operator competencies can be evaluated, as verified using Form ES-301-6 (submit the form along with the simulator scenarios).	✓	JS	MEB	
12.	Each applicant will be significantly involved in the minimum number of transients and events specified on Form ES-301-5 (submit the form along with the simulator scenarios).	✓	JS	MEB	
13.	The level of difficulty is appropriate to support licensing decisions for each crew position.	✓	JS	MEB	
TARGET QUANTITATIVE ATTRIBUTES (PER SCENARIO)		Actual Attributes	---	---	
1.	Total malfunctions (5-8)	7 / 7 / 7	✓	JS	MEB
2.	Malfunctions after EOP entry (1-2)	3 / 3 / 1	✓	JS	MEB
3.	Abnormal events (2-4)	4 / 3 / 4	✓	JS	MEB
4.	Major transients (1-2)	1 / 2 / 2	✓	JS	MEB
5.	EOPs entered/requiring substantive actions (1-2)	2 / 3 / 2	✓	JS	MEB
6.	EOP contingencies requiring substantive actions (0-2)	0 / 2 / 0	✓	JS	MEB
7.	Critical tasks (2-3)	3 / 2 / 2	✓	JS	MEB

OPERATING TEST NO.: 3

Applicant Type	Evolution Type	Minimum Number	Scenario Number			
			00-7	00-8	00-9	Spare
			1	2	3	4
RO	Reactivity	1	4 /	1 /	1 /	1 /
	Normal	1	/ 4	/ 1	/ 1	/ 1
	Instrument	2	1,2 / 1	3 / 4	4 / 2,3	2 / 3
	Component	2	3,5 / 5	2,6 / 6	5,7 / 5,7	4,7 / 8
	Major	1	6 / 6	6,7 / 6,7	6,8 / 6,8	5,6 / 5,6
As RO	Reactivity	1	4	1	1	1
	Normal	0				
	Instrument	1	1,2	3	4	2
	Component	1	3,5	2,6	5,7	4,7
	Major	1	6	6,7	6,8	5,6
SRO-I	Reactivity	0				
	Normal	1	4	1	1	1
	Instrument	1	1,2	3,4	2,3,4	2,3
	Component	1	3,5	2,6	5,7	4,7,8
	Major	1	6	6,7	6,8	5,6
As SRO	Reactivity	0	N/A	N/A	N/A	N/A
	Normal	1	N/A	N/A	N/A	N/A
	Instrument	1	N/A	N/A	N/A	N/A
	Component	1	N/A	N/A	N/A	N/A
	Major	1	N/A	N/A	N/A	N/A
SRO-U	Reactivity	0	N/A	N/A	N/A	N/A
	Normal	1	N/A	N/A	N/A	N/A
	Instrument	1	N/A	N/A	N/A	N/A
	Component	1	N/A	N/A	N/A	N/A
	Major	1	N/A	N/A	N/A	N/A

- Instructions: (1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.
- (2) Reactivity manipulations must be significant as defined in Appendix D.

NOTE: Scenario Number 4 is a "spare" scenario and is represented for comparison purposes only in Examination Outline submittal.

The "/" in the cells for the "RO" applicant type represents the position the applicant is expected to fill during the scenario. The events are listed for the identified position: RO / BOP.

Author: _____

Chief Examiner: _____

Operating Test: 3

Competencies	Applicant #1 RO/SRO-I/SRO-U				Applicant #2 RO/SRO-I/SRO-U				Applicant #3 RO(BOP)/SRO-I/SRO-U			
	SCENARIO				SCENARIO				SCENARIO			
	07	08	09	S	07	08	09	S	07	08	09	S
Understand and Interpret Annunciators and Alarms	1,2,3 ,5,6	2-7	2-8	2-8	1,2,3 ,5,6	2,3,5 ,6,7	4-8	2,4,5 ,6,7	1,5,6	4,5,6 ,7	2,3,5 ,6,7, 8	3,5,6 ,8
Diagnose Events and Conditions	1,2,3 ,5,6	2-7	2-8	2-8	1,2,3 ,5,6	2,3,5 ,6,7	4-8	2,4,5 ,6,7	1,5,6	4,5,6 ,7	2,3,5 ,6,7, 8	3,5,6 ,8
Understand Plant and System Response	1-6	1-7	1-8	1-8	1-6	1,2,3 ,5,6, 7	1,4-8	1,2,4 ,5,6, 7	1,4,5 ,6	1,4,5 ,6,7	1,2,3 ,5,6, 7,8	1, 3,5,6 ,8
Comply With and Use Procedures (1)	1-6	1-7	1-8	1-8	1-6	1,2,3 ,5,6, 7	1,4-8	1,2,4 ,5,6, 7	1,4,5 ,6	1,4,5 ,6,7	1,2,3 ,5,6, 7,8	1, 3,5,6 ,8
Operate Control Boards (2)	1-6	1-7	1-8	1-8	1-6	1,2,3 ,5,6, 7	1,4-8	1,2,4 ,5,6, 7	1,4,5 ,6	1,4,5 ,6,7	1,2,3 ,5,6, 7,8	1, 3,5,6 ,8
Communicate and Interact With the Crew	1-6	1-7	1-8	1-8	1-6	1-7	1-8	1-8	1-6	1-7	1-8	1-8
Demonstrate Supervisory Ability (3)	1-6	1-7	1-8	1-8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Comply With and Use Tech. Specs. (3)	1	2,3	3,4,5	2,4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:

- (1) Includes Technical Specification compliance for an RO.
 (2) Optional for an SRO-U.
 (3) Only applicable to SROs.


Instructions:

Circle the applicant's license type and enter the event numbers that test the competency for each scenario in the set.

NOTE: OPERATING TEST NO.: 3. Scenario Number 4 is a "spare" scenario and is represented for comparison purposes only in Examination Outline submittal. The order of listing for candidates is SRO, RO and BOP by position.

Author:

Chief Examiner:



Simulation Facility	<u>Braidwood</u>	Scenario No.: 00-7	Operating Test No.: 3
Examiners:	_____	Operators:	<u>SRO</u>
	_____		<u>RO</u>
	_____		<u>BOP</u>
Objectives:	To evaluate the applicants ability to use Normal, Abnormal, Emergency and alarm response procedures to respond to an impulse pressure transmitter failure, Pzr Master Controller failing low, 1C RCP #1 seal failing open requiring a unit S/D, loss of ESF Bus, RCP shaft seizure resulting in a LOCA with various components failing to align (start/open) during the Reactor Trip and Safety Injection.		
Initial Conditions:	IC- 21, 100% power, Steady State operations. All equipment in automatic and operating properly.		
Turnover:	100% power, Steady State operations. All equipment in automatic and operating properly.		

Event No.	Malf. No.	Event Type*	Event Description
Preload (NOTE 1)	RP01 IOR ZDIRT2 NORMAL	C BOP RO SRO	Automatic reactor trip failure. Failure of the reactor trip switch from the RO panel.
Preload (NOTE 1)	RP02A	C RO SRO	Failure of the "A" RTB to open.
Preload (NOTE 1)	RP15C MRF FW160 STOP FW43	C BOP RO SRO	Failure of the 1A SI Pump to Auto start. Failure of the 1B AFW Pump to Auto start. Failure of the 1A AFW Pump to Auto Start
1	RX10A, 0	I BOP RO SRO	PT-505 failure low (NOTE 2)
2	RX15, 2355	I RO SRO	Failure of the Pzr Master Pressure Controller
3	CV27C, 4	C RO SRO	Failure of the 1C RCP #1 seal
4		N BOP SRO	Ramp down turbine power at directed MW/min due to RCP seal failure
		R RO	Lower reactor power using rods and/or boration due to RCP seal failure
5	ED07B	C BOP RO SRO	Loss of ESF Bus 142 (overcurrent)
6	TH17C TH06C, 2000 IOR ZDI1HSAP041	M BOP RO SRO	1C RCP shaft seizure 1C RCS cold leg LOCA (1 minute delay) Trip Bkr 1412 in E-0 (after main generator trip) to manually start the 1A SI Pump; then delete override.

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

NOTE 1: Run BATCH FILE for all Preload **BAT 1AFWPMP**

NOTE 2: RP20 (OPEN/CLOSE) RX143 (Trip)

SCENARIO 00-7 OVERVIEW

The scenario starts with the Unit 1 at 100% steady state power. There are no Out of Services and all equipment is operating properly.

After the crew has taken the shift, PT-505, Main Turbine First Stage Impulse Pressure Channel will fail low causing the crew to perform the actions of BwOA INST-2 Attachment D. These actions include manual rod control, going to the steam pressure mode on the steam dumps, defeating the failed channel, tripping bistables and referencing Tech Specs.

After the actions of BwOA INST-2 Attachment D are complete, the Pressurizer Master Pressure Controller will fail high. The crew should take manual control of the controller and restore RCS pressure to normal. The crew may reference BwOA INST-2 Attachment B for guidance. The crew should reference Tech Specs for DNB.

Once Pzr Pressure has been restored to normal, the 1C RCP #1 seal will fail open resulting in the Unit required to be shutdown and the 1C RCP secured within 8 hours. The crew should enter BwOA RCP-1 to address the seal failure. The crew will commence a unit shutdown per BwGP 100-4 ensuring that the 1C RCP will be secured in 8 hours.

Following clearly observable plant response from the reactivity changes resulting from the unit shutdown, an overcurrent condition will occur on Bus 142 resulting in the loss of Bus 142. The crew should enter BwOA ELEC-3 to take actions for the loss of Bus 142. The crew should also determine that Attachment D of BwOA ELEC-3 is not applicable. The crew will reference Tech Specs.

After the actions for the loss of Bus 142 are complete, the 1C RCP shaft will seize resulting in a RCS Cold Leg LOCA. The crew will have to manually trip the reactor from the safeguards panel due to both an automatic reactor trip failure and the failure of the manual reactor trip switch from the RO panel. The crew will perform the actions of BwEP E-0. During the Immediate Actions of E-0, the crew should recognize that the "A" reactor trip breaker failed to open and dispatch a local operator to open it. The crew will have to manually start the 1A SI pump due to an auto start failure. Auxiliary Feedwater will also have to be manually initiated due to the failure of the 1A AF pump to start and the failure of the 1B AFW pump to auto start.

