

Simulation Facility <u>Braidwood</u>	Scenario No.: Operating Test No.: 2014301
Examiners: _____	NRC 14-1
_____	Applicant: _____ <u>SRO</u>
_____	_____ <u>ATC</u>
	_____ <u>BOP</u>
Initial Conditions: IC-21	
Turnover: Unit 1 is at 100% power, steady state, equilibrium xenon, BOL. Online risk is green. Following completion of turnover, the crew is to perform 1BwOS FW-W1, UNIT 1 TURBINE DRIVEN MAIN FEEDWATER PUMP STOP VALVE SURVEILLANCE and the US will address the TRM/Tech Spec requirements for the loss of PZR safety valve indication.	

Event No.	Malf. No.	Event Type*	Event Description
Preload	IOR ZLO1RY8010A1 OFF IMF RP02A IMF RP02B IMF FW13C 25 0 IMF FW26C 2000 0 IOR ZLO1FW5302 ON IOR ZDI1FW002B OPEN IMF FW01		Failed indication for 1RY8010A PZR Safety Valve Reactor trip breaker A fails to open Reactor trip breaker B fails to open 1FW009C fails 25% open 1FW530 fails partially open 1A FW Pp fail to start/trip
1	None	N-BOP, US TS-US	Perform 1BwOS FW-W1 and determine PZR Safety Valve TRM/Tech Spec requirements
2	IMF RX01J 0 300	I-BOP, US TS-US	1PT-544, 1D SG steam pressure channel fails low
3	IMF RX21A 1700 10	I-ATC, US TS-US	Pressurizer pressure channel 1PT-455 fails low
4	IOR ZAI1TK130 95 60	I-ATC, US	1TK-130 controller failure
5	IMF FW02A	C-BOP, US R-ATC	1B FW Pump trip requiring turbine runback
6	IOR ZDI1FW009C CLS IOR ZLO1SLFW530 OFF IOR ZLOMLB6315 OFF	M-ALL	1FW009C fails to mid-position, ATWS 1FW002B failed open
7	IMF RD09 8	C-ATC	Auto rod speed failed
8	IMF FW19C 3.5 30	M-ALL	1C FW line break inside containment
9	Preload	C-BOP	FW isolation failure

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

SCENARIO OVERVIEW

Unit 1 is at 100% power, steady state, equilibrium xenon, BOL. Online risk is green.

After completing shift turnover and relief, the BOP will perform 1BwOS FW-W1, UNIT 1 TURBINE DRIVEN MAIN FEEDWATER PUMP STOP VALVE SURVEILLANCE and the US will address the TRM/Tech Spec requirements for the loss of PZR safety valve indication (TRM 3.3.i conditions A & C).

After completing 1BwOS FW-W1, 1D SG steam pressure channel, 1PT-544, fails low. The crew should take actions to stabilize the plant per 1BwOA INST-2. Technical Specifications 3.3.2 conditions A & D and 3.3.4 condition A apply.

After the 1D SG steam pressure failure has been addressed, the controlling pressurizer pressure channel will fail low. The RO will identify the failure and take manual control to restore pressurizer pressure. The US will enter 1BwOA INST 2, OPERATION WITH A FAILED INSTRUMENT CHANNEL-Attachment B. Tech Specs 3.3.1 conditions A, E, and K, 3.3.2 conditions A and D, and 3.3.4 condition A will be entered.

After the pressurizer pressure channel failure has been addressed, 1TK-130 output, Letdown Heat Exchanger Outlet Temperature Controller, will fail causing high letdown temperature. The BwAR should be referenced and the RO should take manual control to restore letdown temperature to normal. The crew may elect to isolate letdown due to high temperature. If isolated, letdown may be restored per BwOP CV-17.

After the 1TK-130 Controller has been addressed, 1B Feedwater Pump will trip. 1BwOA SEC-1, SECONDARY PUMP TRIP-Attachment A will be entered. The BOP will initiate a turbine load reduction to 700 MW at 250 MW/minute. The ATC will borate the RCS as necessary to stabilize RCS temperature.

