INSTRUCTIONAL COVER SHEET

PROGRAM: OPERATIONS TRAINING

COURSE TITLE: COLUMBIA GENERATING STATION SIMULATOR EXAMINATION

LESSON TITLE: Swap CRD pumps; RPS-B Trip with a Scrammed Rod That Fails To Insert and FDR-V-4 that Fails to Close; RFP-B Control Oil Pressure Drop; Steam Leak Causes RCIC Isolation; RCIC-V-8 & 63 Fail to Auto Close; Feed Line Rupture; HPCS-P-1 Shaft Break; LOCA; ED On RPV Low Level

LENGTH OF LESSON 1.5 Hours

INSTRUCTIONAL MATERIALS INCLUDED

Lesson Plan PQD Code		Rev. No.	
Simulator Guide PQD Code	LO001677	Rev. No.	0
JPM PQD Code		Rev. No.	
Exam PQD Code		Rev. No.	

DIVISION TITLE: Nuclear Training

DEPARTMENT: Operations Training

PREPARED BY: Ron Hayden DATE: 05/28/09

REVISED BY: DATE:

VALIDATED BY: DATE:

TECHNICAL REVIEW: DATE:

INSTRUCTIONAL REVIEW: DATE:

APPROVED: DATE:

Operations Training Manager

Verify materials current IAW SWP-TQS-01 prior to use.

Facility: Columbia NRC Scenario No: 1
Examiners: _____ Operators: _____
_____ _____
_____ _____

Initial conditions: Columbia is operating in MODE 1 at full Power.

Turnover: Swap running CRD pumps to CRD-P-1A running and CRD-P-1B in stby

Event No.	Timeline	Event Type*	Event Description
1.	T = 0	N (ATC)	Swap CRD Pumps from CRD-P-1A running to CRD-P-1B running
2.	T = 10	C (All) TS (CRS)	Loss of RPS-B; FDR-V-4 Fails to Close; Also - a scrammed rod. Rod 18-11 fails to fully insert
3.	T = 10	R (ATC) TS (CRS)	Reduce Reactor Power with RRC Flow to LE 80 Mlbm/hr Drive control rod 18-11 that failed to fully insert
4.	T = 25	C (ATC)	RFW B Control Oil pressure loss; Aux Oil Pump fails to auto start
5.	T = 30	C (BOP) TS (CRS)	RCIC Steam Line Break; RCIC-V-8 & RCIC-V-63 fail to auto close
6.	T = 50		Leak in the CBP discharge piping leading to a reactor scram and loss of the Condensate and Feedwater systems
7.	T = 55	M (All)	LOCA - Containment Sprays
8.	T = 55	C (BOP)	HPCS-P-1 Shaft Break
9.	T = 55		LOCA - RPV Level Drop
10.	T = 70	M (All)	Emergency Depressurization when RPV Level Drops to TAF
11.	T = 75		Re-Initiation of Containment Sprays

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

SCENARIO DESCRIPTION

The scenario begins with Columbia operating at full power. Turnover information will direct CRD Pumps be swapped.

EVENT 1 – Swap CRD pumps to CRD-P-1B running and CRD-P-1A in standby

EVENT 2 - After the CRD pump swap, there will be a loss of RPS B due to a failed MG set motor. FDR-V-4 fails to close on the loss of RPS and will not close when manually attempted.

EVENT 3 - On the loss of RPS B, control rod 18-11 will scram due to blown fuses on the A RPS side. The rod will not fully insert and is at position 10. The crew will reduce core flow to LE 80 Mlbm/hr and drive rod 18-11 full in.

The CRS will refer to Tech Specs for the scrammed control rod 18-11.

The CRS will refer to Tech Specs for FDR-V-4.

RPS B will be repowered from alternate power supply.

EVENT 4 - A slow loss of control oil pressure on the B Reactor Feedwater Pump. The Auxiliary Oil Pump will fail to auto start but can be started manually.

EVENT 5 - A steam line rupture in the RCIC supply line that causes a RCIC isolation. On the isolation, RCIC-V-8 and RCIC-V-63 fail to auto close. When manually attempted both RCIC-V-8 and RCIC-V-63 will close. The CRS will enter ABN-RAD-HIGH and EOP PPM 5.3.1, Secondary Containment Control and will refer to Tech Specs for RCIC System being OOS.

EVENT 6 - A rupture of the condensate line downstream of the Condensate Booster Pumps that will require a manual Reactor scram. The RFW pumps will trip and all Condensate and Condensate Booster Pumps will have to be secured in order to stop the leak.

EVENT 7 - A LOCA will develop shortly after the Reactor scram. Containment sprays will be initiated as appropriate.

EVENT 8 - When RPV Level drops to -50 inches, HPCS will initiate and the MSIVs will close. When HPCS initiates, HPCS-P-1 shaft breaks.

EVENT 9 - RPV level will drop to Top Of Active Fuel in 14 minutes.

EVENT 10 - When RPV level reaches –163 inches, the CRS will direct an Emergency Depressurization be performed.

EVENT 11 - When RPV Level is GT TAF, Containment Sprays will be initiated as appropriate.

The scenario will be terminated when RPV level is being returned with injection from low pressure ECCS pumps, Sprays have been re-initiated as appropriate, or as directed by the scenario coordinator.

Event No. 1		
Description: Swap CRD Pumps to CRD-P-1B running and CRD-P-1A in standby The event is initiated by turnover information and will be performed after shift turnover		
Time	**Position**	**Applicants Actions or Behavior**
T = 0	CRS	Directs to swap CRD pumps to CRD-P-1B running and CRD-P-1A in standby
	ATC	Refers to SOP-CRD-Pumps Section 5.1: • Step 5.1.1 - Contacts OPS 2 and verifies oil level in each CRD-P-1B oil bottle is GE ½ full • Step 5.1.2 – Contacts OPS2 and verifies oil level in CRD-P-1B gear unit bulls eye GE ½ full • Flags P603.A7 3.6 and 5.8 as expected alarms • Step 5.1.3Places CRD-FC-600 in MANUAL • Ensures announcement is made for CRD pump swap • Step 5.1.4 - Starts CRD-P-1B • Step 5.1.5 - Stops CRD-P-1A • Step 5.1.6 – Nulls CRD-FC-600 • Shift CRD-FC-600 to Automatic • 5.1.8 – Slowly adjusts CRD-V-3 to establish approximately 260 psid on CRD-DPI-602
ROLEPLAY: As OPS2 report CRD-P-1B running normally		
COMMENTS:		

Event No. 2		
Description: Loss of RPS-B; FDR-V-4 Fails to Close; Control Rod 18-11 scrams but fails to fully insert (see event 3) This event is initiated when the RCC pump swap is completed by **ACTIVATING TRIGGER 1**		
Time	**Position**	**Applicants Actions or Behavior**
T = 10	ATC	Acknowledges alarms Reports half scram system B Reports control rod scram (& accumulator light) illuminated 18-11 and it is NOT full in (at position 10) Reports power/pressure/level Refers CRS to ABN-ROD due to the scrammed control rod (Refer to Event 3 for the remainder of actions associated with control rod)
	BOP	Informs CRS of RPS Trouble annunciator. Refers to 4.800.C5 DROP 9-5 RPS BUS B TROUBLE: • Announces to immediately stop all maintenance and surveillance testing in progress that has a potential for generating a trip on unaffected RPS channel (RPS A system) • Refers CRS to ABN-RPS Contacts OPS 2 and directs investigation of RPS B loss
ROLEPLAY: As OPS 2 wait three minutes and report that the B RPS MG Set is not running, the motor is hot to the touch, and there is an electrical smell in the room with no indication of fire		

Event No. 2		
	BOP	Per ABN-RPS: Throttles open RWCU-V-104 Ensures all automatic actions have occurred When checked, notes that FDR-V-4 did not close Attempts to close FDR-V-4 and notes and reports that it did not close when C/S taken to close position
	SRO	Refers to Tech Spec 3.6.1.3 and notes condition A applies Directs RPS-B be energized from alternate power
	BOP	Repowers RPS B as follows: • Verifies alternate power available by observing Alternate Feed white light illuminated • Places the RPS Power Source Select Switch in position ALT B
BOOTH OPERATOR: When the *SCRAM (NOT B RPS)* is reset, remove the scrammed rod malfunction in the Director window (right click on the line and select remove)		

Event No. 2		
	BOP	Restores RPS B per step 4.6.2: • Reset half scram at H13-P603 • Resets MS Line Monitors MS-RIS-610B and 610D at P633 • Depresses Isolation logic A & B reset P/B • Depresses Isolation logic C & D reset P/B • Resets RC-1 by depressing WMA-RMS-FAZ/3AXY on RC-1 • Resets RC-2 by depressing WMA-RMS-FAZ/3BXY on RC-2 • Opens RRC-V-19 and RRC-V-20 • Opens EDR-V-19 and EDR-V-20 (LEAK DET DRYWELL EQUIP DRAIN FLOW HIGH is an anticipated annunciator) • Opens TIP-V-15 • Returns RWCU to service per SOP-RWCU-START
COMMENTS: Event 4 may be commenced any time after RC-1 and RC-2 are reset.		