From BwEP E-0 the crew will transition to BwEP E-1 and then to BwEP ES-1.2 to cooldown the primary plant.

Critical Tasks

- E-0--A: Manually trip the reactor from the control room to prevent a transition to BwFR-S.1.
- E-0--F: Establish the minimum required AFW flow rate to the SGs before transition out of E-0.
- E-0--J: Establish flow from at least one intermediate-head ECCS pump before transition out of E-0

Scenario No: 00-7		Event No. 1
Event Description: PT-505 Failure Low		
Time	Position	Applicant's Actions or Behavior
	CUE	Annunciators: 1-14-D1 "TAVE CONT DEV HIGH" 1-14-E6 "TURB IMPULSE PRESS OOS" C-5 C-20 ΔP between PT-505 & PT-506
	US	Transition to 1BwOA INST-2 "Operation With A Failed Instrument Channel" Attachment D "Turbine Impulse Pressure Channel Failure" Direct actions of 1BwOA INST-2
	RO	Place Rod Bank Select Switch in Manual
	BOP	Restore Steam Dumps <ul style="list-style-type: none"> • Check LOSS OF TURB LOAD INTLK C7 – Not Lit • Place MS header pressure controller in MANUAL and reduce demand signal to zero • Place steam dump MODE SELECT switch in STM PRESS mode • Place MS header pressure controller in AUTO
	RO	Manually Defeat Failed Channel <ul style="list-style-type: none"> • Select failed channel on TURBINE IMPULSE PRESSURE DEFEAT switch - PT-505
	US	Trip bistables Check Turbine power greater than 10% P13 input to P7 PB505A
	RO	Check if Rod Control Can Be Placed in Auto <ul style="list-style-type: none"> • TURBINE LOW POWER INTLK C5- Not Lit • Tave-Tref deviation stable and within 1°F • Place Rod Bank Select switch in Auto

Comments: _____

Scenario No: 00-7		Event No. 1
Event Description: PT-505 Failure Low		
Time	Position	Applicant's Actions or Behavior
	US/BOP	Check Status of AMS System Locally check OPERATING BYPASS switch at 1PA54J- OFF
	US	Locally Trip Bistable for Failed Channel AMS Arming C-20 PIS-FW447 Operating Bypass (SW12) to TIP1 Operating Bypass Test Input (SW11) to Test Trip MRF RX149 TRIP
	US/RO	Check P13 Interlock <ul style="list-style-type: none"> • Turbine power greater than 10% • Low Turbine Impulse Pressure Permissive P13 window- Not Lit
	US	Refer to Tech Specs 3.3.1
		NOTE: Initiate Event 2 after Tech Specs have been referenced.

Comments: _____

Scenario No: 00-7		Event No. 2
Event Description: Pressurizer Master Pressure Controller Failure (High)		
Time	Position	Applicant's Actions or Behavior
	CUES:	Annunciators 1-12-B2 "PZR PORV OR SAF VLV OPEN" 1-12-D2 "PZR PRESS CONT DEV HIGH" 1-12-C6 "PZR PORV DISCH TEMP HIGH" <ul style="list-style-type: none"> Spray valves full open
	RO/US	Identify/Report failed PZR Master Pressure Controller
	US	Direct actions for failed PZR Master Pressure Controller
	RO/US	Check PZR Pressure: Verify pressure normal <ul style="list-style-type: none"> Take manual control to restore PZR pressure Ensure spray valves close
	RO	Check proper operation of the following: <ul style="list-style-type: none"> Pzr Heaters PZR Spray Valves PZR PORVs
	US	Verify Tech Spec DNB has not been exceeded 3.4.1
	US	Inform SM/Maint of PZR Master Pressure Controller.
		NOTE: When Pzr Pressure has been returned to normal, initiate Event 3.

Comments: _____

Scenario No: 00-7		Event No. 3
Event Description: Failure of the 1C RCP #1 Seal.		
Time	Position	Applicant's Actions or Behavior
	CUE	Annunciator: (1-7-B3) – RCP SEAL LEAKOFF FLOW HIGH RCP Bearing temperature increase RCP Seal outlet temperature increasing
	RO/US	Identify /Report plant alarms.
	RO	Diagnose RCP seal failure from indications.
	US	Enter 1BwOA RCP-1 “Reactor Coolant Pump Seal Failure” Direct operator actions
	RO/US	Check #1 Seal ΔP <ul style="list-style-type: none"> Seal ΔP >200 psid Check #1 Seal leakoff flow <ul style="list-style-type: none"> #1 seal leakoff flow rate – HIGH Check for Failed Instrument Determine if affected RCP should be stopped <ul style="list-style-type: none"> Maintain at least 9 GPM Seal Injection No. 1 seal leakoff flow <8 GPM RCP temperatures Seal leakoff flow <6 GPM.
		NOTE: If contacted as local operator; #2 Seal Leakoff flow is 0.3 gpm
	US	Determine need for Unit Shutdown Inform SM of status of RCP 1C Seal condition and the need for unit shutdown.
		NOTE: 1C RCP Seal failure leads into Event 4.

Comments: _____

Scenario No: 00-7		Event No. 4
Event Description: Unit Ramp Down		
Time	Position	Applicant's Actions or Behavior
	US	Implement actions of 1BwGP 100-4, "Power Descension"
	US	Direct load reduction
	CREW	Review applicable Precautions, and Limitations and Actions.
	RO	<p>Verify rod position and boron concentration.</p> <p>Initiate boration, if required to maintain ΔI within target band. (BwOP CV-6)</p> <ul style="list-style-type: none"> • Determine boric acid flow rate • Set 1FK-110 BA Flow Cont to desired boration rate. • Set 1FY-0110 BA Blender Preset Counter to desired volume. • Place MU MODE CONT SWITCH to STOP position. • Set MU MODE SELECT to BOR position. • Place MAKE-UP CONTROL Switch to START • Verify proper operation of valves & BA transfer pump (CV110B open, BA pump is running, CV110A throttles open) • Verify BA flow on recorder
	BOP	<p>Initiate turbine load reduction:</p> <ul style="list-style-type: none"> • Depress LOAD RATE MW/MIN • Enter 5 MW/min • Depress REF • Enter power level • When ready to begin load reduction, depress GO • Verify load decreases.

Comments: _____

Scenario No: 00-7		Event No. 4
Event Description: Unit Ramp Down		
Time	Position	Applicant's Actions or Behavior
	RO	<p>Monitor power decrease:</p> <ul style="list-style-type: none"> • Monitor reactor power, Tave, ΔI • Verify rods more in AUTO to maintain Tave within $\pm 1.0^\circ\text{F}$ of Tref. <p>If borating:</p> <ul style="list-style-type: none"> • Monitor VCT level • Monitor BA Blender counter countdown. • Verify boration auto stops at preset value. • Return Reactor Makeup System to blended flow at current blended flow.
		NOTE: Following clearly observable plant response from the reactivity changes, proceed with Event 5.

Comments: _____

Scenario No: 00-7		Event No. 5
Event Description: Loss of ESF Bus 142		
Time	Position	Applicant's Actions or Behavior
	CUE	Annunciators 1-22-A7 "BUS 142 FD BKR 1422 TRIP" 1-22-C7 "BUS 142 OVERLOAD OR LOW VOLTAGE" 1-22-D9 "DG 1B RUNNING UNLOADED" 0 Volts and 0 Amps indicated on Bus 142
	US	Transition to BwOA ELEC-3 "Loss of 4KV ESF Bus" Direct actions of BwOA ELEC-3
	BOP	Determine Affected Bus
	US	Transition to Attachment C
	RO/BOP	Verify Required ESF Loads Energized on Bus 141 <ul style="list-style-type: none"> • Bus 131X • 1A CV Pump • 1A RH Pump • 1A SI Pump • 1A AF Pump • 1A & 1C RCFC • 1A CS Pump • 1A or 0 CC Pump • 1A SX Pump • 0A VC Train
	BOP	Check Bus 142 Not Faulted <ul style="list-style-type: none"> • Place breaker control switches in Pull Out <ul style="list-style-type: none"> - ACB 1423 - ACB 1421 - ACB 1422 - ACB 1424 • Check Bus 142 lockout alarms Not Lit
	BOP	Check DC Crosstie Required <ul style="list-style-type: none"> • Check battery charger 112 energized • Crosstie DC Bus 112 to 212

Comments: _____

Scenario No: 00-7		Event No. 5
Event Description: Loss of ESF Bus 142		
Time	Position US	Applicant's Actions or Behavior
		Refer to Tech Specs <ul style="list-style-type: none"> • Perform the following Tech Spec surveillances within 1 hour 1BwOSR 3.8.1.1 2BwOSR 3.8.1.1 • 3.8.1 • 3.8.2 • 3.8.9 • 3.8.10
		NOTE: After Tech Specs have been referenced, initiate Event 6.