After the crew stabilizes the plant from the FW pump trip, a hydraulic leak will develop on 1FW009C, 1C SG FW Isolation Valve. The leak will continue and 1FW009C will fail to mid position and bind. A reactor trip will be required due to lowering 1C SG level. When a reactor trip signal is generated, the reactor will not trip. The resultant transient will cause a feed water line to break inside containment downstream of 1FW009C. When FW isolation actuates, 1FW530, 1C SG Feed Reg Valve, will not fully close and 1FW002B, 1B FW Pump Discharge Valve, will remain open, resulting in FW flow to the 1C SG when SG pressure lowers below the Condensate Booster pumps shutoff head. The crew will take actions per 1BwFR-S.1, RESPONSE TO NUCLEAR GENERATION/ATWS. Automatic rod control will fail, and the RO will manually insert the control rods to add negative reactivity. The crew will close 1FW006C to isolate feedwater flow to the 1C SG. After completing actions of 1BwFR-S.1, the crew will transition to 1BwEP-0, REACTOR TRIP OR SAFETY INJECTION.

Completion criteria is transition to 1BwEP ES-1.1, SI TERMINATION UNIT 1.

Critical Tasks

1. Insert negative reactivity into the core by initiating RCCA insertion at greater than or equal to 48 steps per minute prior to completion of step 1 of 1BwFR-S.1.
(Westinghouse – CT-52) (K/A number – 000029EA1.09 importance – 4.0/3.6)
2. Isolate the 1C Steam Generator FW Containment Isolation flowpath before transitioning out of 1BwEP-2.
(Westinghouse – CT-17) (K/A number - 000103A2.03 importance – 3.5/3.8)

Simulation Facility Braidwood

Scenario No.: Operating Test No.: **2014301**

Examiners: _____

NRC 14-2

Applicant: _____ SRO

_____ RO

_____ BOP

Initial Conditions: IC-88

Turnover: Unit 1 is operating at 90% power, steady state, equilibrium xenon. Online risk is green. Following completion of turnover, the BOP will lower Unit 1 and Unit 2 reactive load by a total of 2 KV in accordance with BwOP MP-23. Generation Dispatch has requested Unit 1 to raise power to 100% at 0.6 MW/min due to grid demand following completion of the reactive load adjustment.

Event No.	Malf. No.	Event Type*	Event Description
Preload	IMF TC03 IMF MS01A 100 IMF MS01B 100 IMF MS01C 100 IMF MS01D 100 IOR ZDI1SI8801A CLS		Turbine auto trip failure MSIVs fail to close 1SI8801A fails to open
1	None	N-BOP, US	Lower reactive load 2 KV.
2	None	R-ATC, US	Raise power to 100% @ 0.6 MW/minute
3	IMF RX10A 0 15	I-ATC, US TS-US	Turbine impulse pressure channel 1PT-505 fails Low (Tech Spec)
4	IMF FW17 10 30	I-BOP, US	HDT Level Controller Failure in Auto
5	IRF ED027 OPEN	TS-US	Loss of DC to inverter 114
6	IOR ZDI1CV8324A CLS	C-ATC, US	Loss of Normal Charging (1CV8324A closure)
7	IMF ED11D IRF ED019 OPEN	TS-US	Loss of instrument bus 114 (Tech Spec)
8	IMF NI09C 120 10		Spiking PR channel/reactor trip
9	Preload	C-BOP	Turbine auto trip failure
10	IMF TH01 0.5 30	M-ALL	PZR vapor space LOCA
11	Preload	C-ATC/BOP	1SI8801A fails to open

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

SCENARIO OVERVIEW

Unit 1 is operating at 90% power, steady state, equilibrium xenon. Online risk is green. Following completion of turnover, the BOP will lower Unit 1 and Unit 2 reactive load by a total of 2 KV in accordance with BwOP MP-23. Generation Dispatch has requested Unit 1 to raise power to 100% at 0.6 MW/min due to grid demand.

After completing shift turnover and relief, the BOP will lower Unit 1 reactive load and coordinate with Unit 2 to lower reactive load 2 KV in accordance with BwOP MP-23.

After lowering reactive load, the crew will raise turbine load to full power at maximum allowable rate due to grid demand. The crew will commence a power ascension at 0.6 MW/min using a REMA.