Event No. 3		
Description: Control Rod 18-11 Scrams but fails to go full in (stuck at position 10) The event is initiated when the loss of RPS B is activated		
Time	**Position**	**Applicants Actions or Behavior**
T = 10	ATC	Reports control rod scram light illuminated for 18-11 Reports entry into ABN-ROD Reports control rod 18-11 does not indicate full in Selects control rod 18-11 and reports it is at position 10
	SRO	Enters ABN-ROD and directs subsequent actions per section 4.2: • Directs core flow be lowered to LE 80 Mlbm/hr
	ATC	Observes both RRC pump individual controllers are in Auto (RRC-M/A-R676A and 676B) and depresses the LOWER Pushbutton on the Master Controller (RRC-M/A-R675) to lower flow as directed Reports RRC flow is LE 80 Mlbm/hr (should be about 42 Hz) (RPV High level alarm is expected)
	SRO	Per ABN-ROD directs section 4.2.3 be performed
	ATC	Per ABN-ROD step 4.2.3: • Selects rod 18-11 • Depresses the Continuous Insert P/B • Drives rod 18-11 full in • Releases Continuous Insert P/B and verifies it remains full in • Resets rod accumulator trouble and control rod drift annunciators • Directs CRS to Tech Spec – Reactivity Reports power/level/pressure after rod insertion

Event No. 3		
	ATC	Acknowledges SDV Not Drained Alarm and refers to ARP (This alarm may or may not annunciate depending on speed of RPS B reset. It takes about 8.5 minutes to get this alarm) Verifies SDV vent and drains open when Scram is reset
	SRO	May direct BOP to check SDV level indications
	SRO	Refers to Tech Spec 3.1.3 Condition C Requests information on slow and inoperable control rods Directs STA to initiate a MON run Notes that a CR should be generated to document the rod problems
ROLEPLAY: IF asked inform the CRS that a MON run has been performed and no thermal or preconditioning limits have been exceeded **ROLEPLAY: If asked there are NO inop or slow control rods**		
COMMENTS:		

Event No. 4

Description: Slow drop of RFW-P-1B Control Oil Pressure with failure of RFW-P-AOP/1B to start.

The event is initiated any time after the BOP operator resets RC-1 and RC-2 by **ACTIVATING TRIGGER 2** (It takes about 2 minutes to get alarm)

Time	Position	Applicants Actions or Behavior
T = 25	ATC	Acknowledges TURB B CNTR OIL PRESS LOW annunciator and refers to ARP Reports current control oil pressure (at approx 70 psig) on RFT-PI-2/1B
	ATC	Notes that RFW-P-AOP/1B should have started per ARP but is not running and informs the CRS
	SRO	Directs RFW-P-AOP/1B be started (RO may start the pump without direction – auto action that should have occurred but did not)
	BOP	Dispatches OPS 3 to investigate
	ATC	Starts RFW-P-AOP/1B and reports the pump start to CRS Reports control oil pressure returned to normal and clearing of control oil pressure low annunciator
	SRO	Contacts Production SRO/System Engineer to investigate problem with RFW-P-AOP/1B

ROLEPLAY: If OPS 3 is contacted report no obvious signs of a control oil leak and you will continue your investigation

COMMENTS:

Event No. 5		
Description: RCIC Steam Line Break resulting in RCIC isolation signal with RCIC-V-8 and RCIC-V-63 failing to auto close (may be closed manually) The event is initiated when the B RFW Aux Oil Pump is started by **ACTIVATING TRIGGER 3** (It takes 90 seconds to get alarm and 4 minutes to get the RCIC isolation signal)		
Time	**Position**	**Applicants Actions or Behavior**
Critical Task is to Close RCIC-V-8 and RCIC-V-63 to stop steam leak		
T = 30	BOP	Acknowledges REACTOR BUILD RAD HIGH alarm (602-A5 3-1) and reports TIP Drive Area, ARM-RIS- 7, reading GT 25 mr/hr and rising Informs CRS of ABN-RAD-HIGH and Secondary Containment EOP entry condition
	SRO	Announces entry into ABN-RAD-HIGH and PPM 5.3.1 'Secondary Containment Control' Per ABN-RAD-HIGH, directs evacuation of personnel in the Reactor Building
ROLEPLAY: As OPS2 report that there is steam coming from the room above the TIP room and you are leaving the Reactor Building		
	BOP/ATC	Evacuates Reactor Building as directed
	BOP	Acknowledges LEAK DET RWCU/RCIC PIPE AREA TEMP HIGH alarm and investigates Leak Detection Monitors to determine temperature Reports temperatures as they rise above alarm points
	BOP/ATC	Acknowledges alarms and informs CRS of EOP Entry conditions on RWCU Room Temperature Hi-Hi and RCIC Pipe Routing Area Temperature Hi Hi Alarms H13-P601 A2 1-1 & 2-2 and H13-P601 A3 1-8 & 2-5

Event No. 5		
	SRO	Re-enters PPM 5.3.1 as necessary
	BOP	Reports Leak Detection Monitor point A1-5, LD-TE-24K, RWCU/RCIC Room 313, is GT Max Safe value of 212°F when it occurs Reports Leak Detection Monitor points A2-4, LD-TE-24F, is GT Alarm but LT Max Safe value of 340°F
	BOP/ATC	Reports RCIC Trip annunciator and RCIC Steam Line valves RCIC-V-8 and RCIC-V-63 failed to close
	SRO	Directs RCIC-V-8 and RCIC-V-63 be manually closed
	BOP	Obtains keys and closes RCIC-V-8 and RCIC-V-63 and reports closure to CRS
	SRO	Refers to Tech Specs 3.5.3 and performs actions for Condition A: • Immediately verify by admin means HPCS is operable • Restore RCIC to operable status in 14 days
	BOP	Reports clearing of high temperature alarms and dropping area temperatures indicating the leak is isolated
COMMENTS:		

Event No. 6		
Description: Leak in the CBP discharge piping leading to a loss of the condenstate/feedwater systems as a feed source and a reactor scram The event is initiated after actions associated with RCIC steam leak are completed by **ACTIVATING TRIGGER 4** (It takes abut 4 minutes to get the RFW Pump low suction pressure annunciator)		
Time	**Position**	**Applicants Actions or Behavior**
T = 50	**ROLEPLAY: As OPS3 report there is a water line rupture in the Turbine Building 441' elevation. It looks like water is coming from the Condensate Booster Pumps discharge line and you are getting out of the area**	
	ATC	Checks pressures associated with the Condensate and Feedwater systems and observes lowering RFW pump suction pressures and informs the CRS
	SRO	Enters ABN-FLOODING May direct evacuation all personnel from the Turbine Building
	BOP	Announces a evacuation of personnel in the Turbine Building if directed
	ATC	Acknowledges RFW PUMP SUCT PRESS LOW alarms (If reactor has not been manually scrammed)
	SRO	Directs CRO1 to insert a manual reactor scram
	ATC	Performs immediate scram actions: • Announces to listen up for the scram report • Places Mode Switch to Shutdown • Reports APRMs downscale • Reports Reactor Pressure and trend • Reports RPV level and trend • Reports EOP entry condition on Low RPV Level