Comments: _____

Scenario No: 00-7		Event No. 6
Event Description: RCS Large Break LOCA		
Time	Position	Applicant's Actions or Behavior
	CUE	Lowering PZR Level Lowering PZR Pressure Increasing Cnmt Pressure, Humidity and Sump Level
	RO [CT] E-0--A	Manually trip the reactor Will not work from the RO panel, must attempt at the Safeguards panel
	US	Implement 1BwEP-0 "Reactor Trip or Safety Injection" Direct actions of 1BwEP E-0
	RO	Verify reactor trip <ul style="list-style-type: none"> • Rod bottom lights LIT • Reactor trip & Bypass breakers open (Notes 1A RTB closed and dispatches operator to open) • Neutron flux lowering
	BOP	Verify Turbine Trip <ul style="list-style-type: none"> • Turbine throttle valves closed • Turbine governor valves closed Verify power to 4KV busses <ul style="list-style-type: none"> • Bus 141 alive light lit • Bus 142 alive light lit
	CREW	Determine SI needed/actuated <ul style="list-style-type: none"> • If actuated <ul style="list-style-type: none"> • SI First OUT annunciator lit (1-11-B1, 1-11-C1, 1-11-D1, 1-11-E1) • SI ACTUATED lit (1-BP-4.1) • SI Equipment actuated (SI pumps running, CV Cold leg injection SI8801A/B open) • Manually actuate SI

Comments: _____

Scenario No: 00-7		Event No. 6
Event Description: RCS Large Break LOCA		
Time	Position CREW	Applicant's Actions or Behavior
		Recognize ADVERSE CNMT conditions when <ul style="list-style-type: none"> • CNMT pressure > 5psig • CNMT rad level > 10⁵ R/hr (Grid 4 4AS120 or 4AS121)
	RO	Trip RCPs per Operator Action Summary <ul style="list-style-type: none"> • CC Water lost to RCP • • CNMT Phase B actuated • • ALL of the following exist <ul style="list-style-type: none"> • Controlled RCS cooldown NOT in progress • RCS pressure < 1425 psig • HHSI flow > 100 gpm OR SI pump discharge flow > 200 gpm
	BOP	Verify FW isolated <ul style="list-style-type: none"> • FW pumps tripped • Isolation monitor lights lit • FW pumps disch valves closed (FW002A-C)
	RO [CT] E-0--J	Verify ECCS pumps running <ul style="list-style-type: none"> • CENT Chg pumps • RH pumps • SI pumps (Will have to manually start the 1A SI pump)
	BOP	<ul style="list-style-type: none"> • Verify Group 2 RCFC Accident Mode Lights Lit • Verify Phase A isolation - Group 3 Monitor lights lit • Verify CNMT Ventilation isolation - Group 6 Monitor lights lit

Comments: _____

Scenario No: 00-7		Event No. 6
Event Description: RCS Large Break LOCA		
Time	Position	Applicant's Actions or Behavior
	BOP [CT] E-0--F	<p>Verify AF system:</p> <ul style="list-style-type: none"> • AF pumps running (Must dispatch local operator to start the 1B AF Pump) MRF FW160 START • AF isolation valves open (1AF13A-H) • AF flow control valves throttled (AF005A-H) <p>Verify CC Pumps running</p> <p>Verify SX Pumps running</p> <p>Check Main Steamline Isolation</p> <ul style="list-style-type: none"> • Check SG pressure > 640 psig • Check CNMT pressure on 1PR-937 OR 1PI-CS934 thru 937 is >8.2 psig
	BOP	<p>Check if CNMT Spray is required</p> <p>CNMT pressure > 20 psig</p> <ul style="list-style-type: none"> • Stop all RCPs • Check Group 6 CS monitor lights lit • Check Group 6 monitor Phase B Isolation lights lit <p>Check CS eductor suction flow >15 gpm on 1FI-CS013 & 14</p> <p>Check CS eductor additive flow > 5 gpm on 1FI-CS015 & 16</p>
	BOP	<p>Verify AF flows</p> <ul style="list-style-type: none"> • AF flow > 500 gpm • SG levels maintained between 10% (31%) and 50% • NR levels NOT increasing in an uncontrolled manner

Comments: _____

Scenario No: 00-7		Event No. 6
Event Description: RCS Large Break LOCA		
Time	Position	Applicant's Actions or Behavior
	RO	<p>Verify ECCS valve alignment & flows</p> <ul style="list-style-type: none"> • Group 2 Cold Leg Injection Monitor lights lit. • High Head SI flow >100 gpm • RCS pressure <1700 psig • SI Pump discharge flow > 200gpm • Check RCS pressure < 325 psig <ul style="list-style-type: none"> • Check RH pump discharge flow > 1000 gpm <p>Check at least ONE PZR PORV relief path available:</p> <ul style="list-style-type: none"> • At least ONE PORV Isol valve energized. • PORV in AUTO • Associated Isol valve open
	BOP	<p>Verify generator trip</p> <ul style="list-style-type: none"> • OCB 1-8 and 7-8 open • PMG output breaker open
	BOP	<p>Verify DG 1A running</p> <ul style="list-style-type: none"> • DG SX valves 1SX169A open • Dispatch operator to locally check 1A DG <p>Ventilation systems aligned for emergency</p> <ul style="list-style-type: none"> • Control Room • Aux Bldg. • Fuel Handling Bldg.

Comments: _____

Scenario No: 00-7		Event No. 6
Event Description: RCS Large Break LOCA		
Time	Position	Applicant's Actions or Behavior
	RO	Check PZR sprays & PORVs closed RCS temperature control <ul style="list-style-type: none"> • Check RCP status – none running • Check RCS Cold Leg temps trending to or stable at 557°F • Throttle AF flow if required Report RCS cold leg temperatures low due to ECCS injection flow
	RO	Check RCP status: None running
	BOP	Check SG secondary boundary <ul style="list-style-type: none"> • All SG pressure stable Check SG tubes intact <ul style="list-style-type: none"> • All secondary rad monitors < ALERT setpoint
	CREW	Check if RCS is Intact <ul style="list-style-type: none"> • Diagnose LOCA <ul style="list-style-type: none"> • CNMT are rad monitors levels increasing or in ALERT <ul style="list-style-type: none"> • Grid 4 AS101, 4AS202, 4AS303 (1RT-AR014) • Grid 4 AS111 (1RT-AR011) • Grid 4 AS112 (1RT-AR012) • Grid 4 AS120 (1RT-AR020) • Grid 4 AS121 (1RT-AR021) • CNMT pressure > 3.4 psig • CNMT floor water level > 5 inches
	US	Transition to 1BwEP-1 "Loss of Reactor or Secondary Coolant" Direct actions of 1BwEP-1

Comments: _____

Scenario No: 00-7		Event No. 6
Event Description: RCS Large Break LOCA		
Time	Position CREW	Applicant's Actions or Behavior
		Check Status of RCPs None running
	BOP	Check SG secondary boundaries intact <ul style="list-style-type: none"> • Check pressure in all SGs <ul style="list-style-type: none"> • No SG pressure decreasing in uncontrolled manner • No SG completely depressurized Check intact SG levels <ul style="list-style-type: none"> • Narrow range levels > 10% (31%). If not flow is maintain > 500 gpm • Control feed flow to maintain intact SG levels between 10% (31%) and 50% • Check narrow range levels NOT increasing in an uncontrolled manner.
	CREW	Check secondary radiation trends normal <ul style="list-style-type: none"> • SJAЕ GS exhaust 1PR27J Grid 1 1PS027 • SG Blowdown 1PR08J Grid 1 1PS108 • Main Steam: 1RT-AR022 & 1RRT-AR023 for each SG, Grid 1 4AA122/123, 4AB222/223, 4AC322/323, 4AD422/423 • Main Steam Penetration 1A/1D 1RT-AR024 Grid 4 4AA124 • Main Steam Penetration 1B/1C 1RT-AR024 Grid 4 4AB124
	RO	Check PZR PORVs <ul style="list-style-type: none"> • Power to PORV Isol valves 1RY8000A/B energized • PORVs RY455A & RY456 CLOSED • At least ONE PORV Block valve RY8000A OR RY8000B OPEN

Comments: _____

Scenario No: 00-7		Event No. 6
Event Description: RCS Large Break LOCA		
Time	Position	Applicant's Actions or Behavior
	CREW	<p>Check if ECCS flow should be reduced</p> <ul style="list-style-type: none"> RCS Subcooling acceptable Iconic Display <p>OR</p> <ul style="list-style-type: none"> ATTACHMENT A, FIGURE 1BwEP 1-1 <p>Secondary heat sink</p> <ul style="list-style-type: none"> Total feed flow to SGs > 500 gpm <p>OR</p> <ul style="list-style-type: none"> NR level in at least ONE intact SG > 10% (31%) <p>RCS Pressure stable or increasing</p> <p>PZR level >12% (28%)</p> <p>Determine ECCS reduction criteria NOT met (subcooling likely)</p>
	CREW	<p>Check if CNMT Spray should be stopped</p> <ul style="list-style-type: none"> CS Pumps running Reset CS signal When Spray Additive tank LO-2 level lights LIT, close eductor spray additive valves 1CS019A/B When CNMT pressure is < 15 psig AND CS has operated for at least 2 hours, continue with steps to secure CS
	RO	<p>Check if RH Pumps should be stopped</p> <ul style="list-style-type: none"> Reset SI <ul style="list-style-type: none"> Depress BOTH SI RESET pushbuttons Verify SI ACTUATED permissive light NOT lit Verify AUTO SI BLOCK permissive light LIT <p>Determine RH pumps should NOT be stopped with RCS pressure < 325 psig</p>

Comments: _____

Scenario No: 00-7		Event No. 6
Event Description: RCS Large Break LOCA		
Time	Position	Applicant's Actions or Behavior
	CREW	Check RCS and SG Pressures for Faulted SG Indications <ul style="list-style-type: none"> • Verify pressure in all SGs stable or increasing • Pressure in RCS stable or decreasing
	BOP	Check if DG should be stopped <ul style="list-style-type: none"> • ESF and Non-ESF Busses power by Offsite • Stop 1B DG per 1BwOP DG-12
	CREW	Evaluate plant status <ul style="list-style-type: none"> • Verify Cold Leg Recirc capability • Check Aux Building Radiation monitors • Reset Containment Isolation Phase A if necessary • Place H2 monitors in service per 1BwOP PS-9 • Obtain samples <ul style="list-style-type: none"> RCS activity and boron concentration Containment sump and atmosphere • Evaluate plant equipment • Trip all Heater Drain Pumps • Shutdown Feedwater pumps, Condensate pumps and Circulating Water Pumps • Shutdown chiller on non-operating VC train
	RO	<ul style="list-style-type: none"> • Check if RCS cooldown and depressurization required <ul style="list-style-type: none"> • RCS pressure > 325 psig <ul style="list-style-type: none"> • If NOT check RHR flow > 1000 gpm <ul style="list-style-type: none"> • When RWST level < 46% for transition to ES-1.3

Comments: _____

Scenario No: 00-7		Event No. 6
Event Description: RCS Large Break LOCA		
Time	Position	Applicant's Actions or Behavior
	US	Transition to 1BwEP ES-1.2 "Post LOCA Cooldown and Depressurization" Direct actions of 1BwEP ES-1.2
	RO	Reset SI if necessary <ul style="list-style-type: none"> • Depress both SI reset pushbuttons • Verify SI ACTUATED permissive light – NOT LIT • Verify AUTO SI BLOCKED permissive light – LIT
	RO/BOP	Reset Containment Isolation <ul style="list-style-type: none"> • Reset CNMT Isol Phase A • Reset CNMT Isol Phase B • Reset CNMT Vent Isol • Check SACs – ANY RUNNING • Open instrument air CNMT isol valves. IIA065 IIA066
	BOP	Verify ALL AC busses energized <ul style="list-style-type: none"> • Bus 141 & 142 (Bus 142 unavailable) • Bus 143 & 144 • Bus 156, 157, 158, 159
	RO	Check if RH pumps should be stopped <p>Check RH pumps suction aligned to RWST</p> <p>Check RCS pressure > 325 psig</p> <ul style="list-style-type: none"> • If NOT, DO NOT stop RH pumps • If > 325 psig AND pressure stable or increasing Stop RH pumps and place in standby

Comments: _____

Scenario No: 00-7		Event No. 6
Event Description: RCS Large Break LOCA		
Time	Position	Applicant's Actions or Behavior
	BOP	Check Intact SG levels <ul style="list-style-type: none"> • Narrow range levels >10% (31%) • Control feed flow to maintain levels – BETWEEN 10% (31%) and 50% • Narrow range levels - NOT increasing in an uncontrolled manner •
	CREW	Initiate RCS cooldown to 200 F
		NOTE: Once it is determined that a cooldown can be initiated the scenario can be terminated.