After a measurable change in power, First Stage Turbine Impulse Pressure channel 1PT-505 will fail low. The ATC will diagnose the failure of 1PT-505 and take manual control of rods after verifying turbine load stable. 1BWOA INST-2, OPERATION WITH A FAILED INSTRUMENT CHANNEL, Attachment D, will be entered. TS 3.3.1 conditions A and P will be entered. The ATC will return rod control to automatic after verifying Tave and Tref are within 1°F.

After the 1PT-505 failure is addressed, Heater Drain Tank (HDT) Level Controller, 1LK-HD009A, will fail to 10% demand. The 1HD046A/B valves will close and HDT level will rise. The BOP will take actions to stabilize the plant by taking manual control of the 1LK-HD009A.

After the HDT Level Controller failure is addressed, a loss of DC to instrument inverter 114 will occur. The crew will follow the annunciator response BwAR 1-4-D5. The crew will determine from field report that the instrument inverter DC input has failed. Technical Specification 3.8.7, condition A applies.

Following completion of inverter 114 actions, 1CV8324A will inadvertently close. The control switch will not function to re-open the valve (which is interlocked with 1CV8389A resulting in a simultaneous loss of letdown). The ATC will adjust 1CV121 to restore RCP seal injection in band. The US will enter 1BWOA PRI-15, LOSS OF NORMAL CHARGING. The crew will restore normal charging through the 1B REGEN heat exchanger and restore normal letdown per 1BWOA ESP-2, REESTABLISHING CV LETDOWN DURING ABNORMAL CONDITIONS.

After the crew restores charging and letdown, a loss of instrument bus 114 will occur. The crew will enter 1BWOA ELEC-2, LOSS OF INSTRUMENT BUS, and determine that instrument bus 114 is damaged and cannot be energized from the CVT. Tech Spec 3.8.9, condition B will apply.

After the instrument bus 114 failure is addressed, PR channel N-43 will momentarily spike high, causing an automatic reactor trip. The crew will implement 1BwEP-0, REACTOR TRIP OR SAFETY INJECTION. When the reactor trips, the turbine will not automatically trip. The crew will manually trip the turbine. The MSIVs will not close. The resultant rapid RCS cooldown will cause a weld break on the PZR causing a PZR vapor space LOCA. 1B Train ECCS components will be manually aligned due to the loss of instrument bus 114. 1SI8801B is required to be manually open to establish high head SI flow. The crew will transition to 1BwEP-1, LOSS OF REACTOR OR SECONDARY COOLANT, based on primary plant conditions.

The scenario is complete when the crew has determined RCS subcooling in 1BwEP-1.

Critical Tasks

1. Manually trip the main turbine prior to completion of step 2 of 1BwEP-0.
(Westinghouse – CT-13) (K/A number - 045000A4.01 importance – 3.1/2.9)
2. Manually open valve 1SI8801B to establish injection flow from at least one high-head SI pump prior to completion of step 17 of 1BwEP-0.
(Westinghouse – CT-7) (K/A number - 013000A4.01 importance – 4.5/4.8)

Simulation Facility <u>Braidwood</u>	Scenario No.: _____ Operating Test No.: 2014301
Examiners: _____	Applicant: _____ <u>SRO</u>
_____	_____ <u>ATC</u>
_____	_____ <u>BOP</u>
Initial Conditions: IC-21	
Turnover: Unit 1 is at 100% power, steady state, equilibrium xenon, BOL. Following completion of turnover, the shift manager requests the BOP to swap GC pumps per BwOP GC-5, in preparation for an OOS on 1GC01PA next shift.	

Event No.	Malf. No.	Event Type*	Event Description
Preload	IMF ED06A IMF FW44 IMF FW48A		Breaker 1562 ABT failure 1B AF Pp Trip 1A AF Pp fails to auto start
1	None	N-BOP, US	Swap stator cooling pumps.
2	IMF RX06K 0 15	I-BOP, US TS-US	1C SG NR level transmitter 1LT-539 fails low
3	IMF CV05 600 5	I-ATC, TS-US	Letdown line pressure controller 1PK-131 output fails low
4	IMF RH05A 0 5	TS-US	RWST level channel failure
5	IMF FW35C	C-BOP, US	1C HD Pump Trip (standby pump available)
6	IMF RD02H08	R-ATC, C-ATC, US	Emergency load drop of 200 MW/ Single Dropped Rod (H-8)
7	IMF RD02D04	M-All	Multiple Dropped Rods (H-8 and D-4)
8	IMF TH03D 450	M-ALL	1D SGTR
9	Preload	C-BOP	1A AF Pp auto start failure, 1B AF Pp trip

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

SCENARIO OVERVIEW

Unit 1 is at 100% power, steady state, equilibrium xenon, BOL. Online risk is green.