Event No. 6		
	SRO	Repeats back scram report and enters PPM 5.1.1, RPV Control, on Low RPV Level
	ATC	Reports trip of both RFW pumps on low suction pressure
	SRO	Directs all Condensate and Condensate Booster Pumps be stopped
	BOP/ATC	Secures Condensate and Condensate Booster Pumps as directed
ROLEPLAY: If Condensate pumps are not secured, as OPS3 report water is still flowing from line rupture.		
ROLEPLAY: If asked, as OPS3 report the water has stopped coming from piping rupture.		
COMMENTS:		

Event No. 7		
Description: LOCA (Containment Spray) This event is auto initiated when the MSIVs close		
Time	**Position**	**Applicants Actions or Behavior**
T = 55	BOP	Recognizes MSIV closure and updates Crew that the MSIVs are closed and he has pressure control on SRVs at 800 to 1000 psig pressure band
	BOP	Recognizes rising DW Pressure and reports EOP entry at 1.68 psig Also reports additional primary containment EOP entries as they occur
	SRO	Enters EOP 5.2.1, Primary Containment Control and re-enters 5.1.1 RPV Control, due to high DW pressure Directs actuations for +13", -50" and 1.68 psig be verified as appropriate
	BOP	Reports Wetwell pressure when it reaches 2 psig
	SRO	Directs Wetwell sprays/Suppression Pool Cooling with RHR A Directs securing sprays if pressure drops below 1.68 psig
	BOP	Using quick card, initiates wetwell sprays and supplements with suppression cooling
	RO/BOP	Reports Wetwell pressure when it reaches 12 psig

Event No. 7		
	SRO	Directs Drywell Cooling Fans be secured
	BOP	Secures Drywell Cooling Fans as directed
	SRO	Directs DSIL verification Directs Drywell Sprays be initiated with RHR B Directs securing sprays if drywell pressure drops below 1.68 psig
	BOP	Verifies within DSIL and using quick card, initiates Drywell Sprays as directed Reports Sprays effective as Drywell pressure drops
COMMENTS: Drywell Spray initiation may be delayed until after Emergency Depressurization		

Event No. 8		
Description: HPCS-P-1 Shaft Breaks This event is activated at the beginning of the scenario but only realized when HPCS initiates		
Time	**Position**	**Applicants Actions or Behavior**
T = 55	BOP	When HPCS initiates on High Drywell Pressure or RPV/L at -50", verifies HPCS status Recognizes that HPCS-P-1 is running with no flow and only 100 psig discharge pressure and informs CRS
	SRO	Directs HPCS-P-1 be checked
ROLEPLAY: If asked, as OPS2 report that there are parts to the shaft coupling for HPCS-P-1 all over the HPCS Pump room		
	SRO	May directs HPCS-P-1 be secured
	BOP	Secures HPCS-P-1 if directed
COMMENTS:		

Event No. 9		
Description: LOCA (RPV Level Drop) This event starts when scram is initiated		
Time	**Position**	**Applicants Actions or Behavior**
T = 55	ATC	Reports RPV level drop Gives RPV level reports as level continues to lower May direct ABN-CRD-MAXFLOW be performed
NOTE – From scram time it takes about 2 minutes to get to -50” **It takes another 4 minutes to get to -129”** **It takes another 90 seconds to get to TAF at -161”**		
	SRO	Directs ADS be inhibited when ADS timers initiate (at -129”) As level drops, expands RPV band given
	ATC/BOP	When RPV/L drops to -129” and the ADS timers intimate, takes both ADS inhibit switches to inhibit
	ATC/BOP	Reports RPV level as it transitions from Wide Range to Fuel Zone indicators Reports RPV level at -161” (TAF)
COMMENTS:		

Event No. 10		
Description: Emergency Depressurization and Return RPV Level to +13" to +54" This event is initiated when RPV Level reaches -161" (Top Of Active Fuel)		
Time	**Position**	**Applicants Actions or Behavior**
Critical Task is to Emergency Depressurize the RPV when RPV Level reaches TAF at -161"		
T = 70	SRO	Determines that Emergency Depressurization is required at -161" Exits the pressure leg of PPM 5.1.1 and enters PPM 5.1.3, Emergency RPV Depressurization Determines wetwell level is GT 17' and directs 7 ADS SRVs be opened
	ATC/BOP	Opens 7 ADS SRVs as directed
	SRO	Directs containment sprays and Suppression Pool cooling be secured to facilitate RPV injection Directs RPV Level be returned to +13" to +54" level band
	RO/BOP	Secures sprays and Suppression Pool cooling as directed Allows ECCS injection valves to open at 470 psig and RPV injection as it occurs Reports RPV level rising and when GT –161 inches
COMMENTS:		

Event No. 11		
Description: Re-initiation of Wetwell and Drywell Sprays This event is initiated by the SRO when RPV level is greater than TAF		
Time	**Position**	**Applicants Actions or Behavior**
T = 75	SRO	Directs initiation of Wetwell sprays if WW Pressure is GT 2 psig Directs initiation of Drywell sprays if Wetwell Pressure is GT 12 psig Directs Suppression Pool Cooling as required
	ATC/BOP	Secures injection systems as necessary to return RPV level to +13" to +54" band Initiates Wetwell and Drywell sprays as appropriate Initiates suppression pool cooling if directed
Termination Criteria: The scenario will be terminated when RPV level is being returned with injection from low pressure ECCS pumps, Sprays have been re-initiated as appropriate, or as directed by the scenario coordinator		

TURNOVER INFORMATION

Initial conditions: Columbia is operating in MODE 1 at full Power.

Turnover: A PM is scheduled to swap CRD Pumps. After shift turnover swap CRD pumps to CRD-P-1B running and CRD-P-1A in standby.

OPS 2 is standing by for the CRD Pump swap evolution.

SIMULATOR SETUP INSTRUCTIONS

Reset to IC-15.

Put Scenario #1 schedule and Scenario #1 Event in appropriate folders on M drive

Load the schedule.

Go to run.

If using scenario for more that this time, snap into an IC.

SCHEDULE

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<!-- This file contains a Thunder Simulations Schedule -->
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      <ITEM row = 1>
            <TIME>1</TIME>
            <ACTION>Insert malfunction AOV-SCN013F after 1 to FAIL_AS_IS</ACTION>
            <DESCRIPTION>FDR-V-4 DW FLOOR DRN OUTBD ISOL</DESCRIPTION>
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            <DESCRIPTION>ROD 1811 STUCK at position 10</DESCRIPTION>
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            <DESCRIPTION>RPS-CB-MG2 MG-B OUTPT BKR O/C</DESCRIPTION>
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            <DESCRIPTION>Deletes stuck rod malfunction</DESCRIPTION>
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M</DESCRIPTION>
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M</DESCRIPTION>
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1</ACTION>
            <DESCRIPTION>Removes Control Oil TURB B press low on Aux Pump red light
illuminated</DESCRIPTION>
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            <EVENT>28</EVENT>
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            <DESCRIPTION>Returns RFT-PI3-1B to normal on LO Pump red light
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3</ACTION>
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EVENTS

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<!-- This file contains a Thunder Simulations Event -->
<EVENT>

      <TRIGGER id="26" description="Inserts LOCA when MSIVs
close">X01O194G&gt0</TRIGGER>

      <TRIGGER id="27" description="Trips both RFW Pumps when B/U scram light
on">X03O005E&gt0</TRIGGER>

      <TRIGGER id="28" description="Deletes RFW-B lube oil
malfunctions">X8AO160R&gt0</TRIGGER>

      <TRIGGER id="29" description="Deletes Stuck rod when Insert P/B light
illuminates">XRLO033I &gt0</TRIGGER>