Comments: _____

Simulation Facility	<u>Braidwood</u>	Scenario No.: 00-8	Operating Test No.: 3
Examiners:	_____	Operators:	<u>SRO</u>
	_____		<u>RO</u>
	_____		<u>BOP</u>
Objectives:	To evaluate the applicants ability to use Normal, Abnormal, Emergency and alarm response procedures to respond to a		
Initial Conditions:	IC-31, 90% power, Steady State, 1A Charging pump and 1B AFW pump OOS.		
Turnover:	Unit 1 is currently at 90% power. 1A Charging pump is OOS for pump bearing replacement and is expected back next shift. Currently in Tech Spec 3.5.2 Condition A. There are 5 days left on the Completion Time. The 1B AFW Pump is OOS for a modification to the starting circuit and is expected back in 3 to 4 hours. Currently in Tech Spec 3.7.5 Condition A. There are 60 hours left on the Completion Time. Electrical Generation has requested a load increase to full power as soon as possible at 5Mw/min. Unit 2 is in a Refueling outage and they are making preps to lift the head.		

Event No.	Malf. No.	Event Type*	Event Description
Preload (NOTE 1)	RP01 RP02A RP02B	M BOP RO SRO	Failure of the reactor to trip (Auto and Manual)
Preload (NOTE 1)	RD09, 18	C RO SRO	Auto rod speed failure at 18 steps/min.
Preload (NOTE 1)	MS03A 100 Trg 3 MS03B 100 Trg 3 MS03C 100 Trg 3 MS03D 100 Trg 3	C BOP RO SRO	SG Safety failure (4 SGs)
Preload (NOTE 1)	1A CV Pump PTL & OOS 1B AFW Pump PTL & OOS		1A CV Pump OOS 1B AFW Pump OOS
Preload (NOTE 1)	Imbedded Batch File	C BOP RO SRO	1A AFW pump fail to Auto start
1		N BOP SRO	Ramp up turbine power to 100% at 5 MW/min
		R RO	Raise reactor power using rods and/or dilution
2	CV01B	C RO SRO	1B Charging Pump trip
3	RX18E, 650	I RO SRO	A Loop Hot Leg RTD failure high (NOTE 2)
4	RX03C, 4.8mlbm/hr	I BOP SRO	1B SG Steam Flow Channel Failure (controlling channel)
5	EG05A	M BOP RO SRO	1E Main Power Transformer Failure
6	Preloaded	M BOP RO SRO	ATWS
7	TRG! 3	M BOP RO SRO	4 Faulted SGs

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

NOTE 1: Run BATCH FILE for all Preload **BAT ATWS**

NOTE 2: RP20 (OPEN/CLOSE) RX014 (Trip) RX136 (Trip) RX013 (Trip) RX135 (Trip) RX016 (Trip)
RX015 (Trip)

SCENARIO 00-8 OVERVIEW

Unit 1 is at 90% power. Electric Generation has requested load increase to full power as soon as possible. The 1A Charging Pump is OOS for bearing replacement and the 1B AFW Pump is OOS for a modification installation. Unit 2 is in a refueling outage and they are making preps to lift the head.

Once the crew starts the power increase, a failed auto rod speed failure may become evident. If this is the case, the crew will put the Control Rods into manual.

Following clearly observable plant response from the reactivity changes due to the power increase, the 1B Charging pump will trip for no apparent reason. The crew should isolate letdown and reference the applicable Annunciator Response manuals and dispatch a local operator to investigate. The crew should also reference Tech Specs due to no charging pumps available. The local operator will report back that a maintenance worker hit the breaker trip with a bar that he was using to erect scaffolding. There is nothing wrong with the breaker or the pump. The crew should re-start the pump and re-establish letdown.

Once letdown is restored, the "A" Loop Hot Leg RTD will fail high. This will require the crew to enter BwOA INST-2 Attachment A and take the appropriate actions which include placing control rods in manual, defeating the failed channel, tripping bistables and referencing Tech Specs.

After the actions of BwOA INST-2 are complete, the controlling steam flow channel for the 1B SG will fail low. This will require the crew to take manual control of the 1B SG FRV and enter BwOA INST-2 Attachment H. The crew will select an operable channel for the 1B SG steam flow and return the FRV back to automatic control.

Shortly after the crew gains control of the 1B SG level, a catastrophic failure of the 1E Main Power Transformer will occur resulting in a trip of the Main Generator. The reactor will fail to trip resulting in the crew transitioning to BwFR-S.1. Compounding the problem, Auto rod speed will fail to 18 steps/min (rods may be in manual due to rod speed failure previously detected) requiring the crew to take manual control of rods. As steam generator pressure increases due to the ATWS, a safety valve on each of the SGs will fail open resulting in an uncontrolled depressurization of all SGs. The crew will transition from BwFR-S.1 to E-0. From E-0 the crew will transition to E-2 and then to BwCA-2.1

Critical Tasks

- FR-S.1--B: Start AFW pumps within 60 seconds of the ATWS condition.
- 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

Scenario No: 00-8		Event No. 1
Event Description: Ramp up turbine and reactor power.		
Time	Position	Applicant's Actions or Behavior
	CUE:	Request from System Operator to increase power to 100%
	US	Implement actions of 1BwGP 100-3, "Power Ascension"
	US	Direct increase to 100% power at desired rate.
	CREW	Review applicable Precautions, and Limitations and Actions.
	RO	<p>Verify rod position and boron concentration.</p> <p>Initiate dilution, if required. (BwOP CV-5)</p> <ul style="list-style-type: none"> • Determine desired PW flow rate. • Set 1FK-111 PW/Total Flow Cont. to desired dilution rate. • Set 1FY-0111 Primary Water Control Preset Counter to desired volume. • Place MU MODE CONT SWITCH to STOP position. • Set MU MODE SELECT to DIL or ALT DIL position. • Place MAKE-UP CONTROL Switch to START • Verify proper operation of valves & PW pump (CV111A & 111B open, PW pump is running, CV110B opens [if ALT DIL]) • Verify PW flow on recorder
	BOP	<p>Initiate turbine load increase:</p> <ul style="list-style-type: none"> • Depress LOAD RATE MW/MIN • Enter desired load rate • Depress REF • Calculate desired power level • Enter power level • When ready to begin load increase, depress GO • Verify load increases.
	RO	<p>Monitor power increase:</p> <ul style="list-style-type: none"> • Monitor reactor power, Tave, ΔI

Comments: _____

Scenario No: 00-8		Event No. 1
Event Description: Ramp up turbine and reactor power.		
Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> • Verify rods more in AUTO to maintain Tave within $\pm 1.0^{\circ}\text{F}$ of Tref. <p>If diluting:</p> <ul style="list-style-type: none"> • Monitor VCT level • Monitor Primary Water Control counter countdown. • Verify dilution auto stops at preset value. • Return Reactor Makeup System to blended flow at current blended flow.
		NOTE: Following clearly observable plant response, Event 2 may be started.

Comments: _____

Scenario No: 00-8		Event No. 2
Event Description: 1B Charging Pump Trip		
Time	Position	Applicant's Actions or Behavior
	CUES:	Annunciators 1-9-A3 "CHG PUMP TRIP" 1-9-D3 "CHG LINE FLOW HIGH LOW" Lowering PZR level Increasing Letdown temperatures
	RO	Identify/ Report loss of the 1B CHG Pump Recognize no available CHG pumps <ul style="list-style-type: none"> Isolate letdown Reference Annunciator Response Guidelines <ul style="list-style-type: none"> If no seal injection go to 1BwOA RCP-2 "Loss of Seal Injection"
		NOTE: Report from local operator states maintenance worker hit the breaker while erecting scaffolding DMF CV01B
	RO	Verify suction source to 1B Charging Pump. Start 1B CHG Pump

Comments: _____

Scenario No: 00-8		Event No. 2
Event Description: 1B Charging Pump Trip		
Time	Position	Applicant's Actions or Behavior
		<p>Establish Normal CV Letdown per 1BwOP CV-17</p> <ul style="list-style-type: none"> • Verify/Close 1CV8149A,B,C Letdown Orifice Isolation Valves • Align CC to the 1A Letdown HX <ul style="list-style-type: none"> - Verify/Open 1CC9452A&B CC Inlet/Outlet Isolation valves • Place the 1PCV-CV131 Ltdn Line Press Cont Vlv in manual and raise the demand to 40% • Raise 1TCV-CC130A Ltdn HX Out Temp Cont Vlv in manual and raise the demand to 60% • Verify/Open 1LCV-CV460 Ltdn Line Isol Vlv • Verify/Open 1LCV-CV459 Ltdn Line Isol Vlv • Verify/Open for the 1A Regen HX <ul style="list-style-type: none"> - 1CV8324A, Chg to Regen HX 1A Isol Vlv - 1CV8389A, Ltdn to Regen HX 1A Isol Vlv • Verify/Open 1CV8160 Ltdn Line Cnmt Isol Vlv • Verify/Open 1CV8152 Ltdn Line Cnmt Isol Vlv • Verify/Open 1CV381B Ltdn Reheat HX Bypass Flow Cont Vlv • Verify/Close 1CV381A Ltdn Reheat HX Flow Cont Vlv • Verify/Open 1CV8401A Ltdn to Ltdn HX 1A Isol Vlv • Verify charging aligned to a Ltdn Regen HX <ul style="list-style-type: none"> - Verify/Close 1CV8145 PZR Aux Spray - Verify/Open 1CV8147/8146 Chg to RC Loop 1A/1B - Verify/Open 1CV8106/8105 Chg Line Cnmt Isol Vlv • Adjust in Manual 1FK-121 Cent Chg Pp flow control Vlv Controller to establish approximately 100 gpm charging flow. • Adjust 1CV182 Chg Hdr Back Press Cont Vlv to obtain 8-10 gpm seal injection flow. • Open 1CV8149A/B/C Ltdn Orifice 1A/B/C Isol Vlv as required to obtain desired Ltdn Flow • Adjust 1PCV-CV131 Ltdn Line Press Cont Vlv as required to control Ltdn Press as indicated on 1PI-131 Ltdn Line Press. • Adjust 1TCV-CC130 as required to obtain desired temperature (90°F-115°F) • Place 1FCV-121 in Auto • Place 1RE-PR006 in service
		NOTE: When Letdown has been established initiate Event 3.