After completing shift turnover and relief, the BOP will swap stator cooling pumps per BwOP GC-5.

After swapping GC pumps, 1C SG NR level transmitter 1LT-539 will fail low. 1FW530, Feedwater Regulating Valve, will open fully and 1C SG level will rise. The BOP will take manual control of 1C SG level and stabilize 1C SG level. 1BWOA INST-2, OPERATION WITH A FAILED INSTRUMENT CHANNEL, Attachment E, will be implemented. The BOP will restore 1C SG level control to automatic after 1C SG level is restored to normal and an operable 1C SG NR level controlling channel is selected. Technical specifications 3.3.1, conditions A and E and 3.3.2, conditions A and D are applicable.

After the 1LT-539 failure has been addressed, letdown pressure controller 1PK-131 output will fail low. The letdown PCV will close and letdown pressure will rise lifting the letdown line relief valve. The ATC will take manual control of letdown pressure controller and restore letdown pressure. The crew may isolate letdown due to the lifting letdown relief valve. If letdown is isolated, it will be restored per BwOP CV-17. US may choose to enter tech spec 3.4.13 and then exit when relief resets, or remain in tech spec until a RCS leakrate can verify no leakage.

After the 1PK-131 controller failure is addressed, RWST level channel 1LT930 will fail low. The crew will enter 1BWOA INST-2 Attachment S. Technical Specifications 3.3.2 conditions A and K apply.

After the RWST level channel failure is addressed, the 1C Heater Drain pump will trip due to overcurrent. The crew will implement 1BWOA SEC-1, SECONDARY PUMP TRIP, and start the 1B Heater Drain pump. Technical Specifications do not apply. The 1C Heater Drain pump will remain unavailable for the rest of the scenario.

After the 1C Heater Drain pump has been addressed, an emergency load reduction of 200 MW within 15 minutes is requested by Generation Dispatch. After the crew has completed part of the load reduction, rod H-8 will drop into the core causing Tave to drop and reactor power to further drop. The crew will implement 1BWOA ROD-3, DROPPED OR MISALIGNED ROD. After the crew has made sufficient reactivity manipulation to stabilize plant conditions, either by adjusting Tave to within 3°F of Tref, or commencing a load reduction to reduce power to within the range allowable for the dropped rod recovery, a second rod (D-4) will drop into the core. The crew should identify that two rods have dropped into the core and trip the reactor. The crew will take immediate actions per 1BwEP-0, REACTOR TRIP OR SAFETY INJECTION..

After the transition to 1BwEP ES-0.1, the thermal hydraulic shock from the reactor trip results in a SGTR. When the main generator trips, an ABT failure of breaker 1562 results in the 1B RCP being de-energized. The crew will manually actuate safety injection and return to 1BwEP-0. The 1B AF pump will not start. The 1A AF pump fails to auto-start. The crew will manually start the 1A AF pump.

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

Critical Tasks

1. Manually trip the reactor upon discovery of multiple dropped control rods prior to completion of step 4 in 1BwOA ROD-3 (if crew re-enters the procedure at step 1) upon second dropped rod, or upon verification that the DRPI indication for the second dropped rod is valid. (per INPO SER 15-90 & SER 19-89) (K/A number – APE003A2.01 importance – 3.7/3.9)
2. Identify the 1D SG as the ruptured SG and isolate prior to a transition to 1BwCA-3.1 is required. (Westinghouse – CT-18) (K/A number - EPE038EA1.32 importance 4.6/4.7)
3. Depressurize RCS to restore RCS inventory prior to 1D SG PORV or safety valve water release. (Westinghouse – CT-20) (K/A number EPE038EA1.09 importance 3.2/3.3)
4. Establish the minimum required AFW flowrate to the SGs before transition out of E-0 series. (Westinghouse – CT-4) (K/A number - 061000A2.05 importance – 3.1/3.4)