</EVENT>
```

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE: OPERATIONS TRAINING

COURSE TITLE: COLUMBIA GENERATING STATION SIMULATOR EXAMINATION

LESSON TITLE: Start ASD Channel 1A1; Raise Power with Flow; Swap RCC Pumps; 'B' Flow Unit Failure; FPC-P-1B Failure; Main Turbine Trip on High MSR Level; Hydraulic ATWS; Reduced SLC Capacity; Lower RPV Level; S/R/S Inserts Rods

LENGTH OF LESSON 1.5 Hours

INSTRUCTIONAL MATERIALS INCLUDED

Lesson Plan PQD Code		Rev. No.	
Simulator Guide PQD Code	LO001678	Rev. No.	0
JPM PQD Code		Rev. No.	
Exam PQD Code		Rev. No.	

DIVISION TITLE: Nuclear Training

DEPARTMENT: Operations Training

PREPARED BY: Ron Hayden DATE: 05/30/09

REVISED BY: DATE:

VALIDATED BY: DATE:

TECHNICAL REVIEW: DATE:

INSTRUCTIONAL REVIEW: DATE:

APPROVED: DATE:

Operations Training Manager

Verify materials current IAW SWP-TQS-01 prior to use.

Facility: Columbia NRC Scenario No: 2
Examiners: _____ Operators: _____
_____ _____
_____ _____

Initial conditions: Columbia is operating at reduced power. Yesterday ASD Channel 1A 1 tripped. The problem has been corrected and Channel 1A1 is ready to be re-started.

Turnover: Start ASD Channel 1A1 per SOP-RRC-ASD. Step 5.6.1 is complete. After the channel is started, raise Reactor Power with flow to exit the OPRM Enabled Region. The SNE is working on a reactivity plan to continue the power increase from that point. Also RCC Pumps need to be swapped for run time equalization. Start RCC-P-1A and place RCC-P-1C in standby.

Event No.	Timeline	Event Type*	Event Description
1.	T = 0	N (ATC)	Start ASD Channel 1A1, RRC ASD to Auto
2.	T = 0	N (BOP)	Swap RCC Pumps to RCC-P-1A running and RCC-P-1C in Standby
3.	T = 10	R (ATC)	Raise Power with Flow to Exit OPRM Enabled Region
4.	T = 20	C (BOP) TS (SRO)	RCIC Coupling bolts failed, Trip RCIC; Protect HPCS and ADS TS 3.5.3A
5.	T = 30	C (ATC) TS (SRO)	Flow Unit B Failure; Tech Spec (LCS 1.3.2.1 and TS 3.3.1.1)
6.	T = 35	(C) BOP	FPC-P-1B Failure; FPC-P-1A Fails to Auto Start
7.	T = 40	(C) BOP	MSR Drain Tank Valves Fail Causes High MSR Level and MT Trip
8.	T = 45	M (All)	Hydraulic ATWS; Lower RPV Level and Establish LL
9.	T = 50	C (ATC)	Reduced SLC
10.	T = 55	N (BOP)	Perform PPM 5.5.10 and 5.5.11 to insert Control Rods
11.	T = 65		ATWS Clears and RPV Level is Returned to Normal

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

SCENARIO DESCRIPTION

The scenario begins with Columbia at approximately 56% power with RRC Pumps running at 32 Hz. ASD Channel 1A1 tripped yesterday and is now ready to be returned to service. When the Crew takes the shift they will re-start ASD Channel 1A1 and swap RCC Pumps.

EVENT 1 – Start RRC ASD Channel 1A1

EVENT 2 – Swap running RCC pumps to RCC-P-1A running and RCC-P-1C in standby

EVENT 3 – When Channel 1A1 is restarted, place RRC-A ASD into Auto and raise power with flow to exit the OPRM Enabled Region.

EVENT 4 - Failure of RCIC Coupling Bolts. The Control Room will be contacted and informed that the coupling for the RCIC Turbine to Pump has only 2 of 5 bolts engaged. The crew should insert a RCIC trip to prevent it from starting and refer to TS 3.5.3 Condition A.

EVENT 5 - Failure of the B Flow Unit. The ATC operator will investigate alarms and determine the B Flow Unit has an active INOP trip. The CRS will refer to Tech Specs (LCS1.3.2.1 and TS 3.3.1.1)and direct the Flow Unit be bypassed.

EVENT 6 - Failure of FPC-P-1B. FPC-P-1A will not auto start on low pressure but the BOP operator will start FPC-P-1A manually and secure FPC-P-1B.

EVENT 7 – High Level MSR Drain Tank. A failure of the valves for MSR Drain Tank will occur. The BOP operator will attempt to take manual control and reduce drain tank level but will not be successful Eventually a MSR High Level alarm annunciates. The crew should take action and insert a manual scram and trip the Main Turbine which will trip on High MSR Level in 30 seconds from receipt of the alarm.

EVENT 8 – Hydraulic ATWS and Lower RPV Level. When a scram is inserted the crew will determine a hydraulic ATWS occurs. Reactor Power will be about 25%. The RRC Pumps trip when the MT Trips. The CRS will direct all injection be secured and lower RPV level to LT -65". When RPV level is about -100", Reactor Power will be LT 5%

EVENT 9 – Reduce SLC capacity. When the CRS directs SLC initiation, both SLC pumps start but only 20 gpm SLC flow will develop.

EVENT 10 – Insert Control Rods. Rod Insertion. PPM 5.5.10 and 5.5.11 will be performed to insert Control Rods.

EVENT 11 – The rods will insert on the first S/R/S. When all rods are in, RPV Level will be returned to +13" - +54" band.

The scenario will be terminated when RPV level is being returned to normal band or as directed by the scenario coordinator.

Event No. 1		
Description: Start RRC-P-1A ASD Drive 1A1 This event is initiated by shift turnover		
Time	**Position**	**Applicants Actions or Behavior**
T = 0	SRO	Directs that ASD Channel 1A1 be started per SOP-RRC-ASD Section 5.6.
	ATC	Commences Section 5.6 at step 5.6.2: a. Verifies frequency of drive 1A2 at LE 35 Hz b. Depresses the ASD START button c. Verifies the red lamp illuminates (observes red light illuminates, green light goes out and channel failure limit alarm clears) d. Verifies heater breaker is OFF by contacting OPS3 Informs CRS that ASD Channel 1A1 has been started
ROLEPLAY: If asked the Heater Breaker is in the OFF position		
COMMENTS:		

Event No. 2		
Description: Swap RCC Pumps to RCC-P-1A running and RCC-P-1C secured. The event is initiated by turnover information and will be performed immediately after shift turnover		
Time	**Position**	**Applicants Actions or Behavior**
T = 0	CRS	Direct RCC-P-1A be started and RCC-P-1C be secured
	BOP	Refers to SOP-RCC-OPS Section 5.1.1a and starts RCC-P-1A: • Contacts OPS 2 and verifies RCC-V-1A is OPEN • Contacts OPS 2 and verifies RCC-V-2A is OPEN • Place RCC-RMS-P-1A in AUTO after START Refers to section 5.1.2c: • Places RCC-RMS-P-1C in AUTO after STOP • Contacts OPS 2 and verifies RCC-V-23C CLOSED
ROLEPLAY: RCC-V-1A and RCC-V-2A are open and RCC-V-23C did close when asked		
COMMENTS:		

Event No. 3		
Description: Place ASD in Auto and Raise Power With Flow to Exit OPRM Enabled Region The event is initiated by the SRO when ASD Channel 1A1 has been started		
Time	**Position**	**Applicants Actions or Behavior**
T = 10	SRO	Directs ATC to place A RRC Pump ASD control in Automatic
	ATC	Verifies Master and Individual controller setpoints matched and places RRC-A ASD in Auto
	SRO	Directs ATC to raise Reactor Power with flow to exit the OPRM Enabled Region at a rate not to exceed 10 MWE/minute
	ATC	Raises reactor power with flow as directed
COMMENTS:		

Event No. 4		
Description: RCIC Turbine Shaft Coupling Bolts Missing – Inops RCIC The event is initiated by OPS 2 contacting the Control Room when power has been raised and the OPRM Region has been exited		
Time	**Position**	**Applicants Actions or Behavior**
T = 20	**ROLEPLAY: As OPS 2 call the control room on extension 2393 and inform the reactor operator that you and the SSS are down in the RCIC Room. I found a nut on the turbine by the coupling so I called OPS 1. We investigated further and found that only two of the five bolts for the coupling that connects the turbine to the pump are still engaged.**	
	BOP	Answers the phone and informs the CRS that the RCIC turbine/pump coupling only has 2 of the 5 bolts still connected.
	SRO	Calls Production/Work Control and informs them of the RCIC turbine situation
ROLEPLAY: If called as Production/Work Control acknowledge the info and tell them a team will be put together to investigate.		
	SRO	Directs BOP operator to insert a manual trip of the RCIC turbine to prevent it from starting
	BOP	Trips the RCIC turbine by either depressing the Turbine Trip P/B or manually closing RCIC-V-1
	SRO	Refers to Tech Specs 3.5.3 Condition A: • Verifies HPCS operable by administrative means and • Restore RCIC to operable status within 14 days
	SRO/BOP	Refers to OI-49 and determines that HPCS and ADS-SYS 1A/B be protected

Event No. 4		
	BOP	Places protected signs of HPCS and both ADS divisions Contacts OPS2 to hang protected signs on HPCS system
COMMENTS:		

Event No. 5		
Description: Flow Unit B Failure The event is initiated when the OPRM Region has been exited and is initiated by **ACTIVATING TRIGGER 1**		
Time	**Position**	**Applicants Actions or Behavior**
T = 30	ATC	Acknowledges Rod Out Block and Flow Reference Off Normal annunciators, informs CRS and refers to ARP for Flow Reference Off Normal (P603 A8 3-6)
	ATC	Per ARP determines the white light is illuminated indicating Flow Unit B is INOP Refers CRS to LCS 1.3.2.1 and TS 3.3.1.1 and TS Bases page 3.3.1.1-9
	SRO	Refers to LCS 1.3.2.1 and TS 3.3.1.1 and TS Bases page 3.3.1.1-9 and determines requirement is to place in trip within 12 hours
	SRO	Directs ATC Operator to bypass Flow Unit B
	ATC	Places Flow Unit B in the Bypass position Notes the INOP light goes out and the BYPASS light illuminates
COMMENTS:		

Event No. 6

Description Lowering FPC System pressure with a failure of the standby pump to Auto Start