Comments: _____

Scenario No: 00-8		Event No. 3
Event Description: 1A Loop Hot Leg RTD Failure (High).		
Time	Position	Applicant's Actions or Behavior
	CUE	Annunciator 1-14-D1 "TAVE CONT DEV HIGH" 1-14-D3 "LOOP 1D TAVE LOW" 1-14-D5 "LOOP 1D ΔT DEV LOW" 1-14-E2 "AUCT TAVE HIGH" Automatic rod motion in
	RO	Determine failed channel Place rod control in manual
	US	Implement BwOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL", Attachment A "RCS NARROW RANGE RTD CHANNEL FAILURE" and direct operator action.
	RO	Place Rod Bank Select Switch in MANUAL Manually defeat failed RTD <ul style="list-style-type: none"> Select failed Tave channel with TAVE DEFEAT switch Select failed ΔT channel with ΔT DEFEAT switch Select an operable RTD channel to the ΔT recorder Check if rod control can be placed in AUTO <ul style="list-style-type: none"> TURBINE LOW POWER INTLK C5 – Not Lit Tave-Tref deviation – Stable and within 1°F Place Rod Bank Select switch in AUTO Check PZR Level PZR level – normal and stable
	US	Locally trip bistables for the failed channel <ul style="list-style-type: none"> OPΔT Trip TB411G OPΔT Runback TB411H OTΔT Trip TB411C OTΔT Runback TB411D Low Tave TB412G Lo-Lo Tave TB412D

Comments: _____

Scenario No: 00-8		Event No. 3
Event Description: 1A Loop Hot Leg RTD Failure (High).		
Time	Position	Applicant's Actions or Behavior
	RO	Check P12 interlock <ul style="list-style-type: none"> • Tave greater than 550°F • LO-2 TAVE STM DUMP INTLK P12 – Not Lit
	US	Refer to Tech Specs <ul style="list-style-type: none"> • 3.3.1 • 3.3.2
		NOTE: Once bistables have been tripped, initiate Event 4.

Comments: _____

Scenario No: 00-8		Event No. 4
Event Description: 1B SG Steam Flow Channel Failure (Controlling)		
Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciator 1-15-B4 "S/G 1B FLOW MISMATCH FW FLOW LOW" <ul style="list-style-type: none"> • FT-522 indication reading low • Feedwater Regulating Valve throttling closed • FW flow decreasing • SG level decreasing below program
	BOP/US	Identify/Report steam flow channel FT-522 failure Take MANUAL control of Feed reg. valve and balance Feed flow with Steam flow to stabilize SG level, as necessary.
	US	Direct that the turbine ramp be slowed or stopped during troubleshooting.
	US	Implement 1BwOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL", Attachment H "STEAM FLOW CHANNEL FAILURE" and direct operator action.
	BOP/US	Check affected SG levels normal <ul style="list-style-type: none"> • Place feed reg. valve in manual • Verify adequate feedwater ΔP • Restore SG level to a stable condition Select operable steam flow channel Establish AUTO level control Verify steam pressure channels PT-525 and PT-526 normal
	US	Inform SM/Maint of failure of SG 1B steam flow channel FT-522
		NOTE: Two minutes following return of SG level control to auto, Proceed to Event 5

Comments: _____

Scenario No: 00-8		Event No. 5, 6
Event Description:		1E Main Power Transformer Failure (5) ATWS (6)
Time	Position	Applicant's Actions or Behavior
	CUE	Annunciator 1-19-E2 "GENERATOR LOCKOUT RELAY TRIP" 1-19-A10 "MAIN XFMR 1E/1W FD BRKR TRIP" Main Generator Trip Main Turbine Trip
	CREW	Determine requirement for a Reactor Trip Attempt to trip the reactor at both the reactor panel and the safeguards panel
	US	Transition to 1BwFR-S.1 "Response to Nuclear Power Generation/ ATWS" Direct actions of 1BwFR-S.1
		NOTE: When SG pressure increases to the lift setpoint of the SG Safeties, one on each SG will fail open
	RO [CT] FR-S.1-- C	Verify Reactor Trip <ul style="list-style-type: none"> Rod bottom lights lit Reactor trip and bypass breakers open Neutron flux decreasing <p>If the reactor will not trip, then allow control rods to insert automatically until rod speed is less than 48 steps/min, then manually insert control rods.</p> <p>NOTE: Rod speed is failed to 18 steps/min</p>
	BOP	Verify Turbine Trip <ul style="list-style-type: none"> All turbine throttle valves closed All turbine governor valves closed
	CREW [CT] FR-S.1-- B	Check AF Pumps Running <ul style="list-style-type: none"> Determines that no AFW pumps are running Manually starts the 1A AF Pump

Comments: _____

Scenario No: 00-8		Event No. 5, 6
Event Description: 1E Main Power Transformer Failure (5) ATWS (6)		
Time	Position	Applicant's Actions or Behavior
	RO [CT] FR-S.1-- C	Initiate Emergency Boration of RCS <ul style="list-style-type: none"> • Check at least one Cent Chg pump running • Initiate emergency boration <ul style="list-style-type: none"> • Open 1CV8104 • Start boric acid transfer pump • Check emergency boration flow greater than 30 gpm • Verify charging flow greater than 30 gpm • Check PZR pressure less than 2335 psig
	BOP	Verify Containment Ventilation Isolation <ul style="list-style-type: none"> • Group 6 CNMT Vent Isol monitor lights – LIT
	RO	Verify Reactor Subcritical <ul style="list-style-type: none"> • PR channels less than 5% • IR channels negative startup rate
	BOP	Isolate Steam Dumps <ul style="list-style-type: none"> • Place steam dump BYPASS INTERLOCK switches to OFF RESET
	RO	Check if the Following Trips Have Occurred <ul style="list-style-type: none"> • Reactor Trip Dispatch local operator to open reactor trip breakers and secure rod drive MG sets. • Turbine Trip
	BOP	Check SG Levels <ul style="list-style-type: none"> • Narrow Range level in at least one SG Greater than 10% (31%) - Control feed flow to maintain narrow range level between 10% (31%) and 50% <p>NOTE: Open Rx Trip Breakers here.</p>
	BOP	Check SG blowdown isolation valves closed (1SD002A-H)

Comments: _____

Scenario No: 00-8		Event No. 5, 6
Event Description: 1E Main Power Transformer Failure (5) ATWS (6)		
Time	Position	Applicant's Actions or Behavior
	RO	Verify all Dilution Paths Isolated <ul style="list-style-type: none"> Reactor makeup dilution valves closed <ul style="list-style-type: none"> 1CV111A 1CV111B Verify BTRS Mode Selector switch is OFF Dispatch operators to verify dilution paths isolated <ul style="list-style-type: none"> 1CV8441 1CV8435 1CV8453 1AB8629A
	US	Implement 1BwEP-0 "Reactor Trip or Safety Injection" Direct actions of 1BwEP E-0
	RO	Verify reactor trip <ul style="list-style-type: none"> Rod bottom lights LIT Reactor trip & Bypass breakers open Neutron flux lowering
	BOP	Verify Turbine Trip <ul style="list-style-type: none"> Turbine throttle valves closed Turbine governor valves closed Verify power to 4KV busses <ul style="list-style-type: none"> Bus 141 alive light lit Bus 142 alive light lit
	CREW	Determine SI needed/actuated

Comments: _____

Scenario No: 00-8		Event No. 5, 6
Event Description: 1E Main Power Transformer Failure (5) ATWS (6)		
Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> • If actuated <ul style="list-style-type: none"> • SI First OUT annunciator lit • SI ACTUATED lit • SI Equipment actuated • Manually actuate SI
	CREW	Recognize ADVERSE CNMT conditions when <ul style="list-style-type: none"> • CNMT pressure > 5psig • CNMT rad level > 10⁵ R/hr (Grid 4 4AS120 or 4AS121)
	RO	Trip RCPs per Operator Action Summary <ul style="list-style-type: none"> • CC Water lost to RCP • • CNMT Phase B actuated • • ALL of the following exist <ul style="list-style-type: none"> • Controlled RCS cooldown NOT in progress • RCS pressure < 1425 psig • High Head SI flow > 100 gpm OR SI pump discharge flow > 200 gpm
	BOP	Verify FW isolated <ul style="list-style-type: none"> • FW pumps tripped • Isolation monitor lights lit • FW pumps disch valves closed (FW002A-C)
	RO	Verify ECCS pumps running <ul style="list-style-type: none"> • CENT Chg pumps • RH pumps • SI pumps
	BOP	<ul style="list-style-type: none"> • Verify Group 2 RCFC Accident Mode Lights Lit