Simulation Facility <u>Braidwood</u>	Scenario No.: _____ Operating Test No.: 2014301
Examiners: _____	Applicant: _____ <u>SRO</u>
_____	_____ <u>ATC</u>
_____	_____ <u>BOP</u>
Initial Conditions: IC-18	
Turnover: Unit 1 is operating at 75% power, steady state, equilibrium xenon. Online risk is yellow. 1B RH pump has been OOS for breaker work for the past 10 hours. LCO 3.5.2 has been entered. Expect 1B RH pump back in 48 hours. Following completion of turnover, the shift manager requests the BOP to start the 0B WS pump in accordance with BwOP WS-1, STARTUP AND OPERATION OF THE NON-ESSENTIAL SERVICE WATER SYSTEM, and secure the 0C WS pump in accordance with BwOP WS-3, SHUTDOWN OF A NON-ESSENTIAL SERVICE WATER PUMP, for an upcoming clearance order on the 0C WS pump. Align the 0C WS pump for standby after it is secured. Operators have been briefed and are standing by at the Lake Screen House to support WS pump swap.	

Event No.	Malf. No.	Event Type*	Event Description
Preload	IOR ZDI1RH01PB PTL IMF RP01 IOR ZDIRT2 NORMAL IMF RD05G13 15 IMF RD05H12 15 IMF RD05H14 8 IMF RD05J13 25 IMF EG08B		1B RH pump OOS Failure of Rx to auto trip Failure of Rx Trip switch on 1PM05J stuck rod stuck rod stuck rod stuck rod 1B DG Seizure
1	None	N-BOP, US TS-US	Swap WS pumps and determine containment spray additive tank Tech Spec requirements
2	IMF RX13B 0	C-ATC, US TS-US	1LT-460 fails low
3	IMF FW16 1500 30	I-BOP, US	1PT-508 FW Htr Dsch Press fails high
4	IRF EP09 325 IRF EP09 348	C-BOP, US TS-US	Degraded bus voltage with a loss of bus 142
5	None	R-ATC, US	Rapid down power of Unit-1 due to aircraft threat
6	IRF TC03remf TRIP Preload	C-ATC, US	Inadvertent turbine trip, failure of auto Rx trip
7	Preload	C- ATC, US	Four stuck rods
8	IMF ED15C IMF EG08A	M-ALL	Loss of Offsite Power 1A DG Failure

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

SCENARIO OVERVIEW

Unit 1 is operating at 75% power, steady state, equilibrium xenon. Online risk is yellow. 1B RH pump has been OOS for breaker work for the past 10 hours. LCO 3.5.2 has been entered. Expect 1B RH pump back in 48 hours. Following completion of turnover, the shift manager requests the BOP to start the 0B WS pump in accordance with BwOP WS-1, STARTUP AND OPERATION OF THE NON-ESSENTIAL SERVICE WATER SYSTEM, and secure the 0C WS pump in accordance with BwOP WS-3, SHUTDOWN OF A NON-ESSENTIAL SERVICE WATER PUMP, for an upcoming clearance order on the 0C WS pump. Align the 0C WS pump for standby after it is secured. Operators have been briefed and are standing by at the Lake Screen House to support WS pump swap.

After completing shift turnover and relief the BOP will swap WS pumps in accordance with BwOP WS-1 and BwOP WS-3. The Unit will get a phone call from chemistry stating the spray additive tank sodium hydroxide solution concentration is 28%. The US will address the Tech Spec requirements and determines that TS 3.6.7 condition A will be entered.

After swapping WS pumps and spray additive TS, 1LT-460 will fail low. The crew will implement 1BwOA INST-2 and take actions to restore PZR level control and stabilize plant conditions by restoring letdown. TS 3.3.1 conditions A and K apply (LCO 3.3.3 and 3.3.4 for Accident Monitoring and Remote Shutdown panel minimum channel requirements are still met).