The event is initiated when Tech Specs have been referenced for RCIC and systems protected by **ACTIVATING TRIGGER 2**

Time	Position	Applicants Actions or Behavior
T = 35	BOP	Acknowledges CIRCULATION PUMP B DISCHARGE PRESS LOW on P627.FPC2 3-1 and refers to ARP Informs CRS of the alarm and that the automatic actions should be an Auto start of FPC-P-1A but that FPC-P-1A did not auto start (The BOP may start pump and then inform CRS of actions based on auto action that should have occurred but did not)
	SRO	Directs the start of FPC-P-1A if not already running
	SRO	Directs that FPC-P-1B be secured
	BOP	Secures FPC-P-1B as directed
	SRO	Contacts production/Work Control/OPS2 to investigate FPC-P-1B

COMMENTS:

Event No. 7		
Description: Failure of MSR Drain tank 1A level control valves HD-LIC-9A and 9A2 closed The event is initiated by **ACTIVATING TRIGGER 3** after actions for Flow Unit and FPC failures have been completed (It takes about 6 minutes to get MSR A High Level Alarm after trigger activation)		
Time	**Position**	**Applicants Actions or Behavior**
T = 40	BOP	Acknowledges alarm and reports MSR Drain Tank 1A Level High alarm. Refers to ARP. Investigates controllers to ensure they are in Auto and recognizes the controllers are opening drain valves but level continues to rise. May attempts manual operation but valve is already full open. Reports controllers functioning in Auto (or Manual) and level indication is off scale high.
	SRO	Conduct a brief on actions if level continues to rise and MSR Level High alarm is received.
	ATC/BOP	Acknowledges and reports MSR A Level High alarm and refers to ARP (Turbine Trip has a 30 second time delay)
	SRO	Directs a manual reactor scram prior to automatic scram actuation (SRO may direct a scram prior to MSR A high Level alarm)
	ATC	Scrams the reactor and performs immediate operator actions of PPM 3.3.1: • mode switch to shutdown • monitors/reports Power/Pressure/Level Recognizes failure to scram (ATWS) – **(REFER TO EVENT 7)**
COMMENTS:		

Event No. 8		
Description: Hydraulic ATWS This event is setup at the beginning of the scenario and occurs automatically when a manual scram is inserted		
Critical Task is to lower RPV level and establish an LL (Lowered Level).		
Time	**Position**	**Applicants Actions or Behavior**
T = 45	ATC	Continues with immediate scram actions after recognizing all control rods did not insert: • Depress the manual scram pushbuttons • Initiate ARI and verifies valves opened • Insert SRMs and IRMs Announce EOP entry into PPM 5.1.1 on low Reactor Water level and/or Power GT 5% and a scram required Reports reactor power
	SRO	Enters PPM 5.1.1 and directs/verifies that the Mode Switch has been placed in SHUTDOWN and exits PPM 5.1.1 via the Power leg to PPM 5.1.2, RPV Control ATWS Directs BOP to: • Inhibit ADS and take manual control of HPCS • Verify all appropriate isolations and initiations have occurred • Verify pressure is being maintained by the bypass valves
	BOP	Takes both ADS control switches to the INHIBIT position and

Event No. 8		
		acknowledges associated BISIs Arms and Depresses the HPCS system initiation P/B while holding the control switch for HPCS-P-1 to STOP Closes HPCS-V-4 when it get fully opened Reports completion to SRO
	SRO	Directs bypassing the MSIV isolation interlocks per PPM 5.5.6 Directs performance of PPM 5.5.1
	BOP	Performs PPM 5.5.6 and updates Crew Performs PPM 5.5.1 and updates Crew
	SRO	Direct the ATC to: Stop and prevent all injection into the RPV except by Boron injection systems, RCIC, and CRD Lower level to a band less than –65 inches but greater than –183 inches (preferred band is –80” to –140”). Records the upper limit as LL. Maintain level as directed from LL to –183 inches with systems listed in Table 5 (Band should be –80” to –140”)
	SRO	Directs SLC initiation when RRC pumps are off (SLC may be started prior to this as RRC-Pumps are off when MT Trips) **(REFER TO EVENT 8).**
	RO	Uses Quick Cards to stops and prevent condensate and feedwater and lines

Event No. 8		
		up on the startup flow control valves as directed Reports EOP entry on low RPV level Reports Reactor Power as it drops due to lowering level When Reactor Power is LT 5%, marks RPV level to establish an LL Maintains RPV level between LL and –183 inches as directed (–80 inches to –140 inches)
	SRO	Directs PPM 5.5.10 and 5.5.11 (Tabs B, F) performance for a hydraulic ATWS. **(REFER TO EVENT 8)**
COMMENTS:		

Event No. 9		
Description: Failure of SLC pumps to deliver normal SLC flow to RPV This event is activated at the beginning of the scenario and realized by the crew when SLC control switches are taken to OPER to initiate SLC		
Time	**Position**	**Applicants Actions or Behavior**
T = 50	SRO	Recognizes RRC Pumps have tripped off and directs SLC initiation before SP temp reaches 110°F
	ATC	Initiates SLC per the quick card: Swaps keys and places two switches to OPER Verifies squib valves fire Verifies RWCU-V-4 closure Verifies flow and SLC tank level Reports reduced SLC flow (about 20 gpm) and initial tank level
COMMENTS:		

Event No. 10		
Description: Insert control rods using PPM 5.5.10 and 5.5.11 Tab B. This event is initiated by the SRO direction.		
Time	**Position**	**Applicants Actions or Behavior**
T = 55	SRO	Directs PPM 5.5.10 and PPM 5.5.11 be performed to insert control rods
	BOP	Performs: PPM 5.5.10 - Override ARI Logic – pulls 2 fuses PPM 5.5.11 Tab B – Starts the second CRD Pump, places the SDV HIGH LEVEL Trip control switch to BYPASS on P603, and determines that scram cannot be reset per PPM 5.5.11 PPM 5.5.11 Tab F – The second CRD Pump should already be running, the SDV HIGH LEVEL Trip control switch should already be in BYPASS on P603, and determines that CRD drive header pressure can be established per PPM 5.5.11 Directs Instructor to perform back panel operations associated with Tab B and Tab F
FLOOR OPERATOR: Take direction from BOP to perform back panel steps of Tab B (Step Q-3 to perform attachment 6.1) and Tab F (Step Q-6 to perform attachment 6.2) When completed with steps, initial by the blocks and inform the BOP operator that they are completed by standing next to Board S and giving the crew an update: "UPDATE READY - Attachment 6.1 per Tab B and Attachment 6.2 per Tab F of PPM 5.5.11 has been completed, END OF UPDATE."		

Event No. 10		
	BOP	Performs remainder of PPM 5.5.11 Tab B actions to scram/reset/scram: • resets Scram and notes time • After 2 minutes, checks rod density and inserts a manual reactor scram and informs CRS of results If rods do not insert continues scram/reset/scram Tab B
	BOP	Performs remainder actions of PPM 5.5.11 Tab F: • Places RWM Bypass Control Switch to BYPASS • Informs CRS of readiness to drive rods
	SRO	Directs rod insertion starting at rod 18-19 and inserting every other rod every other row until all rods are inserted skipping the peripheral rods
	BOP	Drives Control Rods as directed
COMMENTS: It may take two S/R/S actions before all rods go in.		

Event No. 11		
Description: Control Rods Insert and RPV Level returned to +13" to +54" band This event is activated when RPV level has been lowered and S/R/S is being performed		
Time	**Position**	**Applicants Actions or Behavior**
Critical Task is to insert Control Rods by performing PPM 5.5.11 Scram/Reset/Scram		
BOOTH OPERATOR: When RPV Level has been lowered and is being controlled in the desired band, and scram/reset/scram is being performed to insert control rods: **<u>Delete/remove malfunctions associated with ATWS</u>**		
T = 65	BOP	Checks control rod density Initiates a manual scram Notes Control Rod motion Recognizes and reports All Rods In to the SRO
	SRO	Directs SLC be stopped
	RO	Takes control switches out of OPER and observes both SLC pumps stop
	SRO	Exits PPM 5.1.2 and re-enters PPM 5.1.1 Directs RPV level be raised to +13" to +54" band with available systems
	RO	Raises RPV level into band as directed
TERMINATION POINT – The scenario will be terminated when RPV level has been returned to normal operating band.		
COMMENTS:		

TURNOVER INFORMATION

Initial conditions: Columbia is operating at reduced power. Yesterday ASD Channel 1A 1 tripped. The problem has been corrected and Channel 1A1 is ready to be re-started.

Turnover: Start ASD Channel 1A1 per SOP-RRC-ASD. Step 5.6.1 is complete. After the channel is started, raise Reactor Power with flow to exit the OPRM Enabled Region. The SNE is working on a reactivity plan to continue the power increase from that point. Also RCC Pumps need to be swapped for run time equalization. Start RCC-P-1A and place RCC-P-1C in standby.

SIMULATOR SETUP INSTRUCTIONS

Load IC 220 and load appropriate schedule and Events.

SCHEDULE

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normal)</DESCRIPTION>
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normal)</DESCRIPTION>
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</SCHEDULE>
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EVENT

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<!-- This file contains a Thunder Simulations Event -->
<EVENT>

      <TRIGGER id="29" description="Deletes Annunciator for FPC-B when Pump off light
illuminates">X26O029G &gt 0</TRIGGER>

</EVENT>
```