Comments: _____

Scenario No: 00-8		Event No. 5, 6
Event Description: 1E Main Power Transformer Failure (5) ATWS (6)		
Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> • Verify Phase A isolation - Group 3 Monitor lights lit • Verify CNMT Ventilation isolation - Group 6 Monitor lights lit
	BOP	<p>Verify AF system:</p> <ul style="list-style-type: none"> • AF pumps running • AF isolation valves open (1AF13A-H) • AF flow control valves throttled (AF005A-H) <p>Verify CC Pumps running</p> <p>Verify SX Pumps running</p> <p>Check Main Steamline Isolation</p> <ul style="list-style-type: none"> • Check SG pressure > 640 psig • Check CNMT pressure on 1PR-937 OR 1PI-CS934 thru 937 is >8.2 psig <p>Verify MSIV and MSIV Bypass valves closed</p>
	BOP	<p>Check if CNMT Spray is required</p> <p>CNMT pressure > 20 psig</p> <ul style="list-style-type: none"> • Stop all RCPs • Check Group 6 CS monitor lights lit • Check Group 6 monitor Phase B Isolation lights lit <p>Check CS eductor suction flow >15 gpm on 1FI-CS013 & 14</p> <p>Check CS eductor additive flow > 5 gpm on 1FI-CS015 & 16</p>
	BOP	<p>Verify AF flows</p> <ul style="list-style-type: none"> • AF flow > 500 gpm • SG levels maintained between 10% (31%) and 50% • NR levels NOT increasing in an uncontrolled manner
	RO	Verify ECCS valve alignment & flows

Comments: _____

Scenario No: 00-8		Event No. 5, 6
Event Description:		1E Main Power Transformer Failure (5) ATWS (6)
Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> Group 2 Cold Leg Injection Monitor lights lit. High Head SI flow >100 gpm RCS pressure <1700 psig SI Pump discharge flow > 200gpm Check RCS pressure < 325 psig <ul style="list-style-type: none"> Check RH pump discharge flow > 1000 gpm <p>Check at least ONE PZR PORV relief path available:</p> <ul style="list-style-type: none"> At least ONE PORV Isol valve energized. PORV in AUTO Associated Isol valve open
	BOP	Verify generator trip <ul style="list-style-type: none"> OCB 1-8 and 7-8 open PMG output breaker open
	BOP	Verify DG 1A running <ul style="list-style-type: none"> DG SX valves 1SX169A open Dispatch operator to locally check 1A DG <p>Ventilation systems aligned for emergency</p> <ul style="list-style-type: none"> Control Room Aux Bldg. Fuel Handling Bldg.
	RO	Check PZR sprays & PORVs closed RCS temperature control

Comments: _____

Scenario No: 00-8		Event No. 5, 6
Event Description: 1E Main Power Transformer Failure (5) ATWS (6)		
Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> • Check RCP status – none running • Check RCS Cold Leg temps trending to or stable at 557°F • Throttle AF flow if required Report RCS cold leg temperatures low due to ECCS injection flow
	RO	Check RCP status: <ul style="list-style-type: none"> • None running
	BOP	Check SG secondary boundary <ul style="list-style-type: none"> • NO SG Pressure decreasing in an uncontrolled manner

Comments: _____

Scenario No: 00-8		Event No. 7
Event Description: Four Faulted SGs ECA-2.1		
Time	Position	Applicant's Actions or Behavior
	US	Transition to 1BwEP-2 "Faulted Steam Generator Isolation" Direct actions of 1BwEP-2
	BOP	Check Main Steamline Isolation <ul style="list-style-type: none"> All MSIVs and MSIV bypass valves closed Check if any SG Secondary Pressure Boundary is Intact <ul style="list-style-type: none"> Check pressure in all SGs – any SG pressure stable or increasing (NO)
	US	Transition to 1BwCA-2.1 "Uncontrolled Depressurization of All Steam Generators" Direct actions of 1BwCA-2.1
	BOP	Check Secondary Pressure Boundary <ul style="list-style-type: none"> Check MSIVs closed <ul style="list-style-type: none"> 1MS001A 1MS001B 1MS001C 1MS001D Check MSIV bypass valves closed <ul style="list-style-type: none"> 1MS101A 1MS101B 1MS101C 1MS101D Check SG PORVs closed <ul style="list-style-type: none"> 1MS018A 1MS018B 1MS018C 1MS018D Check FW to all SGs isolated Check SG blowdown isolation valves closed (1SD002A-H) Check SG blowdown sample isolation valves closed (1SD005A-D)
	RO/BOP	Control Feed Flow to Minimize RCS Cooldown

Comments: _____

Scenario No: 00-8		Event No. 7
Event Description: Four Faulted SGs ECA-2.1		
Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> Check cooldown rate in RCS cold legs less than 100°F in any 1 hour period <ul style="list-style-type: none"> If C/D >100°F/HR then decrease feed flow to 45 gpm for each SG. Check narrow range level in all SGs less than 50% Check RCS hot leg temperatures stable or decreasing
	RO	Check status of RCPs
	BOP	Monitor AF Pump Suction Pressure <ul style="list-style-type: none"> AF PUMP SX SUCT VLVS ARMED alarm - Not Lit
	RO	Check PZR PORVs and Isolation Valves <ul style="list-style-type: none"> PORV isolation valves energized PORVs closed PORV isolation valves – at least one open
	BOP	Check Secondary Radiation <ul style="list-style-type: none"> Reset CNMT Isolation Phase A Request Chemistry to sample SGs Check RM-11 for normal plant conditions
	BOP	Check if RH Pumps Should be Stopped <ul style="list-style-type: none"> RH pumps running RH pumps aligned to RWST RCS pressure >325 psig RCS pressure stable or increasing Reset SI <ul style="list-style-type: none"> Depress both SI reset pushbuttons Verify SI ACTUATED permissive light – Not Lit Verify Auto SI Blocked permissive light Lit Stop RH pumps and place in standby
	BOP	Check if CS Should be Stopped (none running)

Comments: _____

Scenario No: 00-8		Event No. 7
Event Description: Four Faulted SGs ECA-2.1		
Time	Position	Applicant's Actions or Behavior
		Check RWST Level greater than 46% Check if SI Accumulators Should be Isolated (RCS pressure >125 psig)
	CREW	Check if ECCS Flow Should be Reduced ICONICS Or Figure in procedure RCS Pressure stable or increasing PZR Level >12% (28%)
		NOTE: Once the crew has made a determination on ECCS flow reduction, the scenario can be terminated.

Comments: _____

Simulation Facility	<u>Braidwood</u>	Scenario No.: 00-9	Operating Test No.: 3
Examiners:	_____	Operators:	<u>SRO</u>
	_____		<u>RO</u>
	_____		<u>BOP</u>
Objectives:	To evaluate the applicants ability to use Normal, Abnormal, Emergency and alarm response procedures to respond to a request to raise power, radiation monitor failure, SG Narrow range level failure, Pzr level failure, a SG tube leak which degrades to a SGTR, and a main steam line break.		
Initial Conditions:	IC-31; 90% Power, Equilibrium. Xenon, Steady State. 1A AFW pump OOS		
Turnover:	Unit 1 is at 90% power, Steady State. The 1A AFW pump is OOS for motor bearing replacement. Currently in Tech Spec 3.7.5 Condition A. The pump is expected back in 3 to 4 hours. There are 60 hours left on the Completion Time.		

Event No.	Malf. No.	Event Type*	Event Description
Preload	1A AFW Pump in PTL & OOS		1A AFW pump OOS
1		N BOP SRO	Raise turbine power to 100% at 5 MW/min
		R RO	Raise reactor power using rods and/or boration
2	RM01AU 5	I BOP SRO	1D Main Steam Line radiation monitor failure
3	RX06C, 0	I BOP SRO	1A SG Narrow Range level channel failure (LT-519) (NOTE 1)
4	RX13A, 0	I RO SRO	Pressurizer Level Channel LT-459 fail low (NOTE 2)
5	TH03D, 20	C BOP RO SRO	1D SG Tube Leak
6	TH03D, 450	M BOP RO SRO	1D SGTR (after crew determines shutdown required)
7	MS04D, 100	C BOP RO SRO	1D SG atmospheric relief fail open
8	MS07A, .5	M BOP RO SRO	1A Main Steam Line steam break (once C/D commenced in E-3)

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

NOTE 1: RP21 (OPEN/CLOSE) RX051 (Trip) RX052 (Trip)

NOTE 2: RP20 (OPEN/CLOSE) RX029 (Trip)

SCENARIO 00-9 OVERVIEW

Unit 1 is at 90% power, Steady State. The 1A AFW pump is OOS for motor bearing replacement. Currently in Tech Spec 3.7.5 Condition A. The pump is expected back in 3 to 4 hours. There are 60 hours left on the Completion Time. Electric Generation has requested an increase in power to 100% at 5MW/min.

Following clearly observable plant response from the reactivity changes, the 1D Main Steam Line radiation monitor will fail. The crew will enter the RM-11 annunciator responses and determine that the Rad Monitor has failed.

After the crew has taken the actions for the failed rad monitor, the 1A SG Narrow Range Level Channel (LT-519) will fail low. The crew will enter BwOA INST-2 Attachment E. The crew will take manual control of the 1A FRV, restore SG level, trip applicable bistables and reference Tech Specs. The crew will also switch controlling channels and return the 1A SG FRV to Auto.

Once the actions for the failed SG level channel are complete, Pzr level channel 459 will fail low. The crew will enter BwOA INST-2 Attachment C to select an operable channel, restore Pzr level to normal and restore letdown. The crew will also trip bistables and reference Tech Specs.

When the crew determines that the tripping of the Pzr level bistables will not generate a reactor trip or SI, the 1D Steam Generator will develop a 20 gpm leak. The crew will enter BwOA SEC-8 and determine that a unit S/D is required. The crew will initiate a S/D to MODE 3 within 6 hours and reference Tech Specs.

After the crew determines that a Unit shutdown is required per SEC-8, the SGTL on the 1D SG will increase to 450 gpm. At the same time, the 1D SG atmospheric relief valve will fail open. The crew will trip the reactor, manually initiate a Safety Injection and transition to BwEP E-0.

From E-0 the crew will transition to BwEP E-3. After the crew has commenced a cooldown in E-3, the 1B main steam line will develop a large steam break. The crew will transition to BwEP E-2 per the foldout page. When the crew completes BwEP E-2 and transitions back to E-3 the scenario will be complete.

Critical Tasks

E-2--A: Isolate the faulted SG before transition out of E-2.

E-3--A: Isolate feedwater flow into and steam flow from the ruptured SG before a transition to ECA-3.1 occurs.