After the PZR level channel failure, feedwater line pressure detector 1PT-508 will fail high over a 30 second period. Both main feedwater pumps speed will lower, reducing feedwater flow and causing all steam generator levels to begin lowering. The crew will take actions to stabilize the plant by taking manual control of the main feedwater pumps. 1BwOA INST-2, OPERATION WITH A FAILED INSTRUMENT CHANNEL, Attachment J, will be implemented. 1PT-508 will remain unavailable for the remainder of the scenario.

After the 1PT-508 failure has been addressed, a degraded bus voltage will occur. Bus 141 and 142 voltage will drop to 3900 volts and will bring in annunciator 1-21/22-C7 and allow the operator to open breakers 1412/1422. Per BwAR 1-21/22-C7 with voltage below 3900 volts the operator is required to open the SAT feed breakers to the ESF busses, if no operator action occurs the bus voltage remains at 3900 volts for 310 seconds and then the SAT feed breakers will automatically open. When the 4 KV ESF busses are de-energized the 1A DG will pick up bus 141. The 1B DG will start, but bus 142 will be faulted. TS 3.8.1 condition A and 3.8.9 condition A applies.

After the degraded bus voltage has been addressed, the NRC phone will ring and the crew will be notified of an aircraft heading toward Braidwood Station and will arrive in the next 20 minutes. The crew will initiate a rapid reactor downpower.

Once the above actions have been taken to initiate a rapid downpower, a trip of the main turbine will occur. The reactor does not automatically trip and the manual trip switch at 1PM05J is disabled. The crew should trip the reactor from 1PM06J and complete immediate actions of 1BwEP-0. When the reactor trips, one control bank rod and three shutdown bank rods will not fully insert. The crew will transition to 1BwEP ES-0.1 and initiate emergency boration for the stuck rods.

Once the crew has initiated emergency boration, a loss of all offsite power will occur and the 1A DG will trip resulting in a loss of all AC power to the unit. The crew will transition to 1BwCA-0.0. **The crew must restore power to Unit 1 within 10 minutes.** After power is restored to Bus 141, a transition will be made to either 1BwCA-0.1 or 1BwCA-0.2.

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

Critical Tasks

1. Perform a manual reactor trip at 1PM06J before transition out of 1BwEP-0.
(Westinghouse – CT-1) (K/A number - 000029EA1.08 importance - 4.5/4.5)
2. Cross-tie an ESF bus to opposite unit within 10 minutes of Loss of All AC.
(Westinghouse – CT-24) (K/A number - 000055EA2.03 importance – 3.9/4.7)
3. Isolate RCP seal injection before a CV pump is started.
(Westinghouse – CT-27) (K/A number - 003000A4.01 importance - 3.3/3.2)

Simulation Facility <u>Braidwood</u>	Scenario No.: _____ Operating Test No.: 2014301
Examiners: _____	NRC 14-5
_____	Applicant: _____ <u>SRO</u>
_____	_____ <u>ATC</u>
	_____ <u>BOP</u>
Initial Conditions: IC-89	
Turnover: Unit 1 is operating at 8% power, steady state, xenon slowly building in. Unit 1 was in process of starting up the main turbine when the main turbine had a bearing failure. Unit 1 is being shutdown for repairs. Following completion of turnover, reduce power less than 5%.	

Event No.	Malf. No.	Event Type*	Event Description
Preload	IMF RP14A IMF RP14B TRGSET 1 ZDISIA1 == 1 TRG 1 DMF RP14A TRGSET 2 ZDISIA1 == 1 TRG 2 DMF RP14B TRGSET 3 ZDISIA2 == 1 TRG 3 DMF RP14A TRGSET 4 ZDISIA2 == 1 TRG 4 DMF RP14B IMF RH01A IMF RH12B		SI actuation failure (Train A) SI actuation failure (Train B) 1A RH Pp trip 1B RH Pp auto start failure
1	IMF NI06B -4.2	TS-US	IR N-36 Fails to approx. 20% reactor power.
2	IMF RX13A 100 10	I-ATC, US	PZR level channel 1LT-459 fails high (no Tech Spec < P-7)
3	None	R-ATC, US	Insert rods to reduce reactor power to <5%
4	None	N-BOP, US	Reset FWI and restore feedwater after reactor trip
5	IMF CV42A SHAFT SHEAR	C-ATC, TS-US	1A CV Pp shaft shear
6	IMF SW01A	C-BOP, US TS-US	1A SX Pump Trip
7	IMF TH18B	C-ALL	1B RCP shaft break
8	IMF TH06B (0 30) 540000 10	M-ALL	Large break RCS LOCA (1B RCS cold leg)
9	Preload	C-ATC, BOP	Failure of SI to automatically actuate 1B RH Pp auto start failure