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	OPERATIONS TRAINING
COURSE TITLE	COLUMBIA GENERATING STATION SIMULATOR EXAMINATION
LESSON TITLE	Raise Power with Flow; Start CW-P-1C; Control Rod Exercise Surveillance Finds an Uncoupled Rod That Won't Re-Couple; SGT Surveillance – Controller Failure; Minimum Seismic EQ; CW Rupture - Causes Back Pressure To Rise Requiring a Manual Scram; OBE; Loss of Offsite Power; DW Floor Rupture; RHR-P-2A Breaker Fails to Close, RHR-V-16B Fails Closed; Emergency Depressurize on exceeding High Drywell Temp

LENGTH OF LESSON 1.5 Hours

INSTRUCTIONAL MATERIALS INCLUDED

Lesson Plan PQD Code		Rev. No.	
Simulator Guide PQD Code	LO001679	Rev. No.	0
JPM PQD Code		Rev. No.	
Exam PQD Code		Rev. No.	

DIVISION TITLE	Nuclear Training		
DEPARTMENT	Operations Training		
PREPARED BY	Ron Hayden	DATE	05/31/09
REVISED BY		DATE	
VALIDATED BY		DATE	

TECHNICAL REVIEW		DATE	
INSTRUCTIONAL REVIEW		DATE	
APPROVED		DATE	

Operations Training Manager

Verify materials current IAW SWP-TQS-01 prior to use

Facility: Columbia NRC Scenario No: 3
Examiners: _____ Operators: _____
_____ _____
_____ _____

Initial conditions: Reactor Power is 90%. Power was reduced due to CW-P-1C not being available. The work on CW-P-1C has just been completed.

Turnover: Start CW-P-1C. After the pump start, raise reactor power with Flow to 95% power. The reactivity brief has been performed. At that time stop the power increase and perform OSP-CRD-W701, Control Rod Exercise of Fully Withdrawn Rods (MODE 1) starting with rod 18-59 and working across from left to right and then from top to bottom until all fully withdrawn control rods have been exercised. After CW-P-1C is started perform the Standby Gas Treatment B System Monthly Operability surveillance, OSP-SGT-M702.

Event No.	Timeline	Event Type*	Event Description
1.	T = 0	N (BOP)	Start CW-P-1C
2.	T = 0	R (ATC)	Raise power with Flow
3.	T = 10	R (ATC) C (ATC) TS (SRO)	Perform Control Rod Exercise surveillance - OSP-CRD-W701 Second rod is uncoupled and will not re-couple when attempted
4.	T = 10	C (BOP) TS (SRO)	Perform SGT B System Operability surveillance – OSP-SGT-M702 Controller Fails when SGT flow is raised
5.	T = 35	M (All)	Minimum Seismic Earthquake CW Pipe Rupture outside Protected Area MT Back Pressure rise requiring Reactor scram and MT Trip
6.	T = 50	M (All)	Operating Basis Earthquake Loss of Offsite Power
7.	T = 55		LOCA Drywell Floor Rupture
8.	T = 60	C (BOP) C (SRO)	RHR-P-2A Breaker fails RHR-V-16B Control Power trips and valve still closed
9.	T = 70		Emergency Depressurize due to High Drywell Temperature GT 330°F

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

SCENARIO DESCRIPTION

EVENT 1 - Start CW-P-1C

EVENT 2 – Power will be raised to 95% with Flow

EVENT 3 – Perform OSP-CRD-W701 (Control Rod Exercise Surveillance). Control Rod 22-59 will be uncoupled when checked. When Recoupling is attempted the rod will not recouple. Tech Specs will be referenced and the rod should be driven full in and isolated with cooling flow maintained

EVENT 4 – Perform OSP-SGT-M702 (Standby Gas treatment System B Operability Surveillance). The controller will fail as is when flow reaches 3100 cfm. The unit may be shut down. Tech Specs will be referenced

EVENT 5 – Minimum Seismic Earthquake results in a CW Line rupture outside the protected area. As a result, Main Turbine back pressure will start to rise. The crew should recognize that the event is not recoverable and insert a manual scram and remove the MT from service

EVENT 6 – After the immediate scram actions have been performed, a OBE will occur causing a loss of Startup Power, then a loss of Backup Power (and the Drywell Floor Ruptures and a LOCA starts – refer to Event 7)

EVENT 7 – Drywell Floor Rupture and LOCA

EVENT 8 – Inability to Spray (RHR-P-2A Breaker Fails and RHR-V-16B will not open)

EVENT 9 – Emergency Depressurize due to Drywell Temperature when it cannot be restored and maintained LT 330°F

The scenario will be terminated when RPV level is being returned to normal or as directed by the scenario coordinator

Event No. 1		
Description: Start CW-P-1C per SOP-CW-START This event is initiated by shift turnover		
Time	**Position**	**Applicants Actions or Behavior**
T = 0	SRO	Directs the start of CW-P-1C per SOP-CW-START
	BOP	Performs SOP-CW-START Section 5.2: • 5.2.1 – Step is N/A • 5.2.2 – Contacts OPS4 to verify • 5.2.3 – Contacts OPS4 to verify • Makes plant announcement of CW-P-1C start • 5.2.5 – Verifies bay level is GT 441’ (is reading 442’) • 5.2.6 – Places C/S for CW-V-13C and TSW-V-115C to OPEN and when valves start to open releases switch • 5.2.7 – Verifies CW-P-1C Blue ready to start light is illuminates • 5.2.8 – Verifies 6 towers on line per P&L 4.2 • 5.2.9 – Step is N/A • 5.2.10 – Places CW-P-1C C/S to START and verifies pump starts, discharge valve opens, and CW-V-13C and TSW-V-115C close Informs CRS that CW-P-1C is running
COMMENTS:		