Scenario No: 00-9		Event No. 1
Event Description: Ramp up turbine and reactor power.		
Time	Position	Applicant's Actions or Behavior
	CUE:	Request from System Operator to increase power to 100%
	US	Implement actions of 1BwGP 100-3, "Power Ascension"
	US	Direct increase to 100% power at desired rate.
	CREW	Review applicable Precautions, and Limitations and Actions.
	RO	<p>Verify rod position and boron concentration.</p> <p>Initiate dilution, if required. (BwOP CV-5)</p> <ul style="list-style-type: none"> • Determine desired PW flow rate. • Set 1FK-111 PW/Total Flow Cont. to desired dilution rate. • Set 1FY-0111 Primary Water Control Preset Counter to desired volume. • Place MU MODE CONT SWITCH to STOP position. • Set MU MODE SELECT to DIL or ALT DIL position. • Place MAKE-UP CONTROL Switch to START • Verify proper operation of valves & PW pump (CV111A & 111B open, PW pump is running, CV110B opens [if ALT DIL]) • Verify PW flow on recorder
	BOP	<p>Initiate turbine load increase:</p> <ul style="list-style-type: none"> • Depress LOAD RATE MW/MIN • Enter desired load rate • Depress REF • Calculate desired power level • Enter power level • When ready to begin load increase, depress GO • Verify load increases.

Comments: _____

Scenario No: 00-9		Event No. 1
Event Description: Ramp up turbine and reactor power.		
Time	Position	Applicant's Actions or Behavior
	RO	<p>Monitor power increase:</p> <ul style="list-style-type: none"> • Monitor reactor power, Tave, ΔI • Verify rods more in AUTO to maintain Tave within $\pm 1.0^\circ\text{F}$ of Tref. <p>If diluting:</p> <ul style="list-style-type: none"> • Monitor VCT level • Monitor Primary Water Control counter countdown. • Verify dilution auto stops at preset value. • Return Reactor Makeup System to blended flow at current blended flow.
		NOTE: Following clearly observable plant response, Event 2 may be started.

Comments: _____

Scenario No: 00-9		Event No. 2
Event Description: 1D Main Steam Line Radiation Monitor Failure		
Time	Position	Applicant's Actions or Behavior
	CUES:	RM-11 Alarm
	BOP	Acknowledge RM-11 and reference Annunciator Response Determine 1D Main Steam Line Radiation Monitor is in alarm Monitor 1D SG level, steam flow and feed flow NOTE: Should be able to determine that it is a Rad Monitor failure based on only 1 RM in the steam line and it is at max indication with no other alarms (SJAE, blowdown, etc).
	RO	Monitor Pzr Level and Pressure
		NOTE: Crew may enter 1BwOA SEC-8 "Steam Generator Tube Leak" while waiting for Rad Monitor failure confirmation.
	US	Notify Radiation Protection to verify alarm Reference Tech Spec 3.3.3
	US	Inform SM/System Engineering of Rad Monitor failure
		NOTE: After determination of a failed RAD Monitor initiate Event 3.

Comments: _____

Scenario No: 00-9		Event No. 3
Event Description: 1A SG Narrow Range Level Channel Failure (LT-519)		
Time	Position	Applicant's Actions or Behavior
	CUE	Annunciator 1-15-A5 "SG 1A LVL LO-2 RX TRIP ALERT" 1-15-A9 "SG 1A LEVEL DEVIATION HIGH LOW"
	BOP	Identify/report Steam Generator Level channel LT-519 failure
	US	Implement BwOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL", Attachment E "NARROW RANGE SG LEVEL CHANNEL FAILURE" and direct operator action.
	BOP	<ul style="list-style-type: none"> Check affected SG levels normal <ul style="list-style-type: none"> If NOT, <ul style="list-style-type: none"> Place feed reg. valve in manual Restore SG level to a stable condition Select operable SG level channel Establish AUTO level control
	US	Locally trip bistables for failed channel <ul style="list-style-type: none"> P14 LB519A Lo-2 Rx Trip/AF Pump Start LB519B
	BOP	Check status of AMS <ul style="list-style-type: none"> Not failed
	US	Refer to Tech Spec (ITS) <ul style="list-style-type: none"> 3.3.1 3.3.2 3.3.3
	US	Inform SM/Maint of failure of SG 1A Level Transmitter LT-519
		Note: Following Tech Spec determination, initiate Event 4.

Comments: _____

Scenario No: 00-9		Event No. 4
Event Description: Pressurizer Level Channel failure low (LT-459)		
Time	Position	Applicant's Actions or Behavior
	CUES:	Annunciators (1-12-A4) PZR LVL LOW HTRS OFF LTDWN SECURED (1-12-B4) PZR LEVEL CONT DEV LOW <ul style="list-style-type: none"> • PZR heaters tripped OFF with associated alarms • Letdown Isolation Valve 1LCV-459 & Orifice Isolation valves 1CV8149A/B/C CLOSE • Charging flow control 1CV-121 throttles open to increase flow
	RO/US	Identify/Report failed PZR level channel - LT-459
	US	Implement 1BwOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL", Attachment C "PRESSURIZER LEVEL CHANNEL FAILURE" and direct operator action.
	RO/US	Check PZR Level: Verify level normal <ul style="list-style-type: none"> • Take manual control to restore PZR level • Select an operable channel • Select operable channel for PZR level recorder
	RO	Check letdown and PZR heaters PZR level >17% Establish letdown per 1BwOP CV-17 <ul style="list-style-type: none"> • Verifies closed 1CV8149A,B,C • Place letdown pressure controller 1PCV-CV131 in MAN and raise demand to 40% • Place Letdown Hx Out Temp Cont Vlv 1TCV-CC130A to MAN and raise demand to 60%. • Open Letdown Line Isolation valve 1LCV-CV459, verify open 1LCV-460 • Verify open inservice regen Hx isolation valves 1CV8324A/B & 1CV8389A/B • Verify open Letdown Line CNMT isolation valves 1CV8160 & 1CV8152 • Verify open Ltdn to Ltdn HX in service 1CV8401A/B • Verify close Pzr Aux Spray Vlv 1CV8145 • Verify Open 1CV8147/8105/8106 Charging Line Cnmt Isol Vlvs

Comments: _____

Scenario No: 00-9		Event No. 4
Event Description: Pressurizer Level Channel failure low (LT-459)		
Time	Position	Applicant's Actions or Behavior
	RO (cont.)	<ul style="list-style-type: none"> Adjust in MAN Cent Chg Pump Flow controller 1FK-121 to establish \approx 100 gpm charging flow with 8-10 gpm seal injection flow. Open the selected letdown orifice isolation valve(s) 1CV8149 A/B/C to establish desired letdown flow Adjust 1PCV-CV131 to obtain 360-380 psig on 1PI-131 and place in AUTO Adjust 1TCV-CC130A to obtain 90-115°F on 1TI-130 and place in AUTO When plant conditions stabilize, place FCV-121 in AUTO. Verify Radiation Monitor 1RE-PR006 in service
	RO/US	Check PZR level control in Auto <ul style="list-style-type: none"> Master PZR Level Controller 1CV121 controller
	US/RO	Trip bistables for 1LT-459 by placing in TEST: <ul style="list-style-type: none"> PZR HI WTR LVL RX TRIP LB459A
	US	Refer to Technical Specifications: <ul style="list-style-type: none"> 3.3.1 3.3.3 3.3.4
	US	Inform SM/Maint of PZR level channel LT-459 status.
NOTE: After it is determined that bistables can be tripped, initiate Event 5		

Comments: _____

Scenario No: 00-9		Event No. 5
Event Description: 1D Steam Generator Tube Leak		
Time	Position	Applicant's Actions or Behavior
	CUE	Increasing Charging flow SG Blowdown Radiation Alarm Off Gas Radiation Alarm PZR level and pressure decreasing
	US	Transition to 1BWOA SEC-8 "Steam Generator Tube Leak" Direct actions of 1BWOA SEC-8
	RO	Maintain PZR Level <ul style="list-style-type: none"> Throttle charging header control valves <ul style="list-style-type: none"> 1CV121 1CV182 Check PZR Level – stable or increasing Monitor VCT Level <ul style="list-style-type: none"> Verify makeup adequate to maintain VCT level
	BOP	Minimize Secondary Contamination <ul style="list-style-type: none"> Perform BwOP MS-13 "Operation With Steam Generator Tube Leakage"
	US	Notify Rad Protection for radiation surveys
	CREW	Identify Leaking SG <ul style="list-style-type: none"> Increasing trend on any Main Steamline Radiation monitor Decreasing feed flow with stable SG level in any SG Unexpected rise in any narrow range level Chemistry report on activity
	RO	Determine SG Tube Leak Rate Estimate SG Tube Leak Rate <ul style="list-style-type: none"> Observe difference between charging flow and seal leakoff plus letdown flow Observe change in VCT level 1BWOA SG-1 Steam Generator Primary to Secondary Leakage Estimation Grab sample Check total RCS to Secondary leak rate less than 10 gpm
	US	Transition to step 9.