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

SCENARIO OVERVIEW

Unit 1 is operating at 8% power, steady state, xenon slowly building in. Unit 1 was in process of starting up the main turbine when the main turbine had a bearing failure. Unit 1 is being shutdown for repairs. Following completion of turnover, reduce power less than 5%.

After completing shift turnover and relief, a failure of intermediate range N-36 detector will occur. The crew should take actions per 1BwOA INST-1. Technical Specifications 3.3.1 conditions A, F & G apply.

After the Intermediate Range failure is addressed, PZR level channel 1LT-459 will fail high. 1CV121, charging header flow control valve, will lower charging flow and pressurizer level will lower. The ATC will take manual control of PZR level and stabilize PZR level. 1BwOA INST-2, OPERATION WITH A FAILED INSTRUMENT CHANNEL, Attachment C, will be implemented. The ATC will restore PZR level control to automatic after PZR level is restored to normal and an operable PZR level control channel is selected.

After the 1LT-459 failure is addressed, reactor power will be reduced to <5% by inserting rods.

During the rod insertion, the reactor will be tripped when reactor power is <5% and then the BOP will reset the feedwater isolation (FWI) and restore feedwater to the SGs.

After the crew restores feedwater, 1A CV pump shaft will shear. The crew will implement 1BwOA PRI-15, LOSS OF NORMAL CHARGING. The crew will start the 1B CV pump to restore normal charging. Technical Specifications 3.5.2 condition A and TRM 3.1.d, condition A applies.

After the crew addresses the 1A CV pump shaft shear, the 1A Essential Service Water pump will trip due to overcurrent. The crew may implement 1BwOA PRI-8, ESSENTIAL SERVICE WATER MALFUNCTION, or use the BwAR and start the 1B Essential Service Water pump. Technical Specifications 3.7.8, condition A applies. The 1A SX pump will remain unavailable for the rest of the scenario.

After the Essential Service Water malfunction has been addressed, the 1B RCP shaft will fail. RCS flow in the 1B loop will drop, but an automatic reactor trip will not occur. The crew must manually trip the reactor. The 1B RCP will dislodge components into the RCS, followed shortly (30 sec) by a large break LOCA in RCS loop 1B due to the dislodged RCP components. Pressurizer pressure will fall to the auto SI setpoint, but auto SI actuation will fail requiring a manual SI actuation. 1A RH pump will trip when starting. The crew must manually start 1B RH pump to establish low head ECCS flow. The crew will take actions per 1BwEP-0, REACTOR TRIP OR SAFETY INJECTION. The crew will transition to 1BwEP-1 after determining that the RCS is not intact.

When the RWST level reaches the low-2 setpoint, the crew will transition to 1BwEP ES-1.3, TRANSFER TO COLD LEG RECIRCULATION. With the 1A RH Pump tripped, the crew will have to align the 1B RH train for cold leg recirculation.

Completion criteria is performance of 1BwEP ES-1.3, step 5.

Critical Tasks

5. Manually actuate Safety Injection prior to transition to 1BwEP-1 or past step 7.a of 1BwEP ES-0.1.

(Westinghouse – CT-2) (K/A number - 000040AA1.01 importance - 4.6/4.6)

6. Manually start 1B RH pump prior to completion of step 6 of 1BwEP-0. (Westinghouse – CT-5) (K/A number – 000011EA1.13 importance - 4.1/4.2)
7. Transfer to cold leg recirculation and establish ECCS recirculation flow that at least meets the assumptions of the plant specific LOCA analysis. (Westinghouse – CT-36) (K/A number - 006000A4.05 importance – 3.9/3.8)