Event No. 2		
Description: Raise Power with Flow This event is initiated by shift turnover		
Time	**Position**	**Applicants Actions or Behavior**
T = 0	SRO	Directs ATC to raise power with flow to achieve 95% reactor power at a rate not to exceed 10MWE/min
	ATC	Notes Reactor Power and Main Generator Output Verifies both RRC pumps individual controllers are in AUTO and depresses Master Controller Raise P/B to increase flow/power as directed
COMMENTS:		

Event No. 3		
Description: Control Rod Exercise. Control Rod 22-59 is not coupled and will not re-couple This event is initiated by shift turnover and started after Reactor Power is 95%		
Time	**Position**	**Applicants Actions or Behavior**
T = 10	SRO	Directs performance of OSP-CRD-W701
	ATC	Performs OSP-CRD-W701 section 7.8 for rod 18-59 with coupling check OK: • Selects the rod • Inserts rod 1 notch • Verifies position changes • Continuously withdraws rod • Verifies position change • Verifies coupling integrity (no alarm) • Verifies position 48 • Repeats for next rod
	ATC	Performs for rod 22-59 and receives ROD OVERTRAVEL annunciator (P603.A7.1-8)
	ATC	Acknowledges alarm and refers to ARP: • Notify SM and SNE of condition • Insert control rod 22-59 to position 00 to accomplish recouping • Continuous withdraws 22-59 and receives ROD OVERTRAVEL alarm again

Event No. 3		
	SRO	Declares Control Rod 22-59 inoperable Refers to Tech Spec 3.1.3 Condition C and verifies total number of slow or inop rods is LE 8 immediately AND Fully insert the inop rod within 3 hours AND disarm the associated CRD within 4 hours Directs control rod 22-59 be fully inserted
	SRO	May direct SOP-CRD-HCU section 5.4 be performed for rod 22-59
ROLEPLAY: If directed to isolate rod acknowledge task only - no manipulations need to be done **ROLEPLAY: If asked, there are no slow or inop control rods**		
COMMENTS:		

Event No. 4		
Description: Perform SGT B Monthly Surveillance OSP-SGT-M702 The event is initiated by the turnover and is performed after CW-P-1C is started		
Time	**Position**	**Applicants Actions or Behavior**
BOOTH OPERATOR: Have SGT Flow displayed on computer **and when flow reaches 3100 CFM ACTIVATE TRIGGER 1**		
T = 10	SRO	Directs Standby Gas Treatment System B monthly operability surveillance, OSP-SGT-M702 be performed
ROLEPLAY – If asked there are no paint fumes, etc. in SGT area and SGT integrity is done		
	BOP	Performs OSP-SGT-M702 as directed: • 7.1.1 - Contacts OPS 2 and verifies no paint fumes • 7.1.2 - Contacts OPS 2 and verifies SGT integrity • 7.1.3 - Records moisture reading on SGT-MI-4B (reads zero) • 7.1.4 - Verifies SGT-V-2B is open (Rx Bldg inlet) • 7.1.5 - Verifies SGT-V-3B1 is open (fan 1B2 inlet) • 7.1.6 - Depresses BISI Manual Out of Service pushbutton • 7.1.7 - Informs CRS to enters SGT system B as inoperable in the TS surveillance log • 7.1.8 - Places SGT-DPIC-1B2 in MANUAL • 7.1.9 - Adjusts SGT-DPIC-1B2 output to minimum (100%) • 7.1.10 - Places SGT-EHC-1B2 control switch to ON • 7.1.11 - Verifies SGT-FN-1B2 auto starts 10 sec. after heaters energize • 7.1.12 - Promptly opens SGT-V-5B2 (exhaust to stack) • 7.1.13 - Slowly adjusts SGT-DPIC-1B2 to obtain 4800 CFM ± 480CFM
BOOTH OPERATOR: W*hen flow reaches 3100 CFM* ACTIVATE TRIGGER 1		

Event No. 4		
	BOP	Observes and reports to the CRS that the DPIC cannot be adjusted and appears to have failed-as-is with SGT flow at about 3100 CFM
	SRO	May directs BOP to shutdown the SGT system and restore the lineup Refers to Tech Specs due to DPIC failure and determines TS 3.6.4.3 Condition A applies – Restore SGT B within 7 Days May contact Production/Work Control/SSS
ROLEPAY: If asked to secure or leave SGT-B running ask the crew to leave it running so mechanics can go check it out.		
	BOP	May use SOP-SGT-SHUTDOWN to secure SGT or use surveillance and do steps in reverse order Per SOP-SGT-SHUTDOWN Section 5.1.2: Take the following switches to PULL TO LOCK: • SGT-EHC-1B2 • SGT-V-2B • SGT-V-3B1 • SGT-V-2B2 • SGT-V-5B1 • SGT-V-5B2 When SGT-EHC-1B1 and SGT-FN-1B1 starts then place SGT-EHC-1B1 to OFF
COMMENTS:		

Event No. 5		
Description: Minimum Seismic Earthquake results in Circ Water Rupture Outside Protected Area requiring a Reactor Scram and Main Turbine Trip This event is initiated when the two surveillances are completed and Tech Specs have been reviewed by **ACTIVATING TRGGER 2 – BOOTH OPERATOR SEE BELOW INSTRUCTIONS**		
Time	**Position**	**Applicants Actions or Behavior**
BOOTH OPERATOR: Start EQ track on lowest volume and run for 5 seconds and then ACTIVATE TRIGGER 2. Allow EQ track to run another 5 seconds then stop it		
T = 35	BOP	Acknowledges Minimum Seismic Alarm, pulls ARP and refers CRS to ABN-EARTHQUAKE Investigates and reports indications on Bd. L (16 Amber and no red lights)
ROLEPLAY: 30 seconds after EQ contact Control Room as OPS 4 and report that you felt the earth shake just a minute ago		
	SRO	Directs announcement per ABN-EARTHQUAKE be performed
	BOP	Makes announcement and directs SAS (meets booth operator at booth door) to repeat on the Maintenance and Security radio channels
ROLEPLAY: When EQ announcement has been performed contact the control room as OPS 4 and report a large piping break between the cooling towers has resulted in a large volume of water flowing away form the plant into the desert		
	SRO	May direct announcement concerning pipe rupture be performed
	BOP	Makes announcement if directed Reports lowering MWe output and rising MT Back Pressure
NOTE: It takes about 9 minutes to get to a back pressure reading of 5.7 and MWe to be 948 MWe – longer if power is reduced in an attempt to keep plant/Main Turbine on line longer		
	SRO	Determines that it is necessary to trip the Main Turbine due to rising back pressure Conducts a brief on scram and MT trip

Event No. 5		
	SRO	May direct a RRC flow reduction prior to directing the Reactor Scram Directs ATC to insert a manual scram
	ATC	Lowers Core Flow if directed Announces "Listen up for the scram report" Performs immediate scram actions: • Places Reactor Mode Switch in SHUTDOWN • Monitors Power, Pressure, and Level • Verifies all rods inserted • Inserts IRMs and SRMs by depressing INSERT P/B Reports EOP entry on low RPV water level
	SRO	May direct MT Trip prior to its auto trip Enters PPM 5.1.1 on Low RPV Level and directs restoration of RPV level to +13 inches to +54 inches (a -40" to +50 " band should be given) with RCIC and/or Condensate and Feed system
COMMENTS:		

Event No. 6		
Description: Operating Basis Earthquake; Loss of Startup Power (10 sec. TD); Loss of Backup Power (120 sec. TD) This event is initiated by **ACTIVATING TRIGGER 3– BOOTH OPERATOR SEE BELOW INSTRUCTIONS**		
Time	**Position**	**Applicants Actions or Behavior**
BOOTH OPERATOR: Start EQ track on lowest volume and take 19 seconds to get to full volume. After 4 seconds ACTIVATE TRIGGER 3. Allow EQ track to run another 5 seconds after reaching max volume and then stop it		
Critical step is to initiate systems required to restore RPV level back to +13" to =54"		
T = 55	BOP	Reports OBE annunciator, pulls ARP and refers SRO to ABN-EARTHQUAKE. Investigates and reports indications on Bd. L (all red and yellow lights illuminated)
	BOP	Investigates electrical boards when the Startup Transformer locks out and updates crew that Startup power is locked out and Backup power is on SM-7 and SM-8. SM-4 is powered from DG-3
	SRO	Due to the loss of feedwater directs RPV level restoration with RCIC and/or HPCS and/or CRD
	ATC	Initiates RCIC and or HPCS using quick cards Restarts CRD pump Uses RCIC and/or HPCS to maintain RPV Level
	BOP	Investigates electrical board when Backup Transformer locks out and updates crew that Backup power is locked out and SM-7 and SM-8 are powered from Diesel Generators
	SRO	Directs RPV Pressure be maintained with SRVs with a band of 800 to 1000 psig