Comments: _____

Scenario No: 00-9		Event No. 5
Event Description: 1D Steam Generator Tube Leak		
Time	Position	Applicant's Actions or Behavior
	CREW	Confirm SG Leak Rate – At least 2 independent indications trend in the same direction <ul style="list-style-type: none"> • MS Radiation Monitors • SJAE/ Gland Steam Exhaust • SG Blowdown • N-16 • Grab Sample
		NOTE: If leak is determined to be ≥ 30 gpm, the following actions will be taken.
	CREW	Initiate Unit Shutdown Check leak rate increasing less than 30 GPD/ HR <ul style="list-style-type: none"> • Reduce Power to less than 50% in 1 hour per 1BwGP 100-4T3, Rapid Power Reduction Flowchart • Shutdown Unit to MODE 3 in the following 3 hours
	US	Refer to Tech Spec 3.4.13
		NOTE: If leak is determined to be < 30 gpm, the following actions will be taken.
	CREW	Initiate Unit Shutdown Check leak rate increasing less than 30 GPD/ HR <ul style="list-style-type: none"> • While continuing with this procedure, shutdown Unit to MODE 3 within Six hours per 1BwGP 100-4/ 5
	US	Refer to Tech Spec 3.4.13
		NOTE: After the crew determines that a Unit Shutdown is required, initiate Event 6,7

Comments: _____

Scenario 00-9		Event 6,7
No:		
Event Description: 1D Steam Generator Tube Rupture (6) 1D SG atmospheric Relief Fail Open (7)		
Time	Position	Applicant's Actions or Behavior
	CUE	Lowering Pzr level Lowering Pzr pressure Increasing charging flow Lowering Feed Flow to the 1D SG
	RO	Manually trip the reactor
	US	Implement 1BwEP-0 "Reactor Trip or Safety Injection" Direct actions of 1BwEP E-0
	RO	Verify reactor trip <ul style="list-style-type: none"> • Rod bottom lights LIT • Reactor trip & Bypass breakers open • Neutron flux lowering
	BOP	Verify Turbine Trip <ul style="list-style-type: none"> • Turbine throttle valves closed • Turbine governor valves closed Verify power to 4KV busses <ul style="list-style-type: none"> • Bus 141 alive light lit • Bus 142 alive light lit
	CREW	Determine SI needed/actuated <ul style="list-style-type: none"> • If actuated <ul style="list-style-type: none"> • SI First OUT annunciator lit (1-11-B1, 1-11-C1, 1-11-D1, 1-11-E1) • SI ACTUATED lit (1-BP-4.1) • SI Equipment actuated (SI pumps running, CV Cold leg injection SI8801A/B open) • Manually actuate SI

Comments: _____

Scenario 00-9		Event 6,7
No:		
Event Description: 1D Steam Generator Tube Leak (6) 1D SG atmospheric Relief Fail Open (7)		
Time	Position	Applicant's Actions or Behavior
	BOP	Verify FW isolated <ul style="list-style-type: none"> • FW pumps tripped • Isolation monitor lights lit • FW pumps disch valves closed (FW002A-C)
	RO	Verify ECCS pumps running <ul style="list-style-type: none"> • CENT Chg pumps • RH pumps • SI pumps
	BOP	<ul style="list-style-type: none"> • Verify Group 2 RCFC Accident Mode Lights Lit • Verify Phase A isolation - Group 3 Monitor lights lit • Verify CNMT Ventilation isolation - Group 6 Monitor lights lit
	BOP	Verify AF system: <ul style="list-style-type: none"> • AF pumps running • AF isolation valves open (1AF13A-H) • AF flow control valves throttled (AF005A-H) Verify CC Pumps running Verify SX Pumps running Check Main Steamline Isolation <ul style="list-style-type: none"> • Check SG pressure > 640 psig • Check CNMT pressure on IPR-937 OR 1PI-CS934 thru 937 is >8.2 psi

Comments: _____

Scenario 00-9		Event 6,7
No:		
Event Description: 1D Steam Generator Tube Leak (6) 1D SG atmospheric Relief Fail Open (7)		
Time	Position	Applicant's Actions or Behavior
	BOP	<p>Check if CNMT Spray is required</p> <p>CNMT pressure > 20 psig</p> <ul style="list-style-type: none"> • Stop all RCPs • Check Group 6 CS monitor lights lit • Check Group 6 monitor Phase B Isolation lights lit <p>Check CS eductor suction flow >15 gpm on 1FI-CS013 & 14</p> <p>Check CS eductor additive flow > 5 gpm on 1FI-CS015 & 16</p>
	BOP	<p>Verify AF flows</p> <ul style="list-style-type: none"> • AF flow > 500 gpm • SG levels maintained between 10% (31%) and 50% • NR levels NOT increasing in an uncontrolled manner <ul style="list-style-type: none"> - If a ruptured SG is identified, then manually close its AF isolation valves - 1AF013D - 1AF013H

Comments: _____

Scenario 00-9		Event 6,7
No:		
Event Description: 1D Steam Generator Tube Leak (6) 1D SG atmospheric Relief Fail Open (7)		
Time	Position	Applicant's Actions or Behavior
	RO	<p>Verify ECCS valve alignment & flows</p> <ul style="list-style-type: none"> Group 2 Cold Leg Injection Monitor lights lit (except 1A AF pump). High Head SI flow >100 gpm RCS pressure <1700 psig SI Pump discharge flow > 200gpm Check RCS pressure < 325 psig <ul style="list-style-type: none"> Check RH pump discharge flow > 1000 gpm <p>Check at least ONE PZR PORV relief path available:</p> <ul style="list-style-type: none"> At least ONE PORV Isol valve energized. PORV in AUTO Associated Isol valve open
	BOP	<p>Verify generator trip</p> <ul style="list-style-type: none"> OCB 1-8 and 7-8 open PMG output breaker open
	BOP	<p>Verify DG 1A running</p> <ul style="list-style-type: none"> DG SX valves 1SX169A open Dispatch operator to locally check 1A DG <p>Ventilation systems aligned for emergency</p> <ul style="list-style-type: none"> Control Room Aux Bldg. Fuel Handling Bldg.

Comments: _____

Scenario 00-9		Event 6,7
No:		
Event Description: 1D Steam Generator Tube Leak (6) 1D SG atmospheric Relief Fail Open (7)		
Time	Position	Applicant's Actions or Behavior
	RO	Check PZR sprays & PORVs closed RCS temperature control <ul style="list-style-type: none"> • Check RCP status Check RCS Cold Leg temps trending to or stable at 557°F • Throttle AF flow if required Report RCS cold leg temperatures low due to ECCS injection flow
	RO	Check RCP status (Check if RCPs should be stopped) <ul style="list-style-type: none"> • ECCS flow – High head SI flow greater than 100 GPM OR <ul style="list-style-type: none"> • SI pump discharge flow greater than 200 GPM • RCS pressure less than 1425 psig • Controlled RCS cooldown not in progress or previously initiated
	BOP	Check SG secondary boundary <ul style="list-style-type: none"> • All SG pressure not decreasing in an uncontrolled manner or completely depressurized Check SG tubes intact <ul style="list-style-type: none"> • Determine 1D SG is ruptured
	US	Transition to 1BwEP-3 "Steam Generator Tube Rupture" Direct actions of 1BwEP-3
	RO	Check Status of RCPs (Should RCPs be stopped) <ul style="list-style-type: none"> • ECCS flow – High head SI flow greater than 100 GPM OR <ul style="list-style-type: none"> • SI pump discharge flow greater than 200 GPM • RCS pressure less than 1425 psig • Controlled RCS cooldown not in progress or previously initiated
	CREW	Identify Ruptured SG (1D)

Comments: _____

Scenario 00-9		Event 6,7
No:		
Event Description: 1D Steam Generator Tube Leak (6) 1D SG atmospheric Relief Fail Open (7)		
Time	Position	Applicant's Actions or Behavior
	BOP [CT] E-3--A	Isolate Flow From Ruptured SG <ul style="list-style-type: none"> • Verify ruptured SG PORV controller in Auto • Check ruptured SG PORV closed: 1MS018D • Verify ruptured SG blowdown isol valves closed: 1SD002C 1SD002D • Close ruptured SG MSIV and bypass valve • Close PORV(s) on intact SGs available for RCS cooldown <ul style="list-style-type: none"> - 1MS018A - 1MS018B - 1MS018C
	BOP	Check Ruptured SG Level <ul style="list-style-type: none"> • Narrow range level greater than 10% (31%) Verify AF isolation valves on ruptured SG closed <ul style="list-style-type: none"> - 1AF013D - 1AF013H Check Ruptured SG Pressure – greater than 320 psig
	CREW	Initiate RCS Cooldown <ul style="list-style-type: none"> • Determine required core exit temperature from table • Check PZR pressure less than 1930 psig <ul style="list-style-type: none"> - PZR LOW PRESS SI BLOCK PERMISSIVE, P-11 Lit • Block steamline isolation SI <ul style="list-style-type: none"> - Place STM LINE SI RESET/BLOCK switches to BLOCK • Dump steam to condenser from intact SG at maximum rate <ul style="list-style-type: none"> - Check steam dumps available - Place main steam header pressure controller in manual and reduce demand signal to zero - Place steam dump mode selector switch in STM PRESS mode - Adjust MS pressure controller in manual or auto to initiate cooldown
NOTE: Initiate Steam break once the cooldown has commenced		

Comments: _____

Scenario 00-9		Event 8
No:		
Event Description: 1A Main Steam Line Break		
Time	Position	Applicant's Actions or Behavior
	CUE	Elevated steam flow on the 1A SG 1A SG pressure decreasing PZR level decreasing PZR pressure decreasing
	CREW	May stop cooldown of 1BwEP-3
	US	Transition to 1BwEP-2 "Faulted Steam Generator Isolation" Direct actions of 1BwEP-2
	BOP	Check Main Steamline Isolation <ul style="list-style-type: none"> All MSIVs and MSIV bypass valves closed Check if any SG Secondary Pressure Boundary is Intact <ul style="list-style-type: none"> Check pressure in all SGs – any SG pressure stable or increasing
	BOP	Identify faulted SG (1A) <ul style="list-style-type: none"> Any SG pressure decreasing in an uncontrolled manner OR <ul style="list-style-type: none"> Any SG completely depressurized
	BOP [CT] E-2--A	Isolate Faulted SG (1A) <ul style="list-style-type: none"> Close AF isolation valves on faulted SG <ul style="list-style-type: none"> 1AF013A 1AF013E Check FW to faulted SG isolated <ul style="list-style-type: none"> Associated row on FW ISOLATION MONITOR LIGHTS panel Lit for faulted SG Verify SG PORV on faulted SG closed <ul style="list-style-type: none"> 1MS018A Verify SG blowdown isolation and sample valves on faulted SG closed <ul style="list-style-type: none"> 1SD002A 1SD002B 1SD005A

Comments: _____

Scenario 00-9		Event 8
No:		
Event Description: 1A Main Steam Line Break		
Time	Position	Applicant's Actions or Behavior
	BOP	Monitor AF Pump Suction Pressure <ul style="list-style-type: none"> AF PUMP SX SUCT VLVS ARMED alarm Not Lit Check Secondary Radiation <ul style="list-style-type: none"> Secondary radiation trends –normal for plant conditions
	US	Transition to 1BwEP-3 “Steam Generator Tube Rupture”
		NOTE: The scenario may be terminated at this pont.

Comments: _____