	BOP/ATC	Cycles SRVs as necessary to maintain RPV Pressure between 800 and 1000 psig (When LOCA starts SRVs will not have to be cycled to control RPV pressure)
	SRO	Directs actuations for low RPV level be verified
	BOP	Verifies and reports actuations complete
	BOP/ATC	Recognizes that CAS compressors and TSW are not running. Directs OPS 3 to place FW on CAS Heat Exchanger cooling and reset and restart CAS compressors A and B
BOOTH OPERATOR: When directed and after appropriate time delay, place firewater on CAS and reset and restart the CAS compressors and report results to control room		
COMMENTS:		

Event No. 7		
Description: LOCA (on a 120 sec. TD); Drywell Floor Failure; RHR-P-2A Breaker Fails to Close This event is initiated from trigger 3 which has already been activated		
Time	**Position**	**Applicants Actions or Behavior**
T = 55	BOP	Reports Drywell Pressure rising and at 1.68 psig reports EOP entry into PPM 5.2.1 (reports others as they occur – SP/T, SP/L, DW/T)
	SRO	Directs actuations for 1.68 psig DW/P be verified
	BOP	Verifies actuations for 1.68 psig and notes RHR-P-2A is not running Attempts to manually close RHR-P-2A breaker and notes it does not close Reports 1.68 actuation findings to CRS
	BOP	Observes that Wetwell and Drywell pressures are approximately the same and informs the CRS Reports Wetwell pressure when GT 2 psig
	SRO	Directs Wetwell Sprays be initiated with RHR-P-2B May direct SP Cooling be initiated Directs sprays be terminated when WW/P drops below 1.68 psig
	BOP	Initiates Wetwell sprays using quick card and opens RHR-V-27B Initiates Suppression Pool Cooling using quick card if directed Reports Wetwell sprays initiated
COMMENTS:		

Event No. 8		
Description: Inability to Spray Drywell This event is initiated from trigger 3 which has already been activated		
Time	**Position**	**Applicants Actions or Behavior**
T = 65	BOP	Reports Drywell Temperature as it approaches 285°F (It takes 6 minutes to reach 285°F after trigger 3 is initiated)
	SRO	Ensures parameters are within DSIL, WW/L LT 51', RRC pumps are stopped and directs Drywell Cooling Fans be secured
	ATC/BOP	Stops Drywell Cooling Fans and reports completion to CRS
	SRO	Directs Drywell sprays be initiated with RHR-P-2B
	BOP	Using quick card, verifies within DSIL and opens RHR-V-17B and attempts to open RHR-V-16B Notes and reports that RHR-V-16B will not open with C/S was turned to start
	SRO	May contact Production/Work Control/OPS1/OPS2 to manually open RHR-V-16B
ROLEPLAY: If asked to manually open RHR-V-16B wait 10 minutes and inform the Control Room that it will not open		
	SRO	Sets Drywell Temperature as a KEY parameters due to inability to spray drywell
	ATC/BOP	Reports Drywell temperature as it rises towards 330°F Reports trend of parameters as it approaches PSP limits
COMMENTS:		

Event No. 9		
Description: EMERGENCY DEPRESSURIZATION when Drywell Temperature reaches 330°F (It takes 10 minutes to get to 330°F from trigger 3 initiation) This event is initiated when it is determined that Drywell Temperature cannot be restored and maintained LT 330°F		
Time	**Position**	**Applicants Actions or Behavior**
Critical step is to initiate an EMERGENCY DEPRESSURIZATION when drywell Temperature cannot be restored and maintained LT 330°F		
T = 60	BOP	Reports Drywell Temperature as it approaches 330°F
	SRO	When Drywell Temperature cannot be restored and maintained below 330°F, determines that an Emergency Depressurization is required: Takes PPM 5.1.1override to PPM 5.1.3, Emergency RPV Depressurization
	ATC/BOP	Stops ECCS injection as necessary to maintain RPV level Directs ECCS pumps not required for adequate core cooling be stopped from injecting
	SRO	Requests Wetwell Level and when reported GT 17 foot, directs seven SRVs, ADS preferred, be opened
	ATC/BOP	Opens seven ADS SRVs as directed and reports completion to CRS

	SRO	Directs RPV/L maintenance +13 inches to +54 inches.
Termination Cue: The scenario can be terminated when the reactor has been Emergency Depressurized and RPV level is under control in the band of +13 inches to +54 inches or as directed by the scenario coordinator		
COMMENTS:		

TURNOVER INFORMATION

Initial conditions: Reactor Power is 90%. Power was reduced due to CW-P-1C not being available. The work on CW-P-1C has just been completed.

Turnover: Start CW-P-1C. After the pump start, raise reactor power with Flow to 95% power. The reactivity brief has been performed. At that time stop the power increase and perform OSP-CRD-W701, Control Rod Exercise of Fully Withdrawn Rods (MODE 1) starting with rod 18-59 and working across from left to right and then from top to bottom until all fully withdrawn control rods have been exercised. After CW-P-1C is started perform the Standby Gas Treatment B System Monthly Operability surveillance, OSP-SGT-M702.

SIMULATOR SETUP INSTRUCTIONS

Reset to IC 219
Set up earthquake machine on lowest volume and paused
Ensure all events and schedules windows are closed
Place Simulator in Run
Open Schedule window and open LO001679
Open Director file

SCHEDULE

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<!-- This file contains a Thunder Simulations Schedule -->
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      <ITEM row = 1>
            <TIME>0</TIME>
            <ACTION>Insert malfunction MAL-RMC006-2259</ACTION>
            <DESCRIPTION>ROD 2259 UNCOUPLED</DESCRIPTION>
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            <ACTION>Insert malfunction BKR-RHR001 to FA_AS_IS</ACTION>
            <DESCRIPTION>RHR-P-2A Breaker Fails As Is</DESCRIPTION>
      </ITEM>

      <ITEM row = 3>
            <TIME>0</TIME>
            <ACTION>Insert malfunction MOV-RHR009F to FAIL_AS_IS</ACTION>
            <DESCRIPTION>RHR-V-16B Fails closed</DESCRIPTION>
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            <ACTION>Insert malfunction CNH-SCN007A on event 1</ACTION>
            <DESCRIPTION>SGT-DPIC-1B2 FAN 1B-2 FLOW CONTROLLER FAIL AS IS</DESCRIPTION>
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            <DESCRIPTION>Minimum Seismic EQ</DESCRIPTION>
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            <ACTION>Insert malfunction MAL-CFW003 to 2400 in 600 on event 2</ACTION>
            <DESCRIPTION>CONDENSER AIR LEAK</DESCRIPTION>
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            <ACTION>Insert malfunction MAL-RWB001 to 0.2 on event 3</ACTION>
            <DESCRIPTION>EARTHQUAKE</DESCRIPTION>
      </ITEM>

      <ITEM row = 11>
            <TIME>0</TIME>
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            <DESCRIPTION>LOCKOUT TR-S 10 seconds after OBE</DESCRIPTION>
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            <DESCRIPTION>LOCKOUT TR-B 120 seconds after OBE</DESCRIPTION>
      </ITEM>

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            <EVENT>3</EVENT>
            <ACTION>Insert malfunction MAL-PCN006 on event 3</ACTION>
            <DESCRIPTION>Drywell Floor Failure</DESCRIPTION>
      </ITEM>

      <ITEM row = 14>
            <TIME>0</TIME>
            <EVENT>3</EVENT>
            <ACTION>Insert malfunction MAL-RRS009A after 120 to 500000 in 1200 on event
3</ACTION>
            <DESCRIPTION>Steam Line break in Drywell 2 minutes after OBE</DESCRIPTION>
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</SCHEDULE>
